

# HI-FI CHOICE

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

NOVEMBER 1990 £2.95

## CD players

FULL TESTS ON 22 OF THE LATEST CD PLAYERS

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A CHOICE GUIDE TO THE BEST IN HEAVY ROCK CDs

OVER

## 950 Test Summaries

IN THE CHOICE BUYER'S GUIDE



ISSN 0955-1115



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

# HI-FI CHOICE

ISSUE NUMBER 88: NOVEMBER 1990

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**PPA**

# Menu

**A**s we preach in *Hi-Fi Choice* month in month out, choosing hi-fi products to suit your needs is never an easy task. Reviewing products is fraught with problems too: while our reviewer might like the sound of a particular component in his system at home, is this any guarantee that you'll like its sound in your system?

Wherever possible we conduct 'blind' listening tests as part of the *Hi-Fi Choice* review methodology, so that our reports on products are more a consensus of opinion rather than simply one person's view. Nevertheless, when it comes to making up your mind what to buy, there's no substitute for listening for yourself - to ensure that you're getting exactly what you're looking for in a system. Which is where specialist hi-fi dealers come in.

The British Audio Dealers Association (BADA) has done much to improve retailing standards in the UK, ensuring that customers are given good demonstrations of products and that sales are adequately supported with proper guarantees and good back-up services. Currently over 100 UK hi-fi dealers are members of the Association, and each year all the staff working in these shops are invited to vote for what they consider to be the most professional suppliers of products, most reliable brands, best company representatives, etc, etc. Needless to say we are absolutely delighted to be able to report that at this year's BADA awards *Hi-Fi Choice* was voted **Favourite Hi-Fi Magazine**. We know from our high sales figures that many thousands of you appreciate that *Choice* is a great monthly read, but it's certainly nice to know that our efforts to produce a high quality magazine have not gone unnoticed elsewhere in the British hi-fi industry!

While we would advocate that buying 'separates' is the only path to true high fidelity in the home, we can appreciate that for many music listeners a midi system is the only option - whether it be for price or space considerations. Not all midi systems are made equal, consequently we've set Alvin Gold the task of testing 15 systems for next month's issue. Don't despair if your hi-fi aspirations are set somewhat higher than a midi system; December's *Choice* will be chock-full of our usual features to whet your appetite and will also include a **FREE** cover-mounted **C90** chrome tape from **Memorex**. Be sure not to miss out!

*John Bamford*



*Cover photograph  
by Chris  
Richardson*

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In Statements this month, the gorgeous Morch tonearm – an analogue delight.



Continuing the hows and wherefores of vacuum tubes in All That Glows . . . II.

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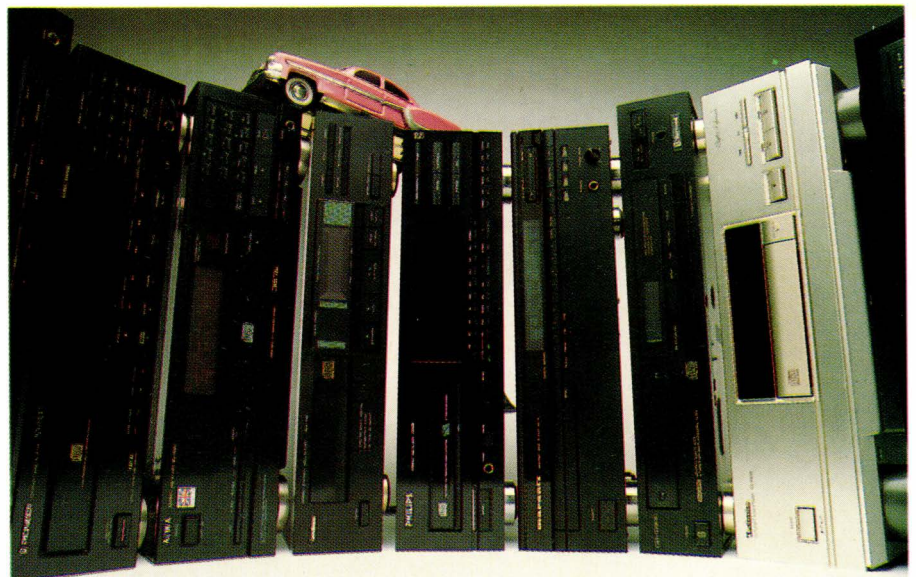
which is still available; see the back issues column for clues on which issue contains the full review.

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### COMING UP

The December issue will be jam packed with audio for the people; yep, it's midi system time again. Alvin has been assessing 15 new systems, there'll be a **FREE** cassette tape with the issue, a chrome C90 from **Memorex**, and this is the month when the *Collection* hits the streets. On November 23rd *Choice's*



CD players lined-up for this month's Choice tests. Which models made the grade?

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CDX-530E  
HI-BIT CD PLAYER

“What the Yamaha CDX-530E does so convincingly where other budget models tend to fail, is to produce a sound that reproduces the dynamics of real music” . . . “It is a first class performance at a very low price.”

Graham Mayor, 'Which CD' – May 1990

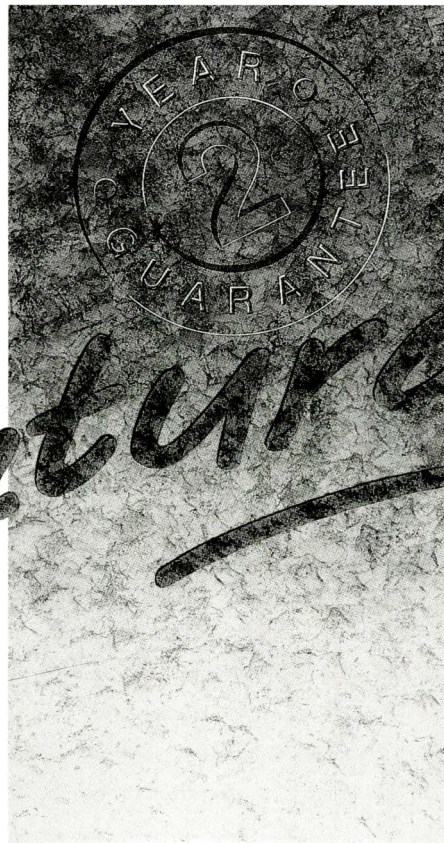


CDX-730E  
HI-BIT CD PLAYER

“The Yamaha CDX-730E has a crisp, well-defined sound that emphasises transients well and which consequently portrays tonal colours boldly and styles of placing with force and vigour.”

Alvin Gold, 'High Fidelity' – June 1990

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Many Yamaha Hi-Fi system components feature RS Integrated Remote Control compatibility



# Update

## PRODUCTS

### A listenable bank?

Nakamichi has unveiled its new *Music Bank* system. The 'system' revamps Nakamichi's entire range of hi-fi separates with two cassette decks, three CD players, three receivers and a brace of amplifiers. The company has relaunched an entire product line because it considers its research and development of digital-to-analogue conversion techniques, CD player mechanisms and amplifier circuitry has moved far enough forward to warrant such a sweeping move.

The range gets its *Music Bank* name from the two more expensive CD players - the '2' and '3' which feature multi disc changers capable of holding up to six CDs each in an internal bank loaded one at a time into the drawer mechanism. The £599 *CD Player 2* is a 20-bit 8 times oversampling model while the *CD Player 3* and *CD Player 4*, at £449 and £299 respectively employ 18-bit 8 times oversampling DACs. All three players include remote controls.

The range now offers two cassette decks, simply named *Cassette Deck 1* and '2', priced £599 and £299. The more expensive model is a three head machine while the *Cassette Deck 2* has two heads. Other features are as one might expect from this cassette deck specialist, including an all-mechanical



*And you thought cassette decks weren't sexy? Nakamichi proves otherwise. . .*

azimuth control for fine adjustment with different tape types. The new receivers are priced between £299 and £799 according to features and power ratings. They all use isolated ground topology and multi regulated power supplies and are remote controlled. The more expensive model is suitable for multi room applications.

Nakamichi also offers two amplifiers (£299 and £599) for those who don't want the built in tuner facility offered by a receiver.

### Tuned in

One of the few tuners launched at this year's Penta hi-fi show was the £139 RT-845L from Rotel. Described

as a high performance model, the all digital tuner offers FM, long and medium waves with automatic or manual tuning and 20 programmable presets for your favourite stations. Excellent sensitivity and selectivity between signals and a high performance stereo decoder are claimed as the tuner's major strengths.

Also due for launch from Rotel is a new 'high performance' range of separates - yet to be officially named - which includes a power amplifier, line level preamplifier and dedicated phono equaliser for vinyl buffs. Offering just the bare essential controls, these up-market separates are attractively housed in gun metal grey fronted cabinets with highly lacquered wooden end cheeks. Prices are yet to be announced.

### Sound of silver

High quality bookshelf loudspeakers were prevalent at this year's Penta hi-fi show. Meridian launched three models in a new series of upmarket designs dubbed *Argent*.

The *Argent 1* bookshelf model costs £1,150 and bears a striking resemblance to the 'satellite' unit on Meridian's

£10,000 *Series 6000* active speaker system. Finished in four coats of high gloss lacquer it is a bi-wireable two-way design using a new aluminium dome tweeter with the voice coil wound in silver wire. *Argent 2* and *3* cost £995 and £1,695 respectively. The less expensive is a two-way shelf-cum-stand option although the makers say free space siting is preferable. Again it is bi-wireable with such niceties as gold-plated binding posts. The '3' is an elegant metre-high floor standing model described as 'genuinely three way' with four drivers, two of them specially made 170mm bass units operating in parallel. The midrange uses a 170mm polymer cone while the tweeter is another 25mm silver wired voice coil number from Meridian's Boothroyd-Stuart design team.

### Thorens takes on the big boys

Following closely in the footsteps of its new high-end stablemate the *TD 2001*, Thorens has launched the *TD 3001*, a £650 motor unit which is designed to take on the likes of Linn and Roksan



*No more Mr Nice Guy, Rotel goes for the high-end jugular.*

turntables. In this respect Thorens has taken the design and engineering of the 3001 very seriously, the main bearing being made of Widia precision steel and toleranced (we're told) to a higher standard than the bearings found on a Linn or a Rega. It utilises a 24 pole synchronous motor driven by a two phase generator, the platter is a two piece design made of Zamak and the suspension uses damped leaf springs for isolation.

Unlike the TD 2001, this top of the UK range model has a detachable Medite armboard that can be cut for virtually any commercially available arm, exceptions being things like parallel trackers and 12inch designs. We'll be asking for one to review in our February '91 issue - so stay tuned.

## Finestra winners

Lucky winners of our Finestra competition in August have been chosen from the bulging bag of entries we received. The Finestra preamp itself, with a Pandora mains purifier goes to Mr R Glew, of Milton Keynes. Runner-up prizes of Pandora mains cleaners go to Les Sergeant of Chandlers Ford, Hants, Ian Bedford from Preston in Lancs and Jim Allison from Aberdeen.

Many thanks to all those who took part. The correct answers to our quiz were as follows: Tom Evans, Linx, Stilton, IO Limited, Monitor Audio and Tom Fletcher.



Finestra prizes: how did you get on with our August quiz?

## KEF babies

KEF's new Reference Series models 101/2 and 102/2 represent a change of philosophy from the makers by opting for bass alignment that is optimised when the speakers are placed near to a rear wall. As a result neither model needs the Kube pre-equalisation of their predecessors in the range. Priced at £450 for the 101/2 and £650 for the 102/2 these are upmarket 'bookshelf' designs built to the very highest standards. 101/2 is a two-way model based on a 160mm Uni-Q driver (with a 19mm tweeter), while 102/2 hides an extra coupled-cavity bass driver within the box.



KEF 102/2 making good sounds at its Penta launch.

## Alphason gets integrated

Turntable, amplifier and loudspeaker manufacturer Alphason Designs has



TD 3001: Thorens gets serious with a high-end contender.

launched an integrated amplifier to complement its existing pre/power combo. Named Apollo the £325 amplifier is a minimalist design in the company's strict audiophile tradition. However, while it is purist in function it allows up to seven inputs with dedicated TV and video sockets - switchable from the front panel. It also boasts a 'specialised' phono input (for MM or MC cartridges) with its own power supply and uses HEXFET output devices which are claimed to give superlative handling of musical transients.

## BUSINESS

### Polly Peck at Mission

Mission International has been bought by Sansui of Japan, which is itself 72 per cent owned by the food and electronics giant Polly Peck. The move results in a new company - Sansui Mission - with both Mission and Cyrus brands wholly owned by Sansui. The company's base will be at Mission's existing headquarters in Huntingdon where both the factory and its machinery were bought as part of the deal. Mission's managing director, Farad Azima, now becomes the new company's chief executive, and all the employees have been retained.

The takeover has apparently delighted Mission executives, as there have recently been some long faces over Darius - the firm's ailing Vancouver-based computer business. Darius was recently sold with Mission becoming solely an audio concern. A jubilant spokesman for Mission,

preferring to call the takeover a merger, told *Choice*: "We built Mission into a number one manufacturer using petty cash, and now we have unlimited resources - so there's no stopping us." Expect soon to see Sansui systems being marketed with Mission loudspeakers. The Cyrus range, however, will remain a separate marketing concern with its own identity.

### Favourite Choice

*Hi-Fi Choice* has been voted **Favourite hi-fi magazine** by the British Audio Dealers Association (BADA). The award was presented along with other winners when the association held its annual 'Badaday', at Stratford Upon Avon in September.

BADA's Industry Personality of the Year award was collected by Ivor Tiefenbrun, whose company Linn Products of Glasgow picked up no less than five other awards for reliability, source product, professional supply, marketing backup

BRITISH AUDIO DEALERS ASSOCIATION



and advertisements. BADA also recognised Mission Electronics (best service department), Rotel (best company reps) and Arcam for its *Alpha* amplifier. Favourite hi-fi journalist was Ken Kessler - who is frantically working on our high-end *Collection* issue as we write. BADA Trainee of the Year was Sarah Randall, of Reading Hi-Fi.

## DAT goes domestic

This month Sony formally launched its DTC-55ES DAT recorder at £550. This, Sony's first domestically oriented machine, features SCMS (serial copy management system) anti-piracy protection circuits designed to keep the music biz at bay.

A number of other Japanese brands are jumping on board to give the bandwagon extra credibility. At the Penta hi-fi show Denon showed its DTR-2000 priced at £799. Kenwood expects its full size component recorder to cost £699, and also has a tiny little portable - a concert recordist's dream, significantly smaller than a Pro Walkman - and Marantz is still making up its mind about a price for the DT-80.

Whilst waiting in the wings, selling only in small quantities primarily to professional users, DAT hasn't wasted the last few years. Chip reduction has been the name of the game; Sony's development of two key LSIs - the CXD2601 PCM signal processor and CXP-80524 control CPU - is one reason why the DTC-55ES is much cheaper than its semi-Pro predecessors.

Another may be the fear that if DAT doesn't get established soon, it may miss the boat entirely. Despite plans to add in-car and portable machinery, there's no sign of any real initiative on pre-recorded music, which guarantees that it will take years to build up real mass market momentum.

Despite introducing the SCMS concept, Philips appears to have foresaken R-

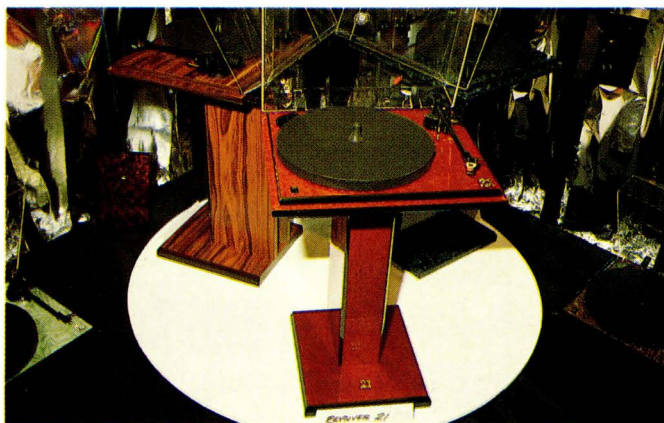


The latest Meridian transport (602) and DAC/preamp (603).

DAT completely and is about to plough its own DCC (digital compact cassette) furrow. An announcement is expected soon, and thus far the technology is entirely unproven. Much will depend on when and which way Matsushita moves.

such as Technics, Quad, Naim and Roksan.

But the absence of a few can't detract from Penta's primary role as the international shop window for British specialist hi-fi, as well as the best opportunity of the year for British



The Revolver comes of age: the 21 includes a matching stand.

## SHOW REPORT

*Paul Messenger and Jason Kennedy report from this year's Heathrow Penta hi-fi exhibition...*

With every succeeding year, the Hi-fi News sponsored Penta show threatens to burst the seams of said Heathrow hotel. Indeed the limited number of decent sized demonstration rooms is at least one reason for the absence of important brands

punters (and even overseas enthusiasts) to catch up on the latest in hi-fi, from the consumer electronics mainstream to the tweekiest of lunatic fringes.

CD is still the big industry moneyspinner, so it's good that specialist companies like Meridian, Micromega, Arcam and many more are now getting firmly to grips with the new technology, their products emphasising that CD players are not all created equal and that the

## In Brief

The music and hi-fi society Analogue Addicts is now up and running. AA aims to bring enthusiasts together both informally and through a quarterly newsletter. Membership costs £7.50 a year. AA Box 33, 22 High Street, Keighley, W Yorks. BD21 2AA.

Richer Sounds, the chain of discount hi-fi shops, has a new store - at 258A Fulham Road, W London.

Bishops Stortford based dealer the Audiophile has extended its operation to St. Ives. The new Audio File will no doubt offer the same high standard of service and equipment as its Hertfordshire neighbour and can be found at 2 Foundry Walk, Market Hill, St Ives. Tel: (0480) 66123.

Audiokits has a new 1990 catalogue. Items include amplifier kit details, high spec audio components and technical literature. The free catalogue is available if you send a large SAE to Audiokits, 6 Mill Close, Borrowash, Derby DE7 3GU.

Both branches of Le Set - the stylish West End hi-fi retailer - have closed following a decision by the backer Thorn EMI. The B&O shop, in South Molton St, which was run by Le Set staff is not affected. Elsewhere Playback - the tape specialist in Percy St, W1 - also closed in July reflecting a downturn in the audio trade which some sources put at 20%.

Zeus Audio has a new branch, in Coleraine, N Ireland, which extends the Zeus chain to three outlets. The new Zeus in Kingsgate Street will offer the same brands and expertise as the Belfast and Donaghmore shops. Tel: (0265) 56634.



All aboard the DAT bandwagon, Sony starts the ball rolling with its £550 DTC-55ES.



**A NEW LOOK**

**A NEW SOUND**

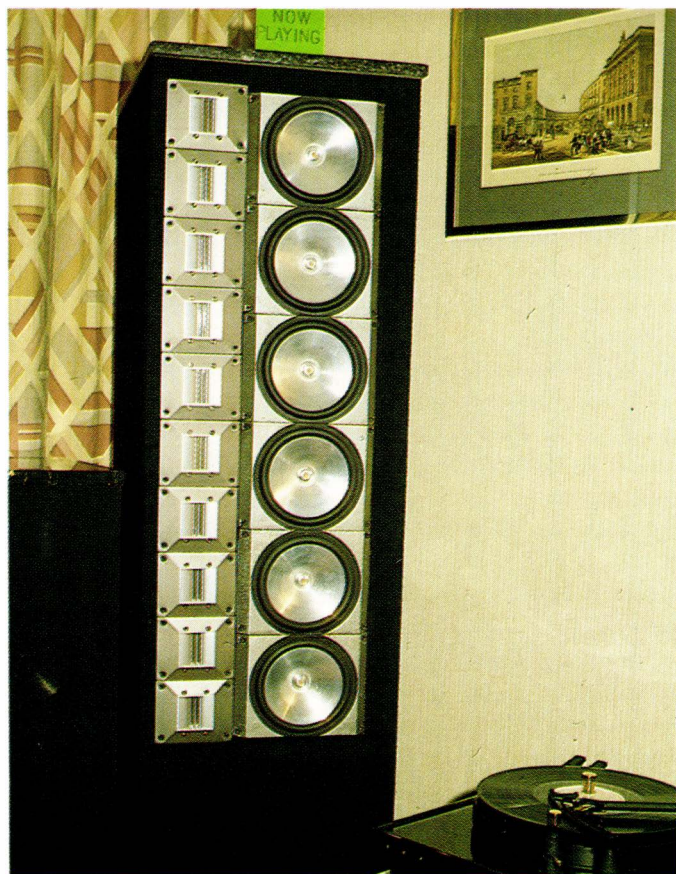
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Still no sign of the round table - but Sir Galahad's arrived.

smaller enthusiast brands have plenty to offer. Meridian came up with a new range of players and DACs dubbed the 600 series as well as giving the first British airing of its *Series 6000* active loudspeakers with digital crossovers on board. Not content with leading the digital field, Meridian also showed a new range of three loudspeakers called *Argent*, the '1' looking almost exactly like the satellite units on the aforementioned 6000.

We may now be in the digital audio age, but Penta provided plenty of evidence that old technologies don't necessarily fade away. The valve amplifier hasn't been as healthy for more than twenty years, and plenty of rooms were happily suffering the inconvenience of vinyl turntables in order to deliver better demonstrations than their all-digital neighbours. Having said that, Deltec, with a new preamp and two new DACs, including the £299 *Little Bit* which uses the latest PDM chips, weren't doing too badly.

One conspicuous worry that regularly surfaced during trade day bar-chatter concerned the continuing availability of the vinyl disc

itself, since few record retailers have the same sentimental attachment as the hi-fi enthusiast. Chances are we'll soon start buying our vinyl from the hi-fi rather than record shop: Linn Products has plans to organise top quality releases via its established worldwide hi-fi distribution.

## DAT's domestic debut

From a global consumer electronics perspective, Penta 1990 was the event at which Sony formally launched DAT as a consumer product in Europe, pre-empting the 'official' Euro-rollout scheduled for Paris a fortnight later.

Sony started the domestic DAT ball rolling in the USA a couple of months ago, relying on the incorporation of SCMS (serial copy management system) circuitry to forestall the litigious threats of an American music biz.

The copyright issue is still in the pending tray, but Sony is going for it, in Europe as well as the US, the new full feature *DTC-55ES* recorder selling at a surprisingly competitive £549 - £50 less than the company's flagship

*TCK-950ES* cassette deck! See this month's news story for more DAT business.

## Titanium or champagne?

Beyond the DAT launch, Japanese brands seemed rather short on ideas, though a number are now reintroducing brightwork finish of one sort or another, usually in order to distinguish specific upmarket models or ranges. Both Sony and Rotel are offering their most expensive models in variations on this theme.

Denon launched its first lifestyle oriented product, the *NS1*, this consisting of three titanium clad boxes (receiver, CD and cassette) with fairly plain fascias and full logic operation. The price of this overtly user friendly and attractive combo is £799.

## Specialist specials

Most ambitious launch amongst the bigger specialist brands came from Musical Fidelity's proprietor Antony Michaelson who introduced the visually stunning *Chronos* valve four-box pre and power amplifiers, under the Michaelson Audio banner. Totally rejecting the pseudo-Pro look of flat fronts and grab handles, *Chronos* is a beautiful and expensively die-cast creation in the elegant art deco idiom. Assembly will be carried out in the USA, where most of the customers for £10,000 worth of amplification presumably live. Another stylish product was a remote control amplifier from newcomer AV International.

Designed by ex-Kelvin Labs man Martin Grindrod, the £1,900 amp is pretty much a top of the range Kelvin pre/power combo in a 'lifestyle' case and with remote control too. A matching CD player and tuner are on their way.

Much less attractive to look at, but much more commercially significant - and just as big a change of direction - in the UK is Linn's 'black box' offensive. The c£500 *Lingo LP12* turntable drive is bound to be the hit product of the 1990 season (see *Sessions*), while *Spark* and *Dirak* provide extra upgrade urge and speed for Linn's separate power and preamplifier respectively.

Designer Max Townshend has clearly been working hard since setting up a new manufacturing base in Malta earlier this year. The *Glastonbury II* loudspeaker now has a slightly cheaper brother, the £1,495 *Glastonbury Tor*, Townshend also exhibiting two marble-clad models, the *AMTM* (£995) and *Marble AMT* (£1,795 inc brass-legged stand). And show visitors were gob-smacked at the sight of the awesome *Sir Galahads* (price on application - circa £7,000!) standing 6ft tall and employing no less than six Jordan drive units and ten leaf tweeters per enclosure. Sensitivity is claimed to be 97dB, power handling 600W and bandwidth 15Hz - 50kHz!

Building on the success of the metal cone *Studio 10*, Monitor Audio introduced the £1,500 *Studio 15* and £1,800 *Studio 20*, with similar drivers but progressively larger boxes. The '20 is



Tube power amplification with style from Michaelson Audio.

available in the same wide range of veneers as the 10, while the 15 is only supplied in 'audiophile black', albeit with nicely radiused edging. The arrival of a new Castle loudspeaker is an altogether rarer event, and on this occasion two larger models update and extend the top end of this company's range. The *Windsor* is a conventional enough large reflex in the *Conway* tradition, but the £1,250 *Winchester* is something completely different - a large floorstanding Colin Walker design featuring quarter wave loading on two mutually perpendicular bass/mid drivers (one firing upwards). Both were driven by a new line preamp (£1,500) and monobloks from JDI.

Ruark is looking at nearly the same price for its pretty new £1,300 *Crusader*, a slim floorstanding three way featuring a large dome midrange driver and a natty line in baffle edge bevelling, while combining with Exposure to create an active system based on the smaller *Talisman*. Elsewhere, Exposure Electronics was

demonstrating its brand new 14 dual-mono preamp featuring dedicated RIAA sections for both the MM and MC inputs, four on-board supplies per channel and balanced outputs.

Somewhat more affordable is the new loudspeaker from Creek, the *CLS20* (£200). And Epos has a new plastic baffled baby called the *ES11* (£300).

## The Viking invasion

The most unconventional of all the new upmarket loudspeakers came from Dali - one of several brands at Penta which confirm Denmark's increasing importance in specialist hi-fi and audio. The £1,200 *Skyline* is nothing less than a stylish full height, full range (3-way) dipole, using a 15inch bass driver and a 40inch long treble ribbon. It was making some very nice music on the end of one of the biggest power amplifiers anyone had ever seen. The smaller models look pretty interesting too, and UK distribution is just getting under way.



More metal music from Monitor Audio: the new Studio 20.

Compatriot Jamo has also recently set up a UK subsidiary. The complete range is an intimidating sight - a tribute to the concept of niche marketing. Nearly forty models are listed, subdivided into no fewer than fifteen distinct ranges, including 'monimialist' sub-and-satellite three box systems for around £200. Finding the genuine hi-fi variations is far from easy, but they do exist and are as carefully executed and competitively priced as the rest of the lineup.

Talking of Danish products, Ortofon revealed a forthcoming *MC5000* cartridge (£1,500) which advances on its current '3000' flagship MC; this could be heard playing in a Pink Triangle *PT TOO Anniversary* which features a subchassis-mounted DC motor. In the same room, PT was showing its new *Aether* tuner (circa £425) and a more affordable version of the highly-regarded *PIP II* preamplifier called *PiPiT* (£1,150).

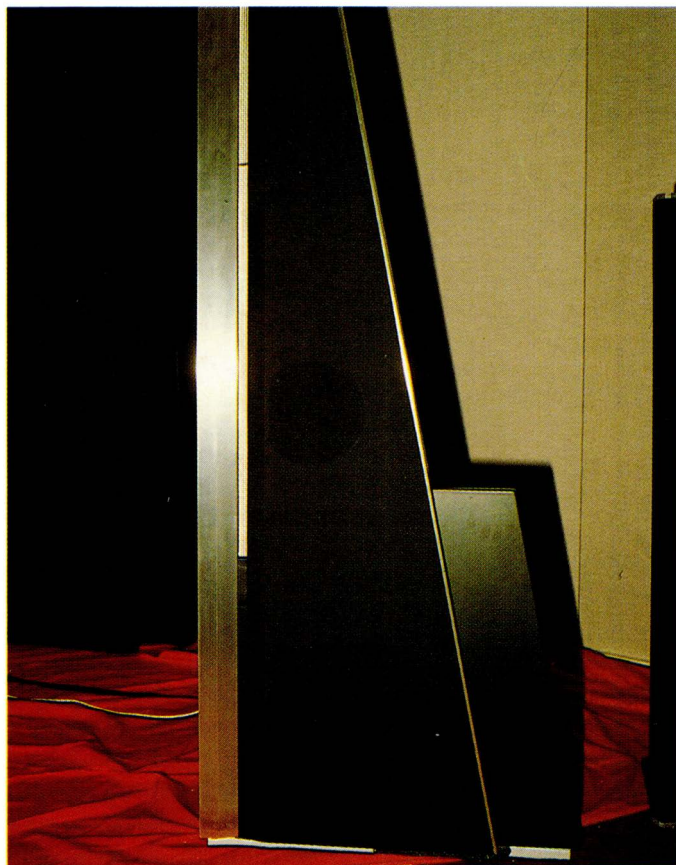
## All that glistens

Gilding is one way to make sure a product stands out from the herd, though it's a moot point whether any assistance was necessary

with something as unusual as the little Bandor 'full range' metal driver, which not only looks good but hunts in packs (and costs a packet).

At least five brands are now using these units in a wide variety of configurations, but the fact that three (*Seventh Veil*, *Pentachord* and *Nefer*) exhibited under Bandor's wing only seems to prove that old adage: three's a crowd, especially when the three are loudspeaker designers and the room is in the Penta hotel. A fourth example - perhaps more compromised but also more practical - from John Jeffries' Reference Imports was making good use of a room to itself down the corridor. But then again it did have the benefit of megabuck amplification from CAT (Convergent Audio Technology) and NRG with the well tasty Zarathustra turntable. More good sounds were emanating from the Welsh Esoteric Audio room, where some Infinity-esque speakers in superb veneers were doing their stuff.

The rise and rise of the standalone phono stage continued at the show, including a valve design from a new company called



Dali's £1,200 hybrid speaker, a nice bit of Danish exotica.

Rothwell Electronics, two models from Oxford Acoustics and many more. But come to think of it, the sensible place for the equalisation and boosting circuitry needed for a pickup cartridge isn't in the amplifier at all. The turntable itself is the logical choice, as Oxford Acoustics' new £1,495 *Crystelle II* illustrates. This company has been particularly busy of late, taking on distribution of BBAP (Bill Beard Audio Products), Vecteur amps and RAM loudspeakers. There wasn't quite as much agency swapping as last year, thank the Lord - but Revolver gained French amplifiers YBA and gave birth to a £499 turntable called *21*, Audiofreaks are the proud distributors of Camber speakers and Nestorovic (very nice American tube power amps), whilst Kelvin has taken on a range of German speakers called KAL.

Absolute Sounds had the usual mouth watering collection of new introductions, including Apogee's tiniest and cheapest ribbon speaker yet.

New Krell power amplifiers include a tiniest yet too, alongside a couple of behemoths, while the editor can't wait to get his hands on a thermionic active filter unit from Audio Research. The AS dems were well up to standard, aided perhaps by the fact that every bit of gear seemed to have its own Mana support!

Another interesting arrival was that of the Museatex *Melior One*. This attractively proportioned panel speaker is the latest incarnation of what was the Sumo *Aria*, its makers Highwood Audio having left that particular amp maker to join forces with another - Museatex - whose products will soon be available from a new distributor.

## Bits and pieces

From the sublime to the prosaic but practical, QED has adapted its round-the-house *Systemline* technology to a simpler, less costly and less ambitious *Roomlink* package. Starting with a single and relatively inexpensive extension, additional rooms may be

added one at a time as a funds permit. *Roomlink's* practical step-by-step approach should certainly widen the appeal of integrated home entertainment.

Ariston showed a new range of full width separates. Called *Maxim*, it includes a 16-bit CD player, 16 preset tuner and a 60W amplifier, all remote controlled and built to that company's sturdy standards. NVA was playing a couple of new integrated amps starting at £225 along with a smaller cubic speaker that's also relatively affordable.

Harman/Kardon meanwhile was the only exhibitor playing cassette tapes through £20,000 speakers! The cassette decks - 4600 (£599) and 4800 (£999) - are the first Dolby S models to hit these shores; the speakers are the massive JBL K2s - serious stuff indeed!

There were of course plenty more goodies singing away. It took a good two days to work one's way around all the rooms, so we couldn't hope to mention everyone in these few pages. But at least we've given a flavour of what was indeed a great hi-fi show.



*Tube Technology's Unisis integrated amp: £1,100 to you, sir.*



*Variety was, as usual, the spice of the Electroactivity room.*



*The Oxford Crystelle II complete with onboard phono stage.*



*Two thirds of Ariston's new Maxim range of separates.*

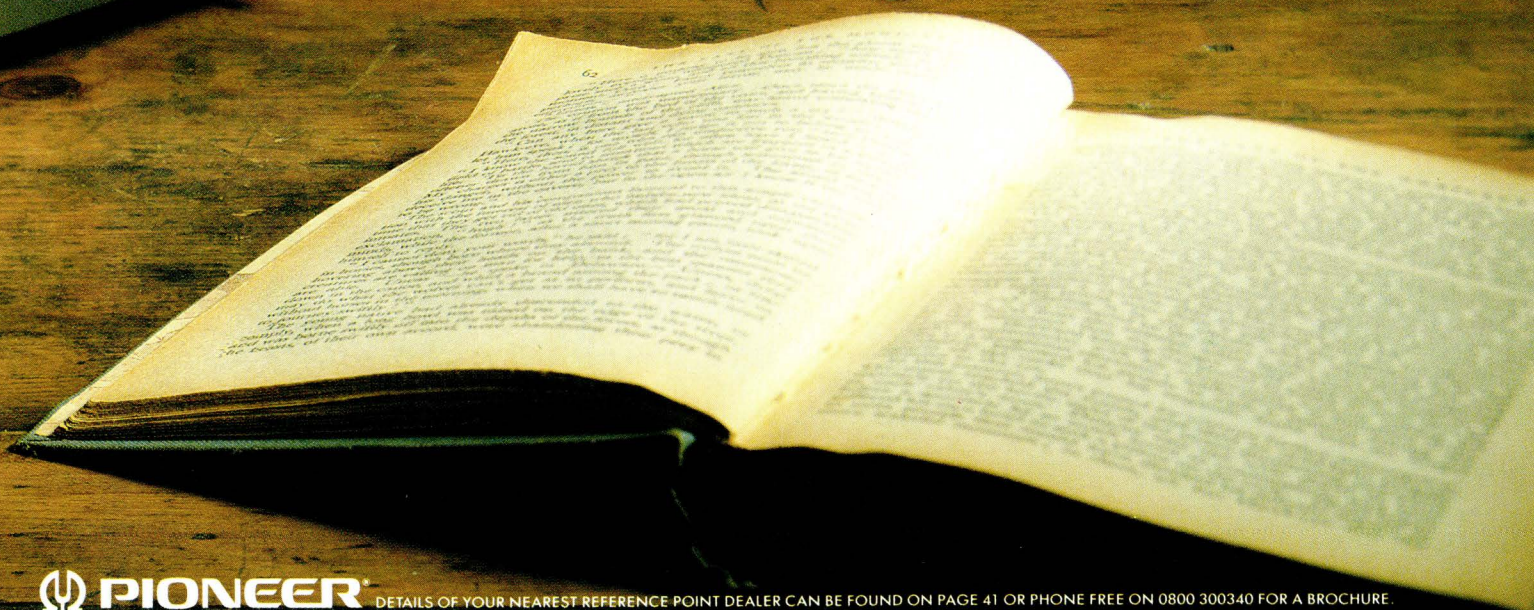


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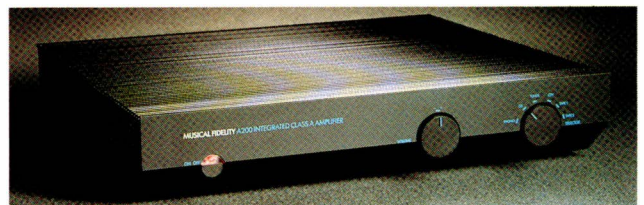
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### Three of the best

Roy Gregory discovers that inexpensive loudspeakers have much to offer. He's been listening to the KEF C15, JPW Sonata and Celestion '3.

The emergence of the Celestion 3 in 1988 heralded a resurgence of interest in £100 loudspeakers. Yet no clear favourite model has emerged at this 'sharp end' of the market. Whilst the Celestion's reputation has held firm, others have drawn attention to the virtues of JPW's Sonata and, latterly, KEF's C15 (something of a late starter, having been around for nearly as long as the Celestion). Particularly intriguing is the fact that each of these three models adopts a rather different approach to the problem of squeezing a good performance out of a small (and cheap) box.

The dogmatists out there are now rubbing their hands in glee. At last, someone is going to come up with a 'best', a definitive judgement! Er, wrong. The notion that a recipe of specific ingredients will render a winning result has been proved wrong time and again. And the fact is that all three speakers are excellent. However, each has a definite character or set of virtues, and circumstances in which it can best be exploited.

So, where will these speakers work best? And who will they appeal to? Well, before getting into that, let's look at how they differ. Starting with the Celestion 3, we find a largish box (for the price), vinyl wrapped with a moulded plastics baffle trim and a smallish (120mm) bass mid-driver paired with the familiar 25mm aluminium dome tweeter first seen in Celestion's DL series. This gives us the clue to the thinking behind the '3, which is very much a down-sizing exercise. The tweeter, which accounts for much of the cost, has been paired with a simple pulp cone bass unit. The whole has been aligned for near wall placement to help bass weight. Cabinet finish is best described as adequate, while the rest of the components, (terminals, crossover) all suffer in the cost equation. This is not necessarily a bad thing, but by electing to use an existing and comparatively expensive tweeter, the designer has had to accept compromises in construction, particularly in the box which is basic 12mm chipboard.

The JPW Sonata is a stark contrast to



the '3. Even the most cursory examination shows that most of the budget has gone on the cabinet. Basic drivers are wired together with a simple three element crossover in the traditional style. The box, on the other hand, is a bit special. It's coated with real tree, which is unusual (to say the least) at £100. Squatter than the Celestion 3, it is nicely finished and really looks the part. Under the skin there's more. The veneer adds rigidity to the cabinet in a way that a vinyl wrap won't – and the carcass is 15mm MDF, not chipboard. The drivers may be straightforward (a pressed steel basket on the bass, and a Tonegon 19mm soft dome) but what appear to be crosshead screws are actually bolts holding the drivers securely in place.

Finally, the KEF C15. This features an off-the-shelf metal tweeter with a small 19mm dome, the wide pleated surround actually resulting in a 25mm radiating area but a far stiffer overall structure than a conventional dome. The bass unit is also slightly unusual, especially in a speaker of this size and price. Although

**Three of the best at around £100: JPW Sonata, KEF C15 and – on top – Celestion's '3.**

small (around 100mm) it is built on a substantial cast chassis, and is mounted by no less than six bolts. The very small cabinet (smaller than an LS3/5a) is built of 15mm chipboard and has some rather nice gold plated terminals on the back. Finish is Henry Ford, and vinyl while the whole is laced together by a complex little crossover, a definite no-no for speakers which are after street cred.

Rather than relying on the drivers' mechanical behaviour to blend them, KEF reasons that with its buying power it can easily produce high quality, close tolerance crossover networks which offer greater benefits in terms of consistency and accuracy than could be achieved with drivers where the mechanical consistency of one sample to the next is variable. Finally, KEF has foregone wall placement and its subsequent bass reinforcement, preferring to maximise stereo performance and bass linearity by free space mounting. There-

# Choice Sessions

*Things we hear. . . This month: choosing affordable loudspeakers is a question of system matching (and taste); building your own isolation table for hi-fi components; pre-viewing Linn's new Lingo two-speed LP12 power supply.*

for amplifiers, the Musical Fidelity *A1* worked well and so too did the more expensive Linn *Nebula*. The emphasis here is on electronics with a sense of warmth, but also possessing a good sense of 'flow' or momentum.

Properly partnered the '3 sounds very impressive, although extended listening shows a loss of midrange information and colour. Always refined, if never quite letting the music 'breathe', it never allows it to hector either. At home with light classical music and MOR pop, middle-of-the-road sums this speaker up, which is exactly why people will – or won't – buy it.

The *Sonata* is in complete contrast, sounding raunchy and direct; up-front in the best sense of the term. Mid and bass are the JPW's fortes, the speaker sounding solid and punchy with a nice sense of space and substance to music. The treble is more problematic. A bit bright and smeared, it definitely loses information. The preference again goes to stranded cable, and this time the Arcam *Alpha* amp or its dearer brother, the *Delta 60*. The JPW/Arcam combination just seems to 'click' and produces extremely enjoyable music without drawing attention to itself or its shortcomings. Perhaps more appealing to the sensual than the cerebral, and definitely the speaker of choice for rock and pop fans, the JPW *Sonata* never disappoints or fails to entertain. And like other JPW's it's capable of good musical communication.

And so finally to the KEF *C15*. This is definitely the most refined and consistent speaker of the three – by which I mean it is the most true to life in terms of its spectral balance. Superbly integrated and capable of excellent resolution, it makes the *Sonata* (and to a lesser extent the '3) sound positively ragged. The downside is the efficiency. This speaker needs the lucidity of solid core cable and the punch and drive of a Rotel

840 *BX2* or Cambridge *P50* to kick it into life. Used with an *Alpha* or *A1* it just sounds dull and studious.

The *C15* enjoys a remarkable advantage in the area of tonal colour and shading, making most other speakers (including some much more expensive ones) sound bleached and washed out. Bass was the deepest of the group but suffered slightly in terms of weight and punch compared to the *Sonata*. And imaging is exceptional. Small boxes away from walls should image; the KEFs do so with gusto. The soundstage is slightly small, but offers all three dimensions and exceptional focus.

Both the *Sonata* and the '3 tend to be pulled apart by better systems, which build on their strengths but expose their weaknesses. The KEF, on the other hand, thrives on them. I've even used *C15s* with DNM and Jadis *JA30* amps. They just get better and better.

So where does that leave us? The speakers you'll prefer will depend on the amp you use, and the music you listen to. The Celestion will appeal to those who want an allrounder which won't offend. The JPW offers raunchy excitement; if you own an Arcam *Alpha*, you won't go far wrong with the *Sonata*. The KEF is a different kettle of fish. If you want a speaker that will grow with you, and if you care about tonal colour; if you listen to mainly classical or jazz, the gentler side of folk and pop, then the *C15* is the speaker for you. It needs driving but will respond in kind, and with the addition of a pair of the excellent *C200SW* subwoofers (£250/pr – see JB's comments in last month's *Sessions*) it will really rock.

The KEF *C15* is the speaker for me, and I daresay it shows in the way I've written about it. Don't let that fool you. There is no 'best'. I hope I've shown where the differences in these speakers lie to help determine which model might best suit you.

fore, in order to extract any bass at all from such a small box, overall efficiency has been traded against bass extension.

So how do they sound? It depends on what you hook them up to and what you hook them up with. Any one of these speakers is capable of showing up differences in partnering equipment and cables. Equally, each has its own preferred partners, as we shall see.

The *Celestion 3* must be allowed to run in. Once it does so it displays a lovely 'open' treble quality, only slightly hinting at fizz, the word here being *slightly*. The problem is that the bass doesn't keep up, qualitatively, with its expensive treble partner and in comparison sounds a little slow, chuggy and, on occasions, disjointed. Sounds terrible? Not really. Indeed, not so long ago the '3 would have had things all its own way at this price point. What it does need is a little care in system matching.

I found that stranded cables (Naim, QED 79) were a must. By 'slowing' the treble and giving drive in the bass, they produced a far more cohesive sound. As

## By Lingo

Linn Products' Sondek LP12 turntable now revolves at 45 as well as 33 $\frac{1}{3}$  rpm, thanks to the brand new Lingo power supply. Paul Messenger was privy to a sneak preview prior to the official Penta show launch.

There's some irony in the observation, but I'd be willing to lay a bet that the most successful product (sales value) through specialist hi-fi dealers over the next twelve months is going to be an add-on turntable power supply.

Linn's Lingo is expected to go on sale this autumn at just below £500. And it's going to sell like hot cakes, simply because of what it does to the sound quality of a standard Sondek. Some 80,000 of those are out there in customers' houses today, and a good percentage of the owners are still on the files of the shops that sold them. And any Sondek owner treated to a Lingo demonstration will be sorely tempted to part with five big ones to satisfy the ensuing craving.

Linn has taken a long time to get around to Lingo. The Valhalla update kit which was the first attempt to bypass the synchronous motor mains drive of the original Sondek must date back at least six years. Since that time the quality of domestic mains electricity as a reliable source of sinewave motor drive has continued to deteriorate, to the point where something rather more elaborate than Valhalla was well overdue.

It was about three years ago that Naim Audio produced a handful of alternative turntable power supplies based on using a simple but generous Hi-cap based transformer, though this so-called Armageddon package was never released on the general marketplace. Having acquired one for my own use, the standard Sondek never sounded quite the same again. Whatever one's taste in value judgements, the Linn was revealed as having a soft underbelly as far as its bass performance was concerned, and said soft underbelly had much to do with the supply feeding the motor.

Whether a Lingo-equipped Sondek will match my Naim-driven Linn is a question I cannot yet answer (though I hope to find out before the month is over). What I can say without any fear of contradiction is that Lingo dramatically enhances the performance of a standard



After all these years the LP12 now revolves at 45rpm, courtesy of Linn's Lingo psu.

Sondek, to a far greater degree than one would have thought was possible – especially considering it's just a motor drive power supply. That alone will ensure commercial success. Additionally, LP12 owners will no longer have to grapple with a pulley adaptor in order to play 45rpm records.

Lingo is not the first Valhalla update that Linn has developed. There was something called a Wakonda that circulated amongst staff and a few dealers a couple of years back. But it wasn't considered good enough to go into full production, which is one reason why we've had to wait so long for this latest step in the Sondek saga. The core of Lingo actually arose out of the work which went into a horrendously expensive analogue-to-digital and digital-to-analogue device called the Numerik, which Linn recently developed for the professional audio market. The basis of Numerik is a quartz clock of remarkable accuracy, and this in turn provides the basis of this drive for the Sondek motor, providing a sinewave of unprecedented accuracy to control first motor and thence turntable.

Visiting the Glasgow factory in late August, I was able to spend an hour or two auditioning a pre-production sample of Lingo against the sound of a standard but otherwise identical Sondek/ Ekos/Troika, in a system based around Linn amplification and Isobarik speak-

ers. On the same agenda was the chance to hear a new preamplifier OPS (out-board power supply) called Dirak, and the already available power amplifier OPS called Spark.

Each addition made its contribution to cleaning and speeding up the sound of the system, but by far the greatest improvements came when the Lingo was put into operation. I was startled to realise how much low frequency grunge was coming through on the standard turntable. Its removal was at first rather disconcerting – a little like losing a familiar friend – but it didn't take many seconds to realise that it was also totally invigorating, bringing far greater freedom and subtle expression to voices in particular.

The Lingo will be available as an add-on for a shade under £500, though I suspect long queues will already have formed well before this publication appears thanks to its debut at the Penta Show. The Sondek itself will now come in two forms, one with and one without Lingo and priced accordingly, giving Linn two bites at the upmarket turntable sector and their customers the option of starting out at £550 for the standard, single-speed LP12, and adding the £500 Lingo later. Doubtless there will be all sorts of controversy over what order to add Lingo in relation to tonearm and cartridge upgrades, but that's all part of the fun of hi-fi.



## The art of suspense

*Richard Black describes an alternative and inexpensive approach to equipment support.*

It's pretty widely accepted these days that audio components, especially those items involving moving parts and above all record players, benefit from proper siting and isolation from the environment. Indeed, this has been known for donkeys' years – even my Garrard TA (circa 1955) is mounted on springs, though one suspects that avoiding groove skipping due to footfalls was about the limit of the designer's intent. Still, that encapsulates the largest factor behind the provision of suspension on record decks; the need to avoid the ill effects associated with vibration entering the system from the outside and being picked up by the cartridge.

The other factor, of course, is the need to do something with vibration inevitably caused (on the action-and-reaction principle) by the process of playing the record; unless the record deck dissipates this completely between platter and arm mounting (which none does, though some come closer than others), a certain amount must be dumped via the deck's suspension, plinth and support to 'mechanical ground', never (one hopes) to return.

These aims are unfortunately not always complementary, but it is possible to do a certain amount to improve performance in both areas (with almost any deck) by suitable choice of support. Dozens of supports are available, most of which appear to work better towards dumping vibration than towards isolating the deck from the environment (the floor, most often). Sometimes a specific need arises to obtain the best possible isolation, if necessary at the expense of other factors, and when I needed to measure rumble on record decks without outside influence I had recourse to an 'elegant' (if one can call it that) solution devised years ago by Max Townshend. This solution has proved so successful in so many ways that it is presented here for wider consideration.

Quite simply, Townshend's suspension base consisted of a large concrete slab supported on an inner tube from a car tyre, with just enough air in the tube to raise the slab an inch or so. This is a classic air spring, characterised by a well-defined resonance at a few Hz with good mechanical coupling below reso-

nance and poor coupling above. That's exactly what one wants; the less the coupling in the audio band, the less the transmission of unwanted and potentially audible vibration from the floor.

My version of the base has a couple of small improvements; the concrete slab is painted before use with diluted 'Uni-Bond' adhesive to seal in dust, and it has sheet lead stuck to both sides with silicone glue. This adds mass, thus reducing the resonant frequency of the assembly, and also damps out resonances within the concrete slab itself. The base is now so heavy that it acts as quite a good mechanical ground on its own, relaxing the requirement for mechanical grounding to sink vibration from within the deck.

There is a slight problem in that the base is undamped on the tyre and therefore rather unstable, but in practice I find this does not interfere with normal use. Damping could be applied if required but it has the disadvantage in such a set-up of transmitting vibration at high frequencies, which is what we want to avoid of course.

In use, the base has been found to reduce structure-borne feedback in record decks as diverse as the Linn *Axis*, the Pink Triangle *PT TOO* and the Townshend *Rock*, not to mention much cheaper turntables. Improvements include much clearer and apparently more extended bass, and overall a feeling of better resolution of low level detail. Naturally, decks that rely on a degree of feedback-induced coloration and stand resonance for some of their

'character' sometimes sound a bit 'sat-on' by comparison with their former selves, but I guess it depends what you want. So far, every deck I have tried seems (to me) to benefit.

Should you wish to make such a base to try for yourself, the best size of concrete slab is 18 inches (50cm) square, which costs about £2.50 from a DIY centre. Lead sheet can be bought from a good builders merchant and cut with strong scissors, and silicone glue comes from the same source in a large tube (you need a special gun to dispense it, another £5 or so). I use an inner tube for a 10R145 size tyre (Mini-size). Stand the whole lot on a suitably robust low table, and you're away!

Out of interest, I attempted to measure the performance of the isolation base – I use the word 'attempted' advisedly, since this sort of vibration measurement is a notoriously tricky area. I measured isolation by placing the base on a solid wooden bench and hitting the bench with a hammer while using an accelerometer to measure vibration alternately in the bench and in the slab. Notwithstanding a distinct resonance in the slab at 740Hz, it gave better than 30dB of vibration isolation above 100Hz, and around 50dB above 1kHz. Hitting the slab itself and comparing the results with those for a normal turntable table showed that the mechanical grounding of the base is also better than that of the table, by 10 to 15dB on average up to 2kHz. Which does seem to vindicate the approach, brute-force though it may be!



*DIY turntable support – the things you can do with a car tyre inner-tube!*



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The sound of music will now have all the warmth and depth of the original recording; that should have a few people running for the hills.

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*Refurbishing a disused chapel became a labour of love for a young London publisher. The result is a home with great acoustics and a poetic atmosphere in which to relax and listen to music.*

*By Dan Houston. Photographs: Colin Clarke*

# A methodical conversion

"**F**or though I've no idea what this accoutred frowsty barn is worth, it pleases me to stand in silence here; a serious house on serious earth it is . . . proper to grow wise in, if only that so many dead lie round." These lines are taken from Philip Larkin's poem 'Church Going' and were given by this month's host as one of the main reasons why he bought his weekend home - a deconsecrated Methodist chapel nestling in the Wiltshire countryside.

The poem was prophetic. Larkin wrote it in 1954 as a muse on what might happen to church buildings as the material age and weighty Sunday newspapers increasingly diverted people from regular worship; since then many churches and chapels have indeed gone, to be converted to homes as the Church realistically sought to have them preserved, if only as an architectural reminder of its past significance in society.

The 'frowsty barn' we're visiting was, as Larkin knew, worth a lot more in terms of spiritual value than its real estate

price tag to the right buyer. William Sieghart is a 30 year old London publisher with a taste for the unusual and a collection of Gothic Austrian antique furniture (now suitably housed).

### Labour of love

The chapel was built in 1841, using local materials of flint, chalk and straw in a method known as Cob. The Cob walls were in a state of disrepair when William's sister saw the chapel for sale in a London newspaper three years ago. "We immediately liked it," he said, "it has this wonderful atmosphere of quiet and contemplation and the big spacious room also had a really good acoustic quality. It was first put up for sale six years ago, and it was so full of rot that it was beginning to fall apart.

"It's a Grade II listed building and after we bought it it took us a year just to sort out the change of use and get planning permission to build an extension. It turned into a real labour of love because we had to get permission from local planners as well as the listed



buildings people, and of course you have to be sensitive about local people who used to worship there. But there was a very good vibe that came from restoring it. It's taken three years to get it to its present (habitable) state and we've basically rebuilt the whole thing from the inside. We've had to go all over the country to get the right furnishings. The sprung maple floor came from a Dulwich school gym in London. We're now starting on the outside - but much of



that is just a paint job.”

The first thing you notice on entering the chapel's main room is the amount of light streaming in through the high leaded windows. The new walls and ceiling are all painted white and the atmosphere is in fact far from frowsty; on a breezy September morning the place was full of fresh air. The original Cob walls have been hidden by a secondary skin of breeze blocks and plaster which banishes the damp that

*Hung high the Monitor Audio speakers literally raise the tone in the chapel.*

would otherwise emanate from the old wall, now preserved outside the second skin. Cob's strength relies on it remaining damp and the second skin doesn't interfere with it. At the back of the chapel William has put a glass window in the breeze block wall through which visitors can see a cross section of the Cob.

Almost as an antidote to the amount of white space, the main 'room' has been furnished with dark, brooding, furniture. Much of it is Austrian, and belonged to William's grandparents. The bookcases here even began their life in ecclesiastical surroundings - as confessionals in a Viennese Jesuit church he told us. Attention to lighting has been important in the chapel's refurbishing. There are several candlesticks (with thick church candles for authenticity) and low voltage



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Secondary speakers in the kitchen, which was built onto the back of the chapel, have also been installed with separate volume control.

## Bedtime control

At the back of the chapel a balcony leads to guest bedrooms and is itself a sitting room - a 'remote' control panel up here allows basic control of the system including switching on and off without having to descend to the main living area.

The Cornflake Shop's intrepid installation duo, Manuel Matarin and Paul Swaby, laid the cables for the remote controls and the loudspeakers at the time the second wall was being built, just before Christmas. This saved replastering time later as the loudspeakers are placed high up and all the cabling is invisible. Once the chapel had been 'wired for sound' it was a case of waiting for the building work to be finished before going back to set up the system. The Cornflake Shop advocates the American Audio Access 'through-the-house' remote system as being one of the best on the market at present. "One of the joys of the Audio Access system is that you can run whatever equipment you like on the end of it," Steve enthused. The system is also modular in the sense that it can be expanded later if the need arises. The Cornflake Shop has run wiring through to the bedrooms on the ground and first floors as part of the job. "We didn't charge for that, but it's useful to have it there in case he wants it later," Steve added, demonstrating his confidence in

'candle' lighting from the Japanese Shiu Kay Kan shop in London running up the inside of the windows, to amplify the ambient effect at night. The result lends a Gothic sobriety to the whole house with touches like a blood-red velvet cover on the Steinway baby grand leading you almost to expect a meeting with Klaus Kinski's Nosferatu after dark.

But that would be thrilling rather than frightening. The homely little chapel retains its conventional, if contemplative nature and William has no qualms about spending the weekends alone there. Even with the graves of past congregationers (the most recent was buried in 1980) lying just outside the window. He has laid the graveyard to lawn, and arranged the headstones along one wall as the only reminder of why the earth is so rich in calcium.

## Sound consultancy

The acoustic value of the chapel, while not absolutely perfect in purist terms, was nevertheless one of its main attractions for William. And he has installed a sound system which will fill it with sound. He chose the Cornflake Shop (which had already provided him with office and home systems) as consultants and suppliers. Steve Moore, one of the shop's founders, went to visit

*The system is housed in a converted antique cabinet. Monitor Nines (below) provide the balcony sound.*

the chapel at an early stage in the renovation and recommended the system as well as loudspeaker placement to deliver the necessary coverage.



# A brief introduction to our award-winning speakers.

Tradition has its place. And our new Series 3 loudspeakers are as true as ever to the Mordaunt-Short traditions of craftsmanship, care and quality.

But technology moves forward and in order to maintain another tradition – that of being in the forefront of loudspeaker design – we have had to make changes.

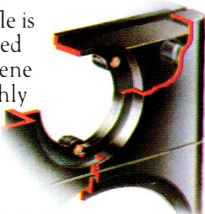
We spend a fortune on research.

And when our research tells us that there are a host of innovations which will make the sound from our Series 3 loudspeakers the purest sound you'll ever want to hear, we must react accordingly.

## THE BAFFLE, FOR INSTANCE

Traditionally, the loudspeaker baffle is made of wood with all its inherent problems of dimensional instability and construction limitations.

Our baffle is plastic moulded in polypropylene making it highly inert with considerable self-damping properties.



Which means we can add strengthening ribs and vary section thicknesses at strategic points, giving us a baffle which is both lighter and more rigid.

We can incorporate performance-enhancing geometries not practicable with conventional woodworking techniques, we can design components for function, rather than manufacturing ease and then fit everything together with the sort



of tolerances that make accurate assembly a reality every time.

## NOT ONE, BUT TWO...

Having devised the polypropylene baffle, we then went one better.

Two baffles.

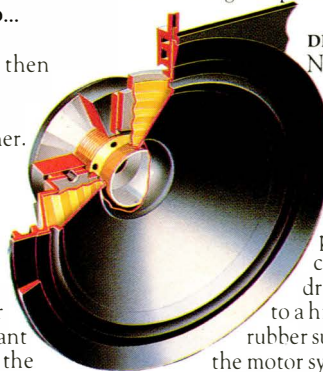
One behind the other.

One structural, one cosmetic, made of two different – yet each eminently appropriate – materials with a small air gap sandwiched between upper and lower baffles providing a resonant behaviour far superior to the conventional one-piece baffle.

The upper baffle has it cushy, its sole purpose being to look good, secure in the knowledge that the mechanical performance

of the composite baffle is not being compromised.

## DRIVERS...



so as to minimise asymmetric pressure distortion. As you move up the range, so does the specification.

Which is true also of the aluminium dome tweeter. Its special suspension, braided voice-coil connections and ferrofluid

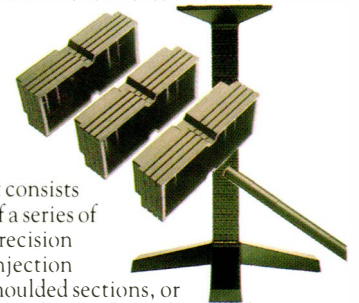
## POSITEC PROTECTION

It's not new, but the POSITEC protection circuitry on all Series 3 speakers safeguards, inaudibly, against drive equipment overload or malfunction.

cooling, whilst common to all speakers, are extremely uncommon in terms of performance and reliability with piston operation to beyond audibility enhancing the top end of the range.

## IT'S A PEACH

The stand we've designed for the Series 3 speakers is possibly the most innovative feature of all.



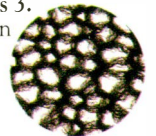
It consists of a series of precision injection moulded sections, or 'vertebrae', which slot together to give a readily adjustable height, providing a structure of which the rigidity and freedom from unwanted resonances is unparalleled by more conventional methods.

## JUST ONE MORE THING

We haven't mentioned the grille.

Which has had as much care and invention accorded it as any feature of the Series 3.

It is a fine open weave mesh with no frame to cause diffraction, so it can be left in place (it arrives in position on your speaker) with no fear of reduced performance.



Or if you prefer, you can remove it.

The Series 3 grille is designed rather like a hair net with elastic edges which fit snugly into a groove around the loudspeaker cabinet.

## SO THERE YOU HAVE IT

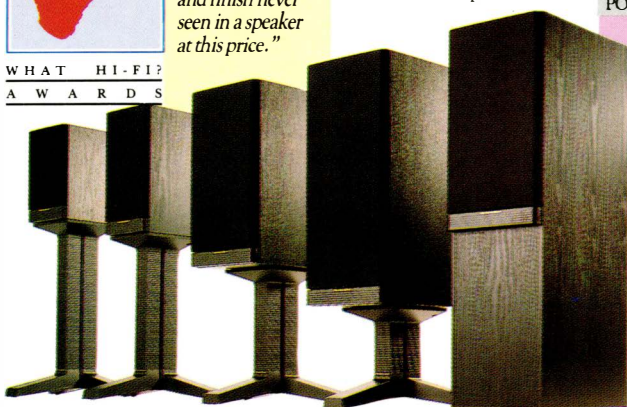
Our new Series 3 loudspeaker range. An award-winning combination of traditional standards and innovative technology.

## Winner



What Hi-Fi? had this to say of the MS3.10 "...a build integrity and finish never seen in a speaker at this price."

WHAT HI-FI? AWARDS



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CLOSER TO PERFECTION





William's loyalty to TCS.

The system itself comprises good quality - if not the most esoteric - hi-fi equipment. It's all housed in a wooden antique cabinet which was used by William's father to house his Quad equipment in the Sixties. Next to it an equally old cabinet houses an eclectic record collection spanning classical music (with some pertinent choral recordings), jazz, blues, reggae and even the odd soul offering. In the system cabinet a Rega Planar 3 turntable was installed for William's existing record collection, together with a CD player, cassette deck and tuner. These are all Yamaha components, and fully remote controlled via the Audio Access control unit which acts as a preamplifier in the system. Yamaha's MX35 power amplifier, designed for surround sound systems but "used by us all the time in multi-room installations" according to Steve, beefs up signal to the smaller pair of Monitor Audio loudspeakers in the balcony and to a pair of Roksan Hotcakes in the kitchen. The volume levels for these can be controlled independently using an output level on the amplifier, and the Hotcakes also have one of The Cornflake Shop's own design volume controls in the kitchen. A QED switching device at the rear of the main system allows the loudspeakers in the main chapel area to be muted relative to the kitchen.

## Hang 'em high

The main loudspeakers are mounted high on the wall, above the Chapel door, and level with seating on the balcony. These are driven by a Rotel power amplifier hidden in the cabinet underneath the rest of the equipment. All the loudspeakers are finished in white to make them as inconspicuous as possible. "We decided to put the loudspeakers high because they work better up there," Steve explained. "If we had put them low down it would have sounded very dead in terms of acoustics and the coverage wouldn't have been as good." As such the 'acoustics' of the room don't overly interfere with the hi-fi sound. The original walls are likely to be very inert anyway and the plaster covered breeze blocks don't ring in the way a stone wall would. There is minimal echo although the space does give sound a chance to

develop. Furniture and floor coverings deaden any 'liveliness' from the bottom of the room so that the music is all coming from above. Setting the *Monitor*



**Handy remotes:** A wall panel allows control of the hi-fi from upstairs.

*Nines* above the balcony at comparatively low levels gives the system just the right boost in that area. The drawback of having loudspeakers so high, and having four of them in one space is that stereo separation is lost; but if anything the room and system combine to produce a full, spacious sound which is pleasantly free from spurious echoes. All credit to the consultancy work on that one.

## Seeing infra-red

The Audio Access intelligent remote control handset allows just about every variation of jiggery pokery available. You can leap from one source to another, from one track to another, all over the radio station dial, turn the volume up or down, pause or mute the system to answer the telephone. The vicarious disc and tape jockey is also quite easy to use. After about thirty seconds instruction from Steve I was away, pushing the logically laid out keys on the pad with a thumb; one should never underestimate the value of a remote control unit which is easily understood and used and which will command a complete system. It's

also powerful enough to be used anywhere in the lower part of the room, with the infra-red bouncing off the white walls if you're too tired or emotional to be able to point it directly at the system.

Endless fun for bored party guests is afforded by the system's second remote pad, sited on the wall next to the entrance to the first floor bedrooms behind the balcony. This keypad is more simple than the infra-red, allowing those same guests to work out the functions quickly. Again it covers the sources, allows skipping tracks, muting and volume level control, all on a few keys. If you felt really mean you could also shut down the system from this keypad - with a guaranteed few seconds silence before the power amps fire up again. The advantage is that it allows control from up here without having to climb stairs - the remote isn't that powerful and the walls aren't that bouncy; you'd fall over the balcony if you tried to point the remote at the system in its corner beneath.

William's favourite listening period is late at night, when he can put on a record of choral music and join in the tradition of contemplation in this building. "I've spent many hours sitting late into the night listening to music. There's such an incredibly good atmosphere here that it's quite difficult to go to bed," he confided. That alone vouches the system's sound quality, but with the wind moaning in the trees and a guttering candle or two I think I'd need to put on some rock 'n' roll.

## The System:

Rega Planar 3 turntable:	£207
Yamaha CDX-730 CD player:	£229
Yamaha TX340 tuner:	N/A
Yamaha KXW-202 cassette deck:	£180
Audio Access PX4FR controller:	£750
Yamaha MX35 4-ch power amp:	£180
Rotel RB-870BX power amplifier:	£220
Monitor Audio 1200Gold speakers:	£800
Monitor Audio Monitor 9 speakers:	£200
Roksan Hotcake loudspeakers:	£199

Total cost including cabling, labour and consultancy: £5,500

System supplied and installed by: The Cornflake Shop, 37 Windmill Street, London W1. Tel (071) 631 0472.

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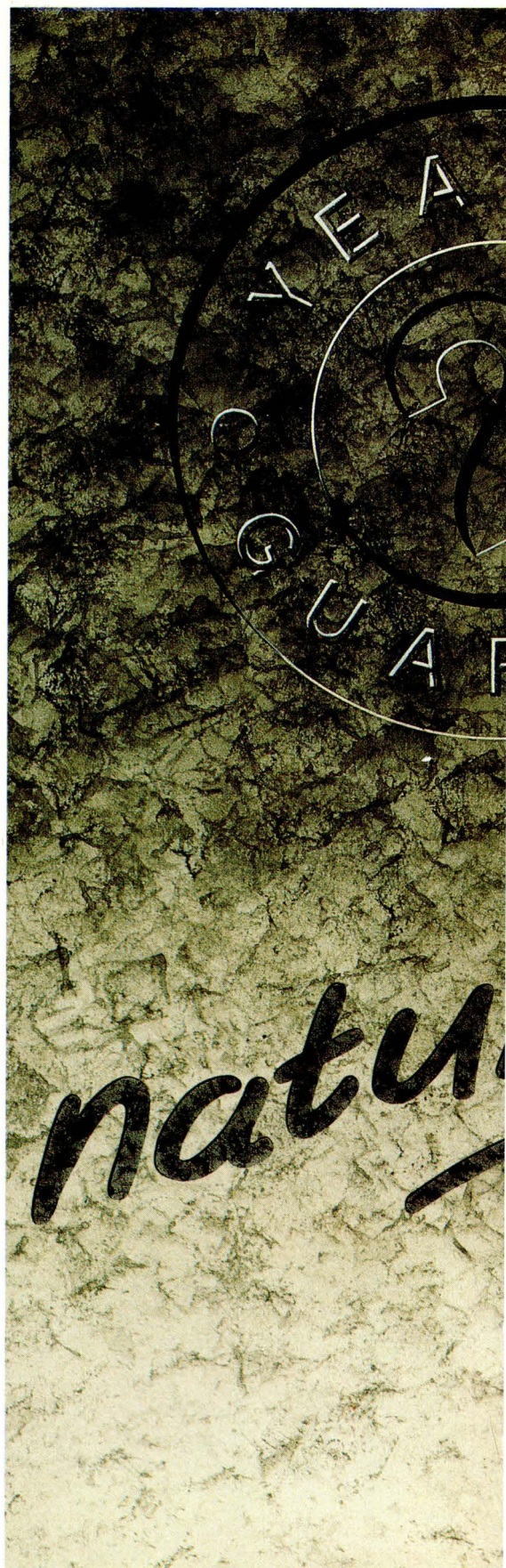
YST-7 & CDX-P7 ACTIVE SERVO TABLETOP STEREO SYSTEM



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# MUSICAL EXPERIENCE

**TWO-YEAR GUARANTEE)**



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**TX-540 AM/FM STEREO TUNER**



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**KX-530 STEREO CASSETTE DECK**



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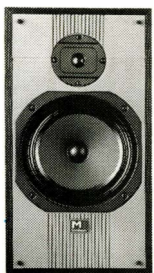
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# Statements

*Monitoring what's happening on the high-end scene. . . This month, Roy Gregory listens to the Morch MP6 tonearm (made in Denmark) and John Bamford improves his system with the Equinox moving coil phono amplifier (made in Daventry, Northants). Roy's also been experimenting with Kimber silver wires. . .*

**W**hile the company has been making turntables and arms in Denmark for many years – notably the UP4 unipivot design – the Morch name is not a familiar one to most UK hi-fi enthusiasts. The MP6 is its latest product, and is a complex and superbly crafted design. Optimisation of the arm's performance and interface are clearly overriding design principles. As a result, every single parameter of arm/cartridge adjustment is user-variable. The only other arms I know of which embody this ideal so comprehensively are the ETII and the moribund (! – ed.) *Triplanar*.

## Design ideas

The heart of the Morch MP6 is the bearing housing. This consists of a standard post and collar arrangement for height adjustment, the post being graduated to allow very accurate incremental changes. Atop the post sits a high quality ball race for lateral motion, and above that two sapphire pin and cup bearings allow vertical movement. These are designed to be at the level of the record to optimise tracking of warps – an idea similar to the *Heliux Orion*, amongst others. The bearings are shrouded in a plastic tower which allows independent damping of horizontal and vertical motion with silicon fluid.

One of a range of interchangeable, internally damped, curved arm tubes

can be attached to the top of the damping tower by a knurled nut. The mechanical contact made is extremely rigid due mainly to the large surface areas of the mating parts. Electrical contact is made via gold pins and sockets. Interchangeable arm tubes allow you to change the cartridge with ease, but more importantly they mean you can alter the arm's effective mass from an incredibly light 3.5 grams up to nearly 20 grams. The lighter armtubes have flat paddle ends against which the cartridge is bolted using the finger lift. The advantage of this is that it allows a wide range of overhang and offset adjustment – to accommodate almost any cartridge. For those who insist on the last word in rigidity, a heavy arm tube is available, this having a conventional headshell with a precision ground underside, to suit low compliance cartridges.

All internal wiring is Teflon-insulated silver. Azimuth is adjusted by screwing one of the pin bearings up or down using an Allen key which fits all the bolts on the arm. A solid rod protruding from the base of the tower accepts a variety of counterweights, to enable optimum positioning of the mass close to the pivot. Bias is applied by a thread and watch spring; both this and the lift/lower device are models of common-sense and elegance.

Finally we come to the most striking



aspect of the arm's appearance. Its slender elegance is graced by a gold plated finish, with detailing in black. Chrome is also available, as is black to special order. This arm definitely looks the part. The only sour point is the nondescript lead out cable, but this is easily replaced. It's just a shame in a product which costs between £600 and £650 depending on finish and armtube.

## Tuning up

With all those options and adjustments, you may have already guessed that just like any musical instrument or motor car, this arm can be in any state of tune between perfect and disastrous.

Thankfully, setting up the MP6 is fairly logical, and a little patience is all that is required. The first thing I did was ditch the arm cable, initially for Van den Hul 502, and then for the even better Audioplan 'X' Wire. Experiments with a number of cartridges proved interest-



**Morch MP6: easy to use, easy to fit – a design of great ingenuity.**

ous shortcoming is a lack of bass weight. It goes down but lacks the last ounce of definition. Likewise, its overall sound is rather soft and polite. Sonic analogies can be taken too seriously, but I'll risk one in this instance. I find the Morch reminiscent of the Quad Electrostatic. I think that character has a lot to do with its happy match with the VdH MC One Super. The cartridge's absolute definition and bass power help the arm, which in turn breathes life into the rather dry balance of the pickup. Finally, the tonal neutrality of both products is allowed to perform unhindered.

Low level dynamics are handled beautifully by this combination. Bass has good weight and momentum, maybe not in *Ekos* or SME V class, but the sense of air and 'texture' leaves most arms for dead. Music is allowed to breathe and you never feel it is being hurried along. Subtle rhythmic accents such as those found at the start of *La Folia* (Harmonia Mundi HM 1050) pass absolutely unquestioned, giving shape to the music as a whole exactly as they should.

### Natural acoustics

This front end – *Xerxes*/MP6/MC One Super – did a better job on one of my standard test discs than anything else I've heard at close to the price. It's a live recording of lute music given by Julian Bream (RCA LSC 2819) with songs by tenor Peter Pears. Recorded at the Wigmore Hall and in the US, it features a great deal of audience noise, applause, and comments from the performers. The subtlety and humour of the playing came across beautifully, as did the Wigmore Hall acoustic and the explosive impact of the applause from the audience.

Whilst I can't see the diehard headbanger (classical or pop) choosing the MP6, anyone who values a natural acoustic and a sound true to the beauty of live music will be captivated. Rewarding of care in set up, it was developed on, and should work well with, the *PT TOO*. The VdH cartridges are a good match, and I would expect the Dynavector 17D2 (surely the best cartridge bargain around), Ortofon MC 3000, Madrigal *Carnegie*, Sumiko or Monster cartridges to work equally well. At a pinch, and against my personal tastes, you could try the Audio Technica OC7 and OC9. I'm sure the

ing. With the MP6 installed on a Roksan *Xerxes* I could get a good idea of the arm's basic diameter but none of the cartridges I played with seemed to 'click' on the basis of a quick listen. The closest I came was my VdH rebuilt Koetsu *Black*, which really motored in the heavy armtube.

The grapevine whispered that the VdH cartridges are a good match so I borrowed an MC One Super. Used in a medium mass armtube this was an instant hit. Then I settled down to fine tuning. Exhaustive experiment showed that a tracking force just shy of 1.6 grams was ideal, although a pair of counterweights a bit further out sounded a little more lucid than three hard up against the tower. The MC One Super is capable of excellent information retrieval and superb soundstaging, but I was surprised at the level of improvement illicited from painstaking overhang and VTA adjustment – and even

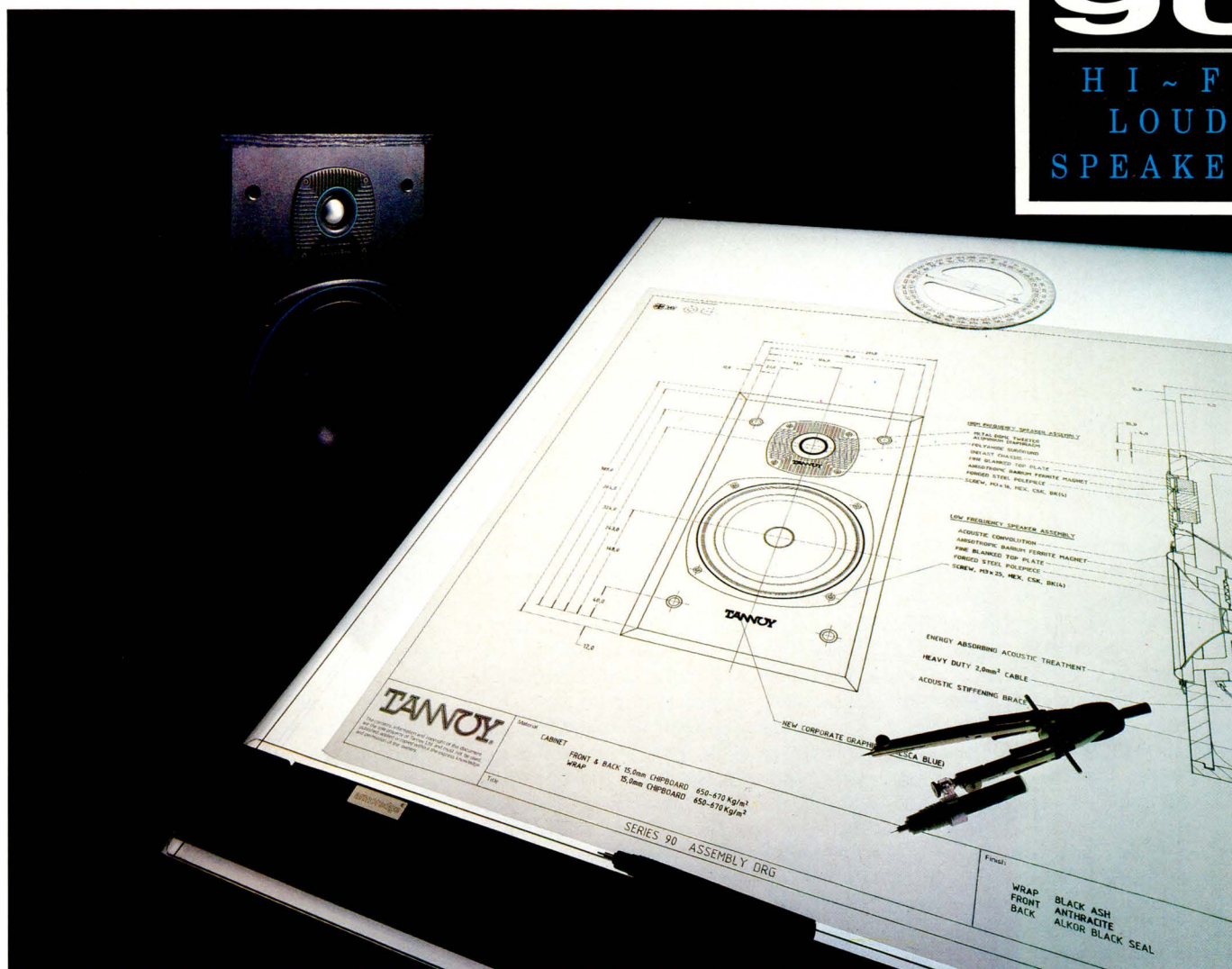
more so azimuth. Set up originally it had good depth and width, but rather poor focus. VTA was fine, the cartridge body was vertical when viewed from the front. . . but of course! The stylus doesn't necessarily align with the the body. Careful adjustment yielded dramatic results. Finally, I had a turntable which seemed near optimum.

Two aspects of the Morch MP6's performance set it apart from run of the mill pivoted arms. Its ability to present music as an harmonically complete entity is remarkable. It performs with an uncanny sense of warmth and naturalness, allowing the individual character and timbre of instruments to coexist in a way which is both satisfying and convincing. Secondly, when aligned optimally, it is transparent to the back of the soundstage, locating instrumental voices and choirs in space, and layering them front to back.

So what are its flaws? The most obvi-

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ART 1 would also work well.

The Morch MP6 is an arm which I would use on a Roksan in preference to any of its similarly priced competitors. Yes, that includes the SME IV and the Artemiz; the latter sounded quite hectoring in comparison. That statement reflects my preference for smaller scale classical works and early music, as well as my love for the ETII's ability to bring them to life. The Morch does more to scale the heights of performance so firmly held by the parallel trackers than any other sub £1,000 pivoted arm. It does so in an easy to use, easy to fit and trouble free design of great ingenuity. As such it is both a pleasure to use and own. I'm going to hang onto this one for as long as possible.

Roy Gregory

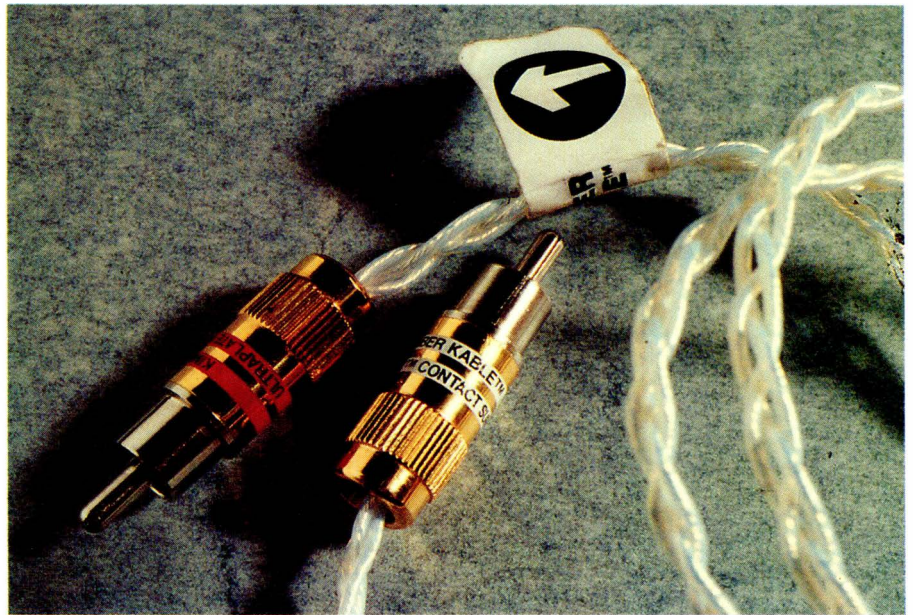
**H**i-fi has a habit of making mountains out of molehills. Magazines are often the worst offenders. Great issues of our time arrive with a bang, and then just fade away.

Which brings me to cables. "Not more column inches devoted to that old chestnut," I hear you groan. And I couldn't agree more! Not only has most of what has been written totally ignored the system-dependent nature of cable performance, but the plethora of new cables hitting the market leaves me feeling punch-drunk. Who, if anyone, can sort out the myriad different options and technologies on offer. I'll admit that when recently confronted with a dozen cable samples from a new manufacturer, my overriding response was, "Who needs them?" After using the same (extremely expensive) cable set for the last two years I'm afraid I had grown complacent.

### Stirring it up

So who should chance along and awake me from my slumbers in my ivory tower but that well known stirrer and agitator, Russ Andrews of RATA. Clutched in his hands were what looked like a couple of bits of rather nasty parcel twine, attached to gold plugs. "Aha!", I thought, "it's his idea of an April Fool." My suspicions were quickly confirmed when he said he wanted twenty six hundred notes in return for ownership of the extremely unexotic-looking bundle.

Never afraid to make an idiot of



Silver wire from Kimber Kable – marked for directionality.

myself I decided to let the poor fool pull my leg. Untangling the cables I discovered an extremely plain looking set of 1.5 metre interconnects in the familiar Kimber open weave, and a 2.5 metre pair of speaker cables, with the same white woven appearance.

"Those", he said, "are Kimber silver cables, the cheaper ones." Now who's fooling who? £2,600 for four stereo metres of cable, and not even top-of-the-line? But from the deadpan look on Russ's face I could tell he was serious.

The cables in question are the Kimber KCAG interconnect and 4AG speaker cable. They are, broadly speaking, silver versions of Kimber's familiar PSB and 4TC cables, but clad in white Teflon which gives them an unfortunate likeness to open weave parcel string. Once you get used to them they do look rather smart, and their flexibility makes them easy to use, but they might get rather grubby with repeated handling.

Their sound is really rather remarkable. Relative to my own cables – the pricey Audioplans – and, indeed, a collection of other highly thought of examples, the Kimbers showed areas of clear superiority. I was quite shocked by the degree of grain that they revealed in every cable to which I compared them, and as a result they were significantly more transparent.

Some readers will have noted the caveat: *areas* of clear superiority. Well, the bass didn't equal the Audioplans for depth, weight or speed and as a result the overall picture was a little soft. The biters didn't bite as hard as they can. However, knowing the differences between 4TC and 8TC I feel sure that the heavier 8AG speaker cable would go a long way to correcting this – at a price. (Remember that 8TC costs twice as much as 4TC! I do mean "at a price".)

But, in traditional fashion, I've kept the best for last. The Kimbers pull off a trick that no other cable in my experience manages. They make musicians sound better! Not music, not the system – the musicians actually seem to play better. How so? Well, obviously the cable can't alter what's on the record. As to making the system sound better, what they really do is make it sound less impressive or less like a hi-fi system, leaving the music to 'happen' on its own. What they do for the performers is allow subtleties and nuances in their playing to emerge. They don't make musicians better, they just allow their real abilities to shine through.

### Musical flow

Oddly, I have found that this effect, whilst it is universal, tends to be more noticeable on less impressive, modern multi-miked recordings. Nonetheless better recordings do benefit, Mitsuko Uchida's Mozart Sonatas revealing new depths of rhythmic poise and sophistication, an even greater sense of flow and melodic line.

At £390 per stereo metre KCAG will remain a ludicrously unobtainable dream for most of us. Is it the best cable around? Is it 'reference' quality? I'll treat those absurd notions with the contempt they deserve. No, the importance of these silver Kimber cables (for all but the lucky few who could consider buying them) is that they serve as a timely reminder of just how much damage cables can wreak on an electrical signal. In exposing how obstructive even good quality cables can be, they reconfirm the value of getting your cabling right. It needn't cost a fortune, but there are real benefits to be had, with a little patience and the help of a good dealer.

Roy Gregory

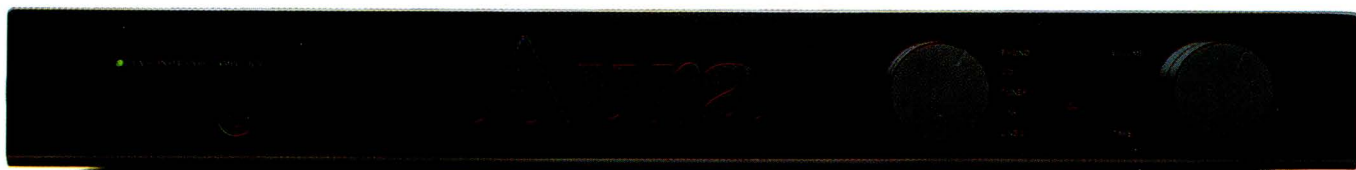
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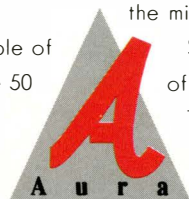
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**D**on't be misled by the wording on the front panel. Although Equinox Audio has chosen to call its first domestic hi-fi product a 'moving coil head amplifier', something we would normally assume to be a step-up device to boost the very low output signal from an MC cartridge (which can be as little as 0.2mV) to something approaching the level produced by typical fixed coil cartridges (around 4mV), thereby negating the need for a special moving coil stage in your preamplifier or integrated amplifier, the *Equinox* is in fact a moving coil *phono amplifier*. This means it is far more than just a 'signal booster'; it is a dedicated MC phono stage and RIAA amplifier.

The output from the *Equinox* is at 'line level', around 0.5V (depending which cartridge you use); therefore it connects to a line level input of your amplifier – any of those inputs labelled Tape, Tuner, Aux or CD, for example. Designed to be of top-notch quality, the idea is that it should be used instead of the phono stage which is built in to your amplifier, the implementation of which is bound to be compromised in one way or another. And in esoteric systems, the *Equinox* can be partnered with a passive preamplifier or one of the new breed of 'line-only' preamplifiers which seem to be becoming ever more popular in these days of the compact disc. Equinox Audio has just such a component on the drawing board as I write.

## Extracting information

While getting hi-fi quality sound from CD-based systems is of prime importance to thousands of audiophiles these days, there remain many (true?) audiophiles looking to extract the ultimate resolution and musical information from high quality record players. This said, standalone phono amplifiers are a rare breed in the UK. The shortlived Linn *Link* was the first I remember encountering some eight or so years ago, while Naim Audio also makes a phono stage, albeit 'unofficially', as part of its famous *Armageddon* kit for the Linn *Sondek* turntable. There are also models available from PS Audio, Moth, and Sondex. But it's Roksan Engineering which has revitalised interest in the dedicated phono amplifier market in recent months with the launch of its *Artaxerxes* device, powered via a second output from the *Xerxes* turntable's power supply and small enough to be built into the plinth of the turntable.

Part of the attraction of the *Artaxerxes*, of course, is that the cable from the base of the turntable can be just an inch or two long and hard-wired into the circuit. But it will remain a phono amplifier specially for the *Xerxes* turntable until Roksan produces a dedicated power supply for *Artaxerxes*, allowing audiophiles to use it with other record players.

The *Equinox* costs a cool £795 and for this not insubstantial sum of money you get a serious bit of kit indeed. Small but impeccably formed, its power supply is a pair of sealed lead acid batteries housed in a chunky case and kept on continuous float charge from the mains, while the amplifier itself is no larger than a packet of cigarettes. Constructed using surface mounted components, it provides a low noise *balanced* input followed by a passive RIAA equalisation stage, the buffered output being via a pair of gold plated phono sockets. The amplifier is mounted in a housing machined from solid aluminium and is designed to be mounted on the leg of your turntable table, as close as possible to the base of the record player's tone-arm. *Equinox* provides a special (balanced) arm lead as part of the package, dealers being instructed to ensure that the lead is kept as short as possible.

*Equinox* Audio has been formed as a division of a company called Customscan Ltd, based in Daventry. Proprietor John Standen is an ex-Home Office radio engineer with a background in satellite navigation systems, and with his partner Terry has done much work in TV studio design and worked as a

consultant for Motorola in the development of cellular telephones. Living just a mile away from the BBC's World Service transmitter, John developed the *Equinox* almost out of necessity, having been plagued for many years by RF breakthrough in his hi-fi system. One thing you notice immediately on wiring the *Equinox* in to your system is the remarkable 'silence'. This is just the device for owners of *very* low output cartridges like the Ortofon MC3000/III.

## Top pedigree

Used with my Townshend *Rock Reference* and an Audio Technica OC9 moving coil, the *Equinox* offered a relaxed and civilised sound – clear and smooth yet superbly dynamic and detailed too. It shows its pedigree in its superb soundstaging and recreation of depth perspectives. Never before has my system produced such 'out-of-the-box' images, using loudspeakers as diverse as KEF 105/3, Snell Type C and the superb JBL XPL 200s. At first I thought the *Equinox* a shade 'dull', suspecting a gently rolled-off treble response. What I was observing, in fact, was the total absence of electronic 'hash'; the *Equinox's* response, I'm told, is ruler flat.

Clearly £795 is a hefty price tag, but with top-flight moving coil cartridges costing as much as this and more, many audiophiles looking for the best will consider it a steal. Construction of the *Equinox* is first class, it comes with a three year guarantee, and once installed in your system you'll wonder how on earth you ever lived without it.

John Bamford



Small and beautifully formed, the *Equinox* phono stage. You can 'hear' the silence.

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# Win an Aiwa DAT recorder!

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## How To Enter

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

## The Prizes

The first correct entry drawn from our mailbag after the closing date will win an *HDS1* portable DAT recorder worth £600, complete with carry case, remote controller, rechargeable battery and battery charger/AC adaptor, connecting leads and analogue to digital converter. The second correct entry drawn will win a stylish *NSX-800* CD mini system complete with loudspeakers and worth £549, and the third an *HS-PL300* personal stereo finished in titanium silver with headphones, rechargeable batteries and mains adaptor worth £110.

## The Questions

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

1. In which country is the Morch tonearm manufactured?
2. Which company has just brought out the 600 Series CD players?
3. In which county is Aiwa's UK headquarters?
4. What is the name of Alphason's new integrated amplifier?
5. Some CD players feature FTS. What does FTS stand for?
6. What flows between anode and cathode in a valve?

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# Doug Brady Hi-Fi

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# Readers Write Choice Answers

## Taking the two grand plunge

With a possible budget of £2,000, what is the best system I can buy? Some of the components I have considered are: PT *Little Pink Thing*, Roksan *Xerxes* and Voyd turntables with Nagoaka *TS-11*, Goldring *1042* cartridges, Marantz *CD40* or Arcam Alpha CD players and amplification of the Arcam *Delta 60*, *Cyrus Two* or *MF B200II* variety.

My main problem is loudspeakers; my room is only 12ft square with a suspended wooden floor so the speakers need to be able to work well up against the wall. I would like good stereo with a clean, clear sound and deep solid bass. My shortlist includes *JPW AP2*, *Linn Index* and *Helix*, *MF MC1* and *2*, *Rogers LS4a* but doesn't stop there. I'm also unsure about suitable stands and cables. Can you help?

I. HARKINS,  
HUYTON, LIVERPOOL.

*It seems safe to assume that you've had only limited exposure to audio equipment of the calibre that you're*

*suggesting buying, and to start with we would suggest you spend a few evenings down at Bradys listening to some of the alternatives. You should then be a bit more confident about the short of thing that appeals to you and be better able to make a decision. However, you asked for our recommendation, so you're going to get it. Are you sitting comfortably? For starters you could try the Voyd Valdi turntable with a Moth arm and a Glanz MFG 310LX cartridge, plug that and an Arcam Alpha CD player into a Pioneer A400 amplifier. The A400 is one of a new breed of brit-fi oriented Japanese designs that really does sound superb. The JPW AP3 is amongst the best wall standing loudspeakers around and appreciates filled four leg stands – Foundation and Target make suitable models.*

*See the Directory for recommendations on equipment supports and cables, but if you can afford it the Mana Sound Table (£200) is the best thing to put your turntable on. If funds are short, 1mm 'twin-and-earth' house wiring cable makes very usable speaker cable.*

*So there you go; not everyone's cup of tea and a touch 'flavour of the month', but*



*Pioneer CT-91a, mic ready if used with a Nakamichi mixer.*

*musically a very informative and enjoyable set-up that should provide you with hours of entertainment. And after all, that's what it's all about.*

## Remarkable improvements

I am writing to thank and congratulate you for your special offer with Quantum Audio. As a birthday present I bought myself a pair of Furukawa *FS2T09* speaker cables fully prepared to be unimpressed by the improvement over my *QED 79 Strand*. Using the Furukawa to link my *Audiolab 8000A* and *KEF C95* speakers provided a remarkable improvement, particularly in bass

definition. I'm now considering bi-wiring. Full marks!  
P. SIDEBOTHAM,  
HOYLAKE, WIRRAL.

## Missing the mic inputs

I have been a subscriber to *Hi-Fi Choice* for almost twelve months now and find it an excellent magazine. Mainly as a result of studying the *Directory*, I purchased my first CD player, a *Denon DCD-1520* plus an *Arcam Black Box* and am most pleased with the results. Since then I have sold my eight year old *Teac 550RX* cassette deck (I think I have the correct model number), and again having studied the *Directory*, purchased a *Pioneer CT-91a*. This I consider to be a very good deck but not all that superior to my old one. I am sorry that in your list of facilities you do not state whether cassette recorders have a microphone input. This is the one function the Pioneer lacks and which I would find very useful.

Can you name any cassette recorder in my price range (£500) that has this facility and compares favourably with the Pioneer in other respects?

H. N. SMITH,  
STROUD, GLOS.

*There are few current cassette decks that have mic inputs; Technics make some but not of the CT-91a's calibre (or price) and Harman Kardon used to make quite a good £695 machine called the CD491 which had this facility. But finding a suitably*

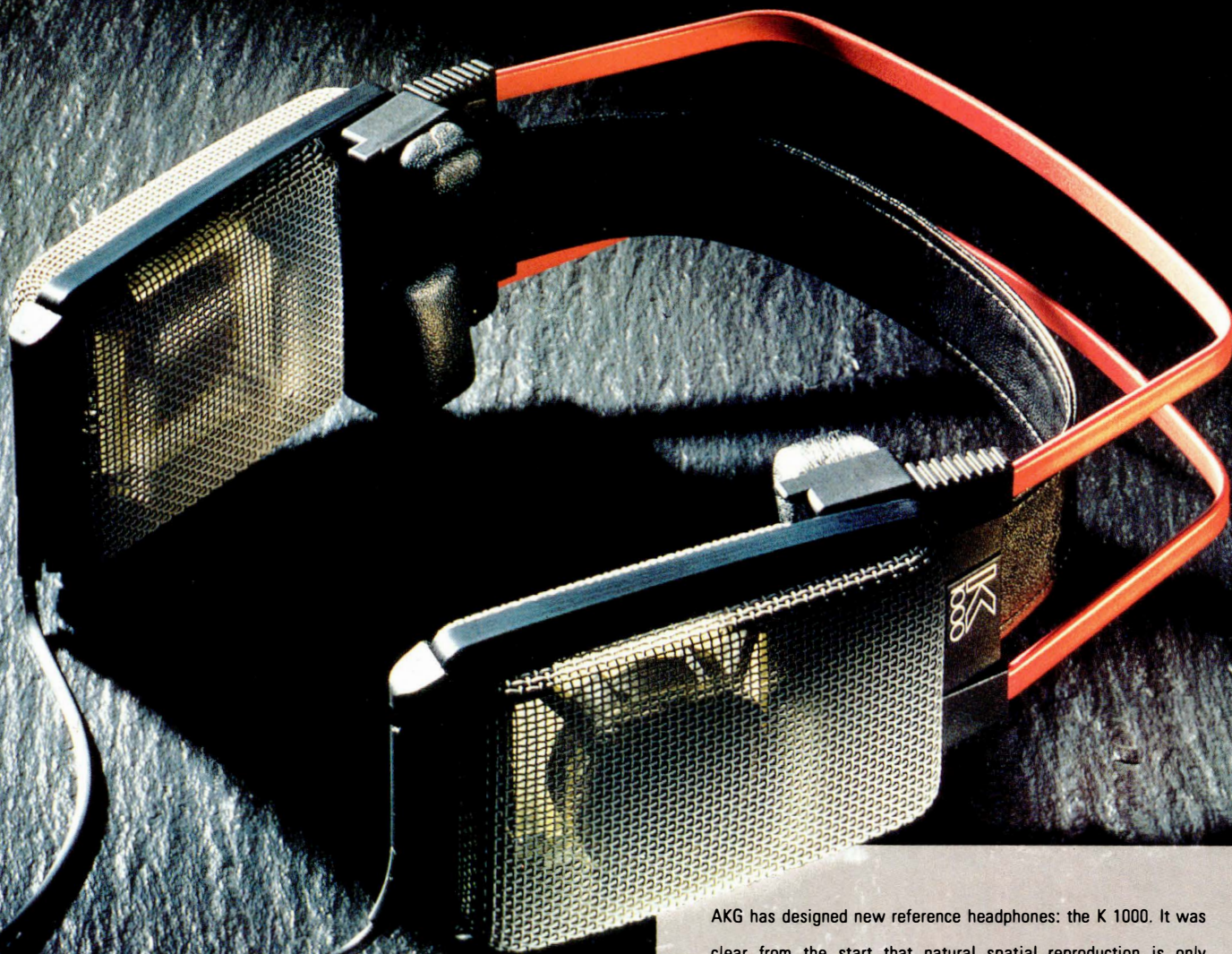


*Voyd's Valdi turntable: endless hours of entertainment.*

# AKG

ACOUSTICS

## A New Reference: The AKG K 1000



AKG has designed new reference headphones: the K 1000. It was clear from the start that natural spatial reproduction is only possible without any ear cushions that would change the sound. This was the idea.

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equipped and comparable deck may be impossible. There is an alternative however. Nakamichi, that master of the cassette deck art, makes a pair of components that can be used to adapt its and other company's decks to accept microphones. The kit consists of the PS-100 power supply (£55) and MX-100 microphone mixer (£75) which accepts up to three mics and connects to the line inputs on the deck.

## Searing strings

A couple of years ago my system consisted of a Sony 337ES CD player, 700ES tuner and Nakamichi BX300 cassette deck driving a pair of Wharfedale Lintons via a Leak 30+ amplifier. It sounded fine, a little warm perhaps, but always musical. A few months ago I made what was to be the 'final upgrade'. The amplifier was replaced with an Audiolab 8000C/Denon POA 2400 combination, the speakers were upgraded to KEF C95s and the system was hooked up with Kimber PSB interconnect and F200 speaker cable. The result: excellent stereo imaging, bags of dynamic slam and good detail in complex classical pieces. Piano is a delight, voices are handled well and military brass band music is absolutely stunning.

Sounds wonderful doesn't it? But you should hear a violin on the system – it's absolutely awful! Glassy and hard with the odd tizz thrown in for good measure. All three sources produce this result, with radio no better than CD. That a friend's Philips midi system sounds much better in this respect leaves me questioning this entire hi-fi business. Is it all hype?

How do I correct the problem without sacrificing

the system's strengths? I am by nature a mean man, but am prepared to spend time and money sorting this out and look forward to your suggestions.

B. RICHARDSON,  
BURGESS HILL, SUSSEX.

PS. I've just read Bill Woodman's comment in July's *Craftsman* feature. He's quoted as saying, "Violin can be searing. . .". Now I'm totally confused – thanks Bill! Surely if it hurts the ear it can't be music – or can it?

*Woah there, that's enough philosophising. This is the letters page you know. Yes, music can be painful, especially amplified music, while acoustic instruments like brass can also 'grate', as can violins, if recorded in an appropriate fashion. Most contemporary classical recordings tend to be multi-miked with close miking of solo instruments, and this can often exacerbate sibilance and headroom problems in hi-fi systems. Another problem is that most of today's recordings are digital, which is at its weakest and most prone to unappealing distortion at high frequencies, a factor that can be exaggerated on playback on CD players. You'd be surprised how many popular players have subtly rolled-off top ends to reduce this 'sear factor'.*

*Other influential factors are the dome tweeters on the KEFs which are at their weakest at the very high frequencies created by violin harmonics. And the interconnect has been criticised for having what Paul Miller calls a 'slightly clanky treble', which isn't going to help.*

*Basically what you'll need to do is soften the top end of the system a bit. This will result in brass bands sounding somewhat less 'stunning' and imaging being a tad compromised, but*

*the overall result should be a more relaxing sound. The most straightforward, if unfashionable and crude, way to achieve this effect would be to use the tone controls on the preamp. A more 'hi-fi' approach would be to toe-in your speakers so that their axis cross in front of the listening position. You might even try leaning the speakers back so that the tweeter is slightly upward-facing. If the sound is still too aggressive, consider replacing the interconnect with something reasonably smooth such as Deltec Slink.*

*If you're still suffering, and have the most basic of soldering skills, try putting together a device like the one suggested by Richard Black in one of the other letters this month. He found that if a simple low pass filter made up of a series 2.7k resistor and a shunt 1nF capacitor was placed between output and interconnect of his Marantz player the sound became smoother and less harsh.*

## The drooping response

Reading Martin Colloms' CD player reviews in the June issue, and subsequently investigating reviews elsewhere, I was struck by the fact that a high proportion of highly recommended CD players have a slightly drooping high frequency response. As an experiment therefore, I tagged a simple low-pass filter consisting of a series 2.7k resistor and a shunt 1nF capacitor (about 0.75dB down at 20kHz) on the back of my (Marantz) CD player, and lo and behold it made quite a difference – a difference at once subtle and obvious.

This is a little confusing; the amplitude and phase changes wrought by such a filter are pretty small compared with typical loudspeaker anomalies, but the sound certainly seemed smoother and less harsh. But then it is known that the ear prefers gentle to steep filters, so maybe the added rolloff and phase shift simply attunes the ear rather better to the CD's limited response. It would be interesting to compare reactions to this

from other listeners – perhaps some readers would care to try it and write in with their findings? But don't necessarily expect the same results with CD players which already have such a response dip!

R. BLACK,  
LONDON.

*The fact that many recommended CD players have a drooping hf response is purely coincidental. And I believe that employing a device such as the one suggested by RB would worsen slew rate and reduce sound quality. MC.*

## Oops department

I refer to the last time *Hi-Fi Choice* tested a large group of CD players (June issue) and the Harman Kardon 73/7400 and 7500 CD players therein. Martin Colloms is mistaken in his identification of chip technology employed. Astonishingly enough, his observations are incorrect in both cases.

To clarify, the 73/7400 design uses a new Burr-Brown 18-bit DAC. It does not use "a hybrid high oversampling/low-bit Sanyo chip set". The HD7500/7600 design employs a NTT/Technics MN6471 MASH/PWM DAC. It does not use "a hybrid high oversampling/low-bit Sanyo chip set".

We are powerless to dispute the findings of the listening panel. However, that a reviewer with the experience of Martin Colloms should make factual errors of this magnitude is as irritating as it is baffling. Could it be that Martin Colloms is writing about a different player altogether – one that employs the mysterious "Sanyo chip set"?  
K. HADDOCK,  
HARMAN AUDIO, SLOUGH.

*We sent a copy of this to Martin Colloms who apologised for the mix up that occurred when he, Chris Bryant and Paul Messenger produced the two reviews. He suspects that the data sheets for the players got mixed up but maintains that all other remarks are attached to the reviews of the appropriate machines.*



HK's smooth-sounding HD7500: NTT/Technics' low-bit DAC, not Sanyo's.

# STOP



*and listen*

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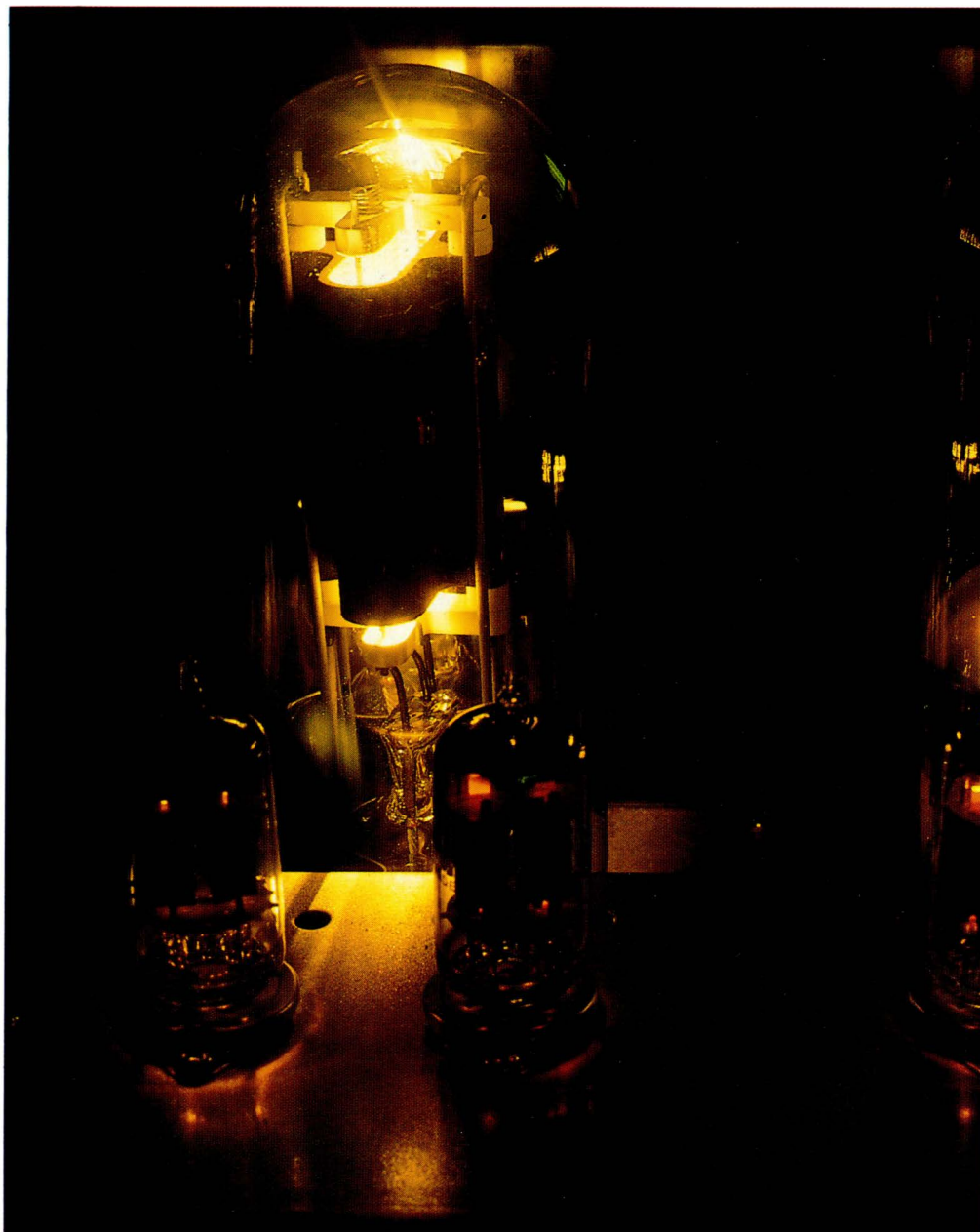
In the first article of this series we looked at the different types of thermionic valves, and how they provide amplification of an input voltage. In this article we will move on to look at how they can be combined in circuits to construct full range audio amplifiers.

To begin, we need to look at the building blocks which make up an amplifier circuit. Like all electronic equipment a power supply is required to provide the voltage across the valve and the current for the heaters. While this needs to provide a very high voltage (several hundred volts in many designs), the amount of current drawn is very low. This is the opposite of the case for transistor amplifiers which require only a few tens of volts but may require several amps of current. Designs using indirect heated valves will also require a separate voltage source for the heaters.

## Output transformers

In most designs the quality of the power supply directly affects the performance of the amplifier as the rapidly changing signal causes varying levels of power to be drawn from the supply. Some types of amplifier draw constant current from the supply, but at the cost of complexity in other areas. Most valve designs, and a few esoteric transistor circuits, use an output transformer to match the load of the loudspeaker to that required by the valve, step down the voltage and increase the current provided.

There are many aspects to the design of transformers. Specialists can spend hours arguing over the details of winding ratios, sections, core materials and construction and types of wire. The design of a transformer requires careful calculation and a knowledge of advanced metallurgy, however this need not concern us here. The need for an output transformer has often been cited as a problem since it must introduce some losses. However, these are minimal in a well designed system. A number of amplifiers have been built which do not use transformers but instead use a large number of paralleled output devices run at low voltages to provide the necessary current capability. Known as 'OTL' (output transformerless) amplifiers, the cost and complexity of such designs tends to put them well outside the mainstream.



There are a large number of different circuit topologies which can be used to build a valve amplifier. The following sections look at some of the main types and describe their usual features.

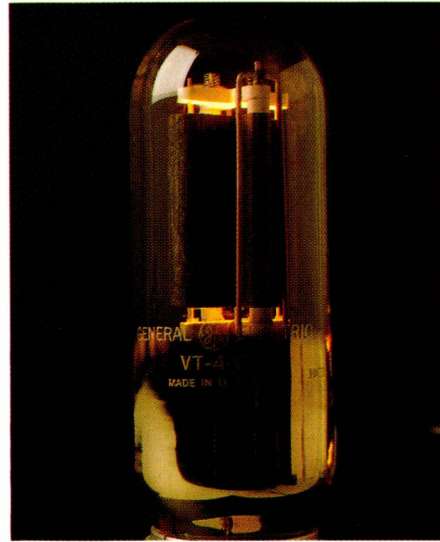
## Valve circuits

Let's start by looking at some of the most commonly used circuit types. The diagrams we have used employ standard electronics symbols for components, thus a jagged line represents a resistor and two parallel lines a capacitor. A valve is shown by a circle with lines to represent the plates, a dotted line to show the grid and a curved line for the heater. All of the circuits shown use triode valves since these are easier to deal with and more widely applicable.

In the first article of this series we saw that varying levels of input voltage on the control grid of a valve alter the flow of current between the anode and cathode. Thus for a given level of input voltage a known current will flow. In

Fig. 1 the current provided by the valve flows through the load resistor (RL) which produces a known voltage drop. Varying the input signal voltage will alter the current flowing through the valve from the anode (A) connected to the high tension line via the load resistor to cathode (K) connected to the ground line. This in turn will change the voltage across the load resistor and thus give us our output voltage. The difference between the input and output signals will be determined by a number of factors, including the transconductance of the valve, the value of the load resistor and the anode resistance of the valve.

You may be wondering where in the circuit the static grid voltage is drawn. The requirement for a negative grid voltage with respect to the cathode can be transposed to a positive cathode with respect to the grid, which is normally tied to earth with a 'grid leak' resistor. By varying this bias voltage the working anode voltage (or operating point) can



## All that glows . . . II

*Earlier this year, in our June issue, Guy Adams and Alan Bateman outlined the operating principles of different valve types. This month they set out to explain how vacuum tubes are incorporated in the design of many high quality audio amplifiers.*

be adjusted. This type of circuit changes a negative incoming signal into a positive output signal - in other words, it is phase inverting. This is not a problem in any particular amplifier stage but some people are sensitive to the absolute phase of a signal and most designers prefer to make their designs non inverting overall.

### Extra components

Circuit one poses a problem if we require a subsequent amplification stage. The static output voltage is equal to the mid point of the anode voltage - that is 150 volts. This grid voltage applied to a subsequent stage would make normal biasing impossible. Circuit two - shown in Fig. 2 - overcomes this problem by introducing a couple of extra components, one capacitor and one resistor. This blocks the DC level differences as the capacitor allows different voltages to exist on either side of itself, in this case 150 volts and 0 volts. The main problem with this circuit is the

introduction of a coupling capacitor in the signal path. The audible effects of these are well documented. This can be minimised by using the best possible types; electrically the best type for this application are the paper and oil variety which have a lower dielectric absorption than the more common polypropylene types and thus less 'memory'. The main drawback is the cost - Japanese audiophiles prize these devices very highly. In the Far East it is even possible to buy capacitors hand wound with silver foil!

It's possible to avoid the problems of coupling capacitors by directly coupling the two stages together (Fig. 3). The

disadvantage of this circuit is the requirement for a high voltage bias supply which is accurate to within approximately 0.0001% and is stable with temperature and time! There are a number of improvements which can be made to this basic circuit but the underlying problem of maintaining the accuracy of the supply remains.

A quite different approach is used in the next circuit type (see Fig. 4) - the Shunt (or Series) Regulated Push Pull topology. This replaces the simple loading resistor with an active load, a second valve. Some of the current flowing through the resistor is shunted back to provide the grid voltage for the

# AFTER CHRIS PORTER MIXES IT WITH GEORGE MICHAEL HE TAKES THE MIX HOME TO HIS AKAI.

It's hard to imagine from the clarity and precision of the "Faith" album that throughout much of its recording the engineer Chris Porter was "legless".

This, however, didn't stop it walking away with a much coveted "Grammy" award (the Music Industry's Oscar) as The Album Of The Year.

In fact, working on crutches following a riding accident whilst keeping up with the exacting standards demanded by George Michael is just one example of Chris's professionalism.

Fortunately the rest of his career has seen him leaping around the world as a producer/engineer producing a Number One for Aswad, and also working with top bands in the USA and Europe.

Not surprisingly he's working again with George Michael on his forthcoming album.

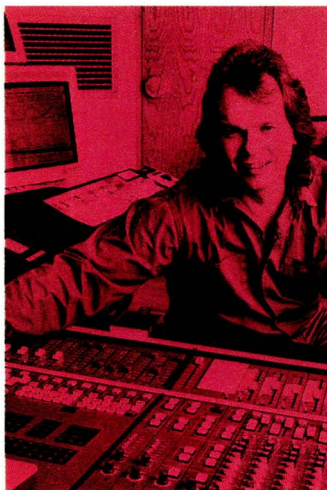
Sitting in his own studio deep in rural Surrey he says, "The engineer's job is to make it look effortless", adding, "when the artist has an idea I get it going quickly".

Getting it going isn't that difficult. He's surrounded by equipment that wouldn't look out of place on the Space Shuttle.

"10 years ago, 90% of this didn't exist", says Chris as he indicates the banks of black boxes, serried rows of dials and switches and pulsating lights.

But then machines like the Akai Pro-Audio Professional range changed everything. Now, at his fingertips Chris has a range of digital effects, samplers, musical computers and drum machines.

Today, George Michael's



songs are created with the assistance of computers and multi-track recorders.

"Equipment technology seems to change month by month" says Chris. But Akai remains at the forefront. "The Akai S1000 Sound Sampler is the industry standard", he adds.

After spending up to six hours a day over the past eight months perfecting what he calls the "sound picture" of each song, Chris often listens to the tape on his Akai midi-system. Doesn't he



notice an incredible difference in quality?

"Not at all" he says, "of course the sound's only as good as the equipment it's played on... listening on some systems is like viewing a painting through out-of-focus glasses".

The Akai range could never be accused of that. Akai's expertise



in satisfying the professionals has created HiFi systems and separates that keep the sound picture in perfect focus.

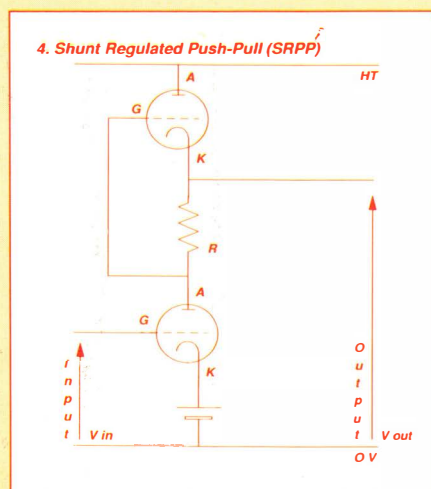
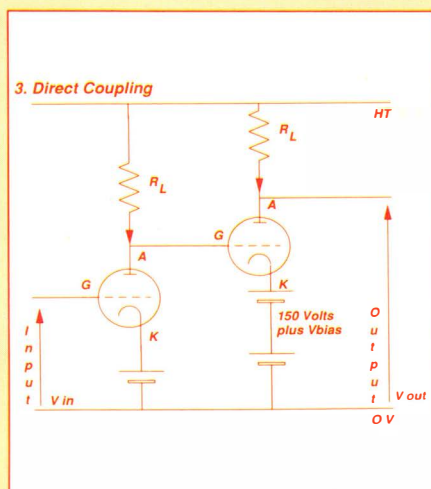
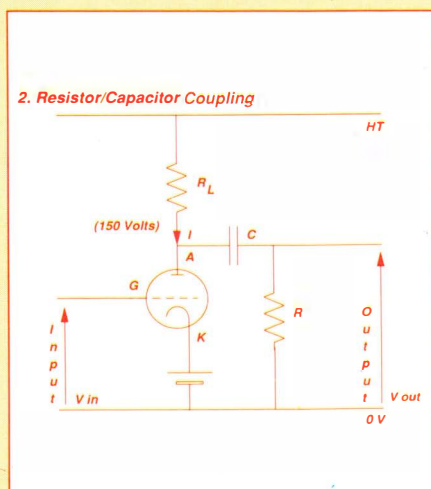
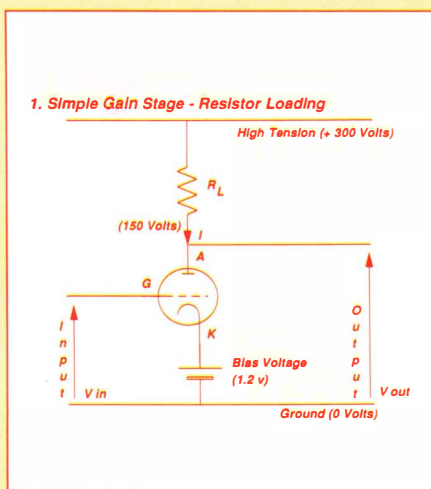
They completely live up to Chris's description of good equipment. "Something that keeps the detail and the punch of what we achieve on the master".



## AKAI

always professional





loading valve, which in turn alters the flow of current through the resistor. This provides the lower, driving valve with a more suitable load and thus improves the linearity of the stage. This in turn means that the distortion is lower, especially for large voltage swings.

Here there are a number of additional advantages for audio use. Power dissipation is lower and so is the output impedance into both simple resistive and complex reactive loads. This type of circuit is becoming increasingly popular.

Cascode operation, shown in Fig. 5, also uses an active loading device but is slightly more complex than SRPP operation. This type of circuit has a major advantage in that its use partly cancels the Miller Effect which introduces parasitic capacitances within the valves and is caused by the proximity of the plates within them. The Miller Effect is normally a problem at radio frequencies but this type of circuit can also have benefits at audio frequencies.

### Transformer coupling

As we mentioned in the introduction, when a valve has to drive the audio signal to the outside world, either to a

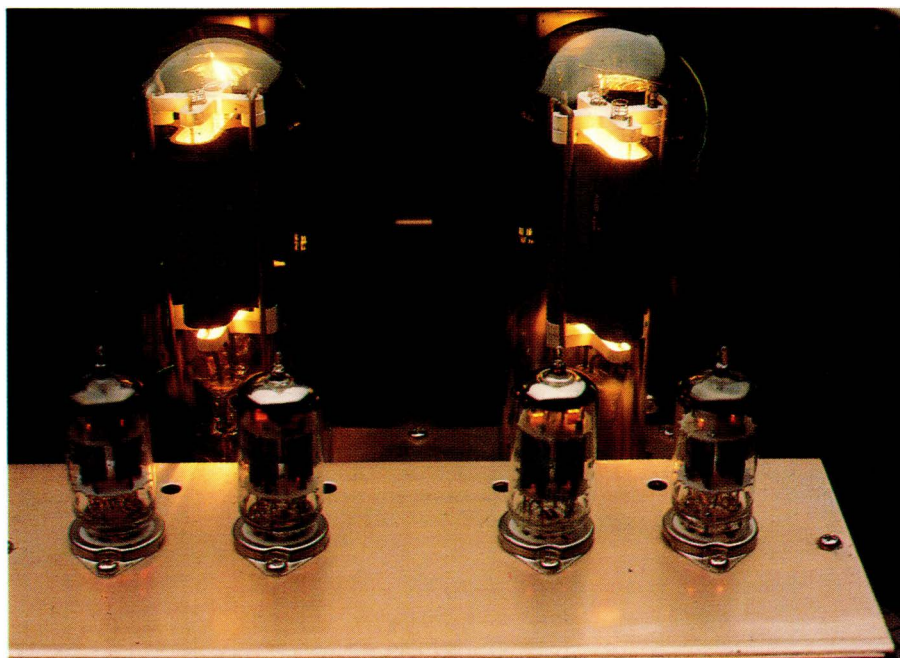
loudspeaker or to a separate amplifier, there is a need to convert the high impedance of the valve circuit to a lower level. The high voltage, low current signal from the valve has to be

converted to a lower voltage, higher current signal as seen from the outside. This is normally done using a transformer.

Transformers use electromagnetic induction to convert one level of voltage and current to another, and consist of a magnetic core with two or more coils of wire wound around it. The first coil is connected to the output from the valve and the signal flowing in this primary coil causes a signal to flow in the secondary coil which is then connected to the loudspeaker. The relationship of the voltage in the primary to that in the secondary is governed by the ratio of turns on the two coils.

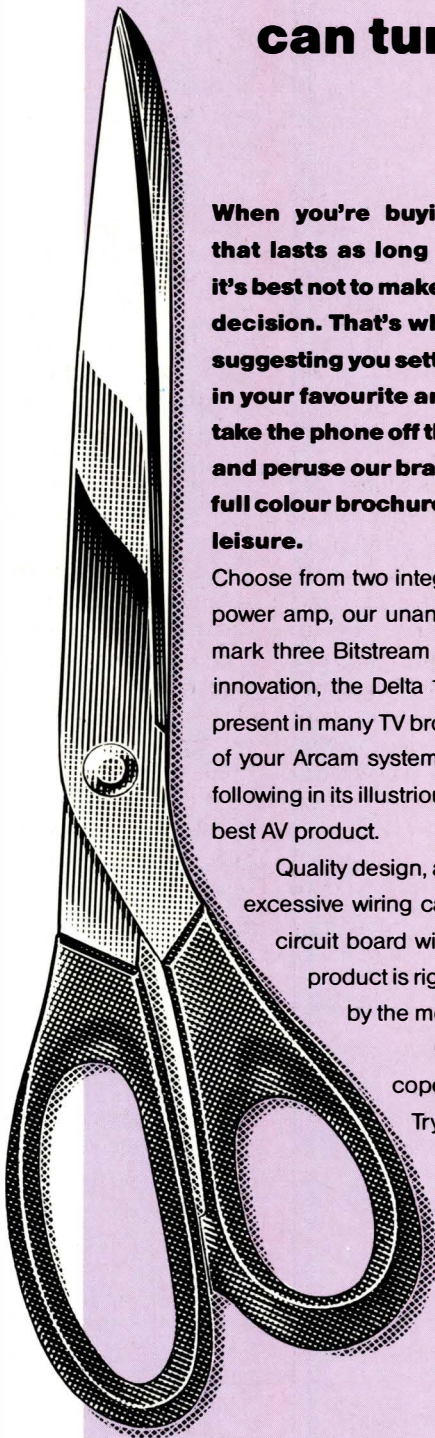
In a power amplifier the voltage is stepped down so there are more turns on the primary than on the secondary. In a moving coil step up transformer, where the voltage is to be increased at the expense of current, the reverse is the case. The impedance the transformer offers with a given load is critical to the performance of the amplifier as it affects both the power output and level of distortion. The simplest transformer coupled output stage is called a single ended circuit, because it has a single primary winding on the transformer (see Fig 6).

Single-ended topology is preferred by many designers because of its simplicity and is widely used in high-end audio in both Japan and France. It does have some significant drawbacks however. For example, there is a tendency for the constant average current flowing in the



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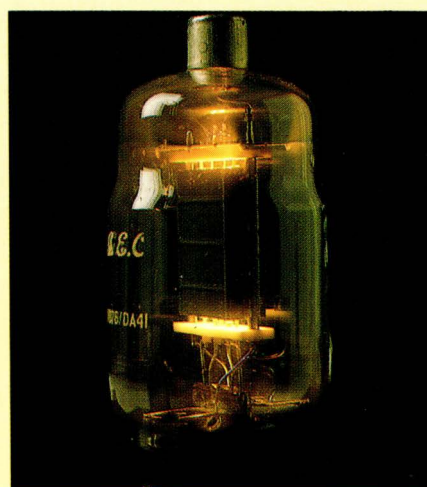
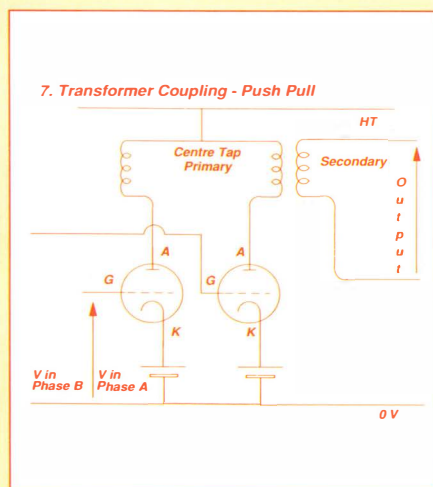
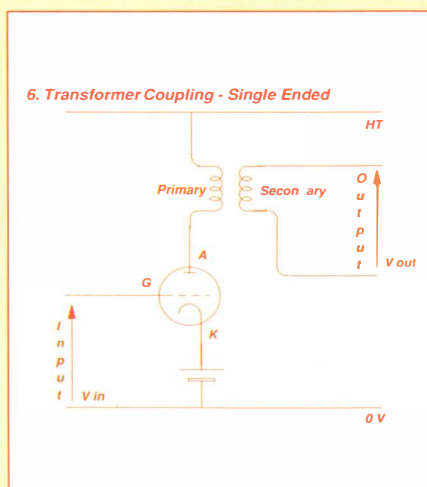
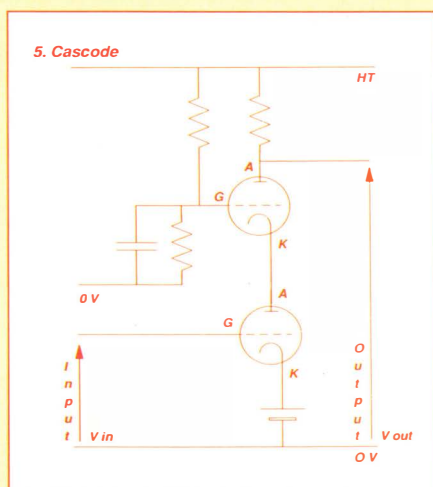
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with saturation of the transformer. The signal frequency components of current in the high tension line also cancel out. Thus the power supply can be made simpler and, more importantly, the current drawn will not vary with input signal. Even order harmonics are also cancelled out, thus the amplifier can supply twice as much power for a given level of distortion. Low frequency response is better and, finally, there is a cancellation of any induced hum from the power supply and heaters. All of these improvements, however, rely on identical valves and a perfectly balanced transformer, otherwise performance deteriorates rapidly. The antiphase signal also needs to be generated (normally using a phase inverting stage such as the resistor loaded valve we described earlier, set for no voltage gain), and this can generate additional distortion.

None of the topologies we have described so far use any feedback. One of the designs used most widely with pentode valves is the 'Ultralinear' circuit which forms the basis of many commercially available amplifiers. Here a wire connection or tap is made part of the way along a winding, and connected to the screen plate of the output valve. This form of local feedback improves the linearity of the stage without reducing power output - but like all feedback has adverse effects on the time domain behaviour of the amplifier. Another approach is to connect separate transformer windings to the anode and cathode of the output valve. This has been used successfully by Quad, EAR and Macintosh among others.

## Conclusion

This month we have tried to explain how most of the common types of valve amplifier circuit work. There are many different types, but to include them all would require a fairly substantial book and be of little interest to the general reader. Anyone interested in delving further should search out a good basic electronics book, or contact manufacturers for product information.

In a later issue of *Choice* we intend to look at another aspect of amplifier design. Negative feedback is widely used to improve the stability and measured performance of both valve and transistor designs. However, there are side effects to using feedback and today's amplifier designers are using it less and less. The next article in this series will explain why this is. Stay tuned.

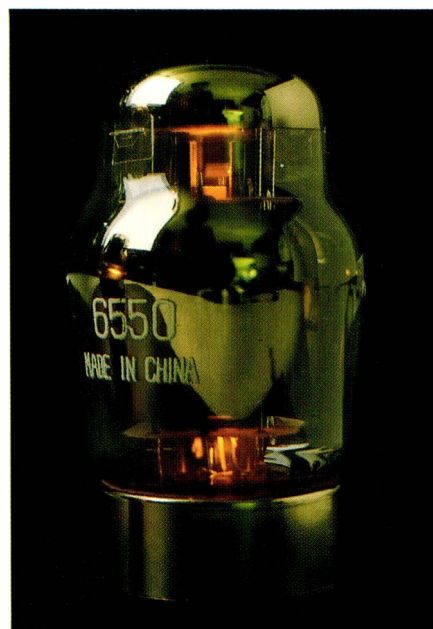
primary to take the core material close to its maximum magnetic flux level. This is known as *saturating* the transformer and it reduces the headroom available for input signals and can greatly increase distortion on peak signals. The low frequency response is relatively poor, while power supply requirements are fairly complex because the output stage can draw up to twice the nominal bias current on audio signals in Class A. In Class AB the problem is usually several orders of magnitude worse. The change in current can be up to 1,000 times on peaks!

## Pushing and pulling

Most of these problems can be alleviated with careful design, the alternative approach being to use a push-pull output stage as shown in Fig 7. Essentially this is two single ended stages connected in antiphase to a single transformer with two primary windings and a single secondary. The windings are arranged so that the antiphase components are added together to look like a single input signal. One half of the circuit pushes while the other half pulls, thus the name.

There are a number of advantages to

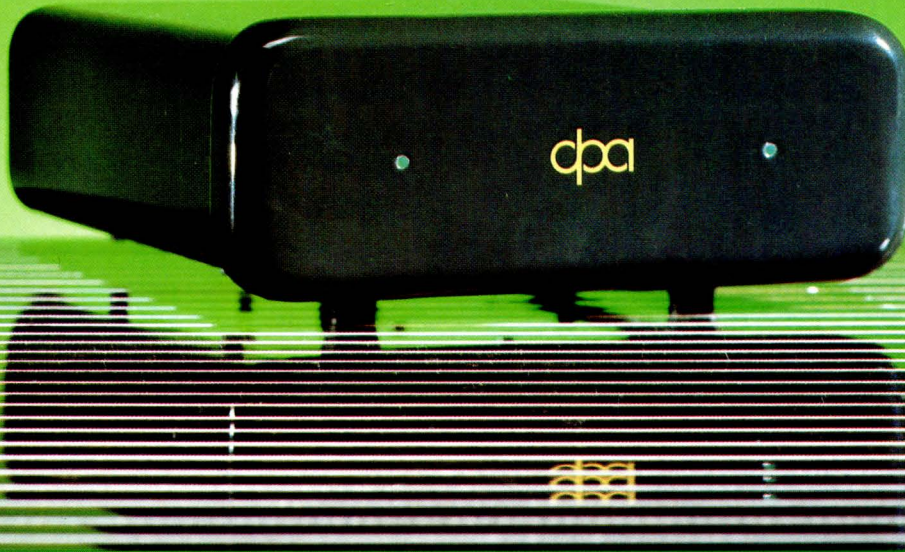
be gained in using this arrangement. Because the direct bias currents in the two windings are flowing in opposite directions they produce opposing magnetic fluxes, thus there is no problem



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# Choosing and Using . . . CD Players

*CD players are now the most popular component in the hi-fi chain. For the uninitiated, Hi-Fi Choice explains what's what in today's machines.*

Compact disc has come a long way in six years, and is now starting to represent a significant percentage of hardware and disc sales (particularly by value). Rather surprisingly, the UK has proved one of the slower growing markets, though this partly reflects a greater difference in price between a CD and its LP or musicassette equivalent than in some overseas markets. Whereas disc prices have only reduced slightly since the format was launched (one or two budget labels notwithstanding), player prices have dropped to a third of those charged when the system was first launched. £200 is now a typical budget price, some machines cost as little as £130, and cheap mechanisms are built into systems and portables.

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

The addition of data channels allows complex pre-programming and accessing, while other CD applications include adding video (CD-Video), interactive A/V (CD-I) and the CD-ROM computer software format. In-car, portable and personal players are in the shops, though there is still the nagging doubt that

tape is inherently more immune to the shock and vibration of such applications, while the wide dynamic range and inaudible background noise can be almost an embarrassment in a noisy environment. Doubters notwithstanding, the format clearly is here to stay, which is an achievement in itself when one notes the enormous historic difficulties encountered by those trying to create a successful new domestic format, not to mention the current problems facing DAT, touted as the tape equivalent to CD. Indeed, DAT may well be a total non-starter now that CD-R (recordable CD) is just around the corner.

## The Discs

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

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

companies to the format.

From the general consumer's point of view, price is still a key factor. While early CD users were clearly prepared to pay a 100 per cent premium, the pricing of CDs has now become something of a political issue as consumer pressure groups are becoming incensed at the lack of freedom of choice. History has shown that the broad base of recorded music sales is very price-sensitive but not especially quality conscious – musicassette purchasers who were attracted by the convenience of that medium were not deterred by sound quality substantially inferior to LP.

## The Players

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

There is also a mild risk that a CD user will find his amplifier no longer seems to go as loud. The reason for this is that the digital CD medium is better at preserving the high loudness peaks in music which analogue systems 'squash' downwards. Consequently for the same peak output, the mean (average) output from CD with the same recording will be slightly lower than before. One can of course compensate by cranking up

the volume, but if an amplifier is already being used close to its limits, the CD peaks could cause premature 'clipping', for which the only solution is a bigger amplifier.

The prospective purchaser faces a wide range of choice at wildly varying prices, starting below £150 and going up to above £2,000. Players are available for in-car use, are incorporated in large portables, and exist as tiny personals, with some doubling as unconventional domestic machines. The mains models can be manual or remote controlled, and simple or complicated in terms of ergonomics and programmability.

Autochanger variations can accept and play from a caddy of half a dozen discs, selected and programmed remotely. For enthusiasts looking for top quality performance, there is now a preponderance of 'two-box' players, where the disc transport and complex digital-to-analogue circuitry are physically separated and have independent power supplies.

Despite protestations of 'perfect' sound, CD players show significant audible and measurement differences, and these are discussed in detail in our reviews. That said, most machines measure very competently, showing occasional weakness at the cheapest end of the market and among low voltage portable machines. Though correlation with measurement still proves elusive, listening tests prove quite capable of consistently distinguishing between the different decks. While the poorer examples can make the new medium sound quite unpleasant, the best can provide eminently satisfactory results with refreshing repeatability and the promise of longevity.

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Originally known for its early mastery of cassette deck technology, Aiwa has also had success in personal stereos, midi systems and standalone CD players, like the budget priced £150 XC333 reviewed here. The company has actually been owned by Sony for many years, but has continued to maintain a separate identity and operate autonomously throughout.

Probably the first Japanese brand to start CD player manufacture in the UK, this has tariff advantages that particularly help the competitiveness of budget players such as this, so like some of its predecessors the '333 carries a 'British made' logo, though in most respects the design resembles normal Japanese design and manufacturing practice.

Indeed, the (mechanical and visual) symmetry of the centrally located drawer and display is very much the current Far Eastern fashion, and the '333 throws in a couple of gold trimmed cosmetic feet at the front for good measure, while three further stubby little feet support the rear and near-centre. In fact the drawer is not quite as central as the styling suggests when it is viewed from below. . .

It's a fairly bulky unit and quite imposing in its way. The display is quite complex, though individual numbers are small, and the total button count is quite high, though good sense lies behind the placing and sizing so that basic operation is very straightforward. Smaller keys handle direct track entry, skip, scan, play and display modes. The handset is slim enough for single handed operation, and includes all worthwhile controls including direct track entry and synchronised record, though there's no remote volume provision.

Construction is the usual metal tray and wrap, with an elaborate and slightly chamfered moulded front panel. Just a single phono pair provides nor-

mal stereo output from the rear, while a fixed level gold plated headphone socket is mounted on the front.

Not surprisingly, many of the component building blocks are Sony sourced, notably the control and digital filter chips, though the multi-bit DAC is an NEC device. The interior has plenty of unused space, and construction is neat though far from hi-tech. The main board is single sided with lots of wire links, components are standard commercial grade, and power supply provision is minimal. The disc drive is a predominantly plastic mechanism with fixed clamp arm and worm drive.

## Lab Report

The lab tests generated entirely satisfactory, if determinedly average results. Output level and source impedance are both a shade high, dynamic range is good, as is low level linearity. Distortions are rather below average at full output level, with mild peak clipping, though low level results are better. De-emphasis is fairly accurate, error correction is satisfactory and noise levels are fine.

## Sound Quality

Though by no means an outstanding sounding player in absolute terms, the '333 nevertheless manages to see off a number of more expensive models, which is an encouraging result for such a modestly priced machine. Average it may be, but it is also basically honest.

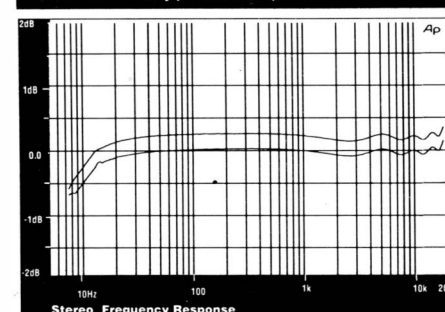
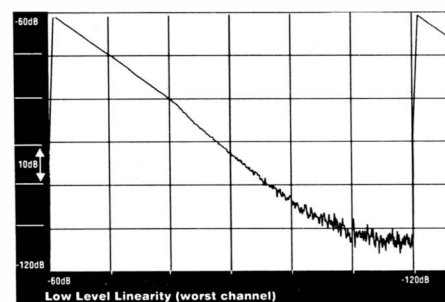
Rhythm and timing both rise above the mediocre and dynamics approach the group average. Focus is reasonably sharp, though depth is unimpressive, and some loss of detail accompanies complex passages. The treble is a little bright and 'grainy', while bass is softer than average, though having said that, it is still superior to that found with competing low-bit designs.

## Conclusions

The XC-333 is an honest sounding, attractively styled machine with a generous feature count which sells at a very realistic £149, ensuring basic good value for money and meriting a *Choice* recommendation.

## TEST RESULTS

Test resolution (L/R av)	15.6 bits		
Output level, dB rel 2V, Source	2.2V, 0.83dB, 1.1kohms		
Effective dynamic range (-70dB thd + N + dither)	92dB		
Harmonic distortion	20kHz	1.0kHz	20kHz
Full level ref 0dB	-67/72dB	-67/72dB	-43dB
at -70dB encode + dither	-37dB, 1.41%		
Stereo separation	107dB	118dB	104/84dB
Stereo balance L/R	0.24dB	0.21dB	0.21dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.15dB		
Audible high frequency intermodulation	-44dB		
Audible electrical noise	-88dB		
Audible mechanical noise	low		
Ultrasonic noise	-86dB		
Error correction	1.5mm gap		
Shock/vibration resistance	very good		
De-emphasis	±0.75dB to 16kHz		
Track finding speed (15, YEDS 2)	3 secs		
White noise overload test	slight negative clip		
Size (w x h x d)	43 x 11.5 x 35cms		
Typical price inc VAT	£149		





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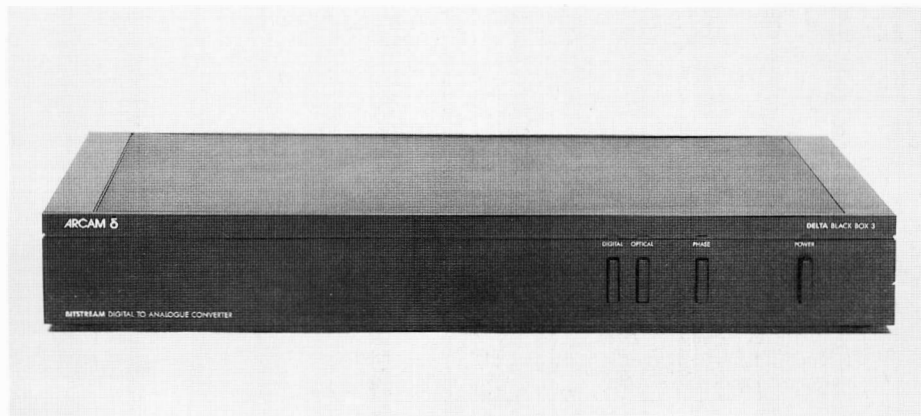
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# Arcam Black Box 3

**R**ecommended

A&R CAMBRIDGE LTD., DENNY END IND. CENTRE, WATERBEACH, CAMBRIDGE CB5 9PB. TEL: (0223) 861550.



Arcam's *Black Box* D-to-A converter can be used with a dedicated CD transport mechanism, like the *Delta 170* featured on the next page, but that's an expensive option and there are precious few around anyway. More usefully you can also use it with CD players that have direct digital outputs, and that applies to a good proportion of those on the market. Buying a *Black Box* is an obvious and cost effective way to update the performance of an older high quality machine without chucking the whole thing in and starting again.

This review of the £349 *Black Box 3* comes exactly a year after our review of the (then £299) *Black Box 2*. But old *Black Boxes* don't die, they merely get cheaper as they get older. You can now buy the original *Black Box* for £199 and the *BB2* for £249, both machines based on the Philips multi-bit chip set. The *BB3* itself provides the 'bitstream' low-bit option for a further £100 premium.

There's virtually nothing in the way of features to enliven the appearance of this unit. You get a neatly enough executed slimline black slab, with three switches on the front (power, input priority and absolute phase inversion), plus the socketry on the back to handle optical and electrical, (coaxial) digital data inputs, a digital output monitor (for DAT), and audio output at two alternative (fixed) levels.

The circuitry is Arcam's implementation of a double differential bitstream design. The *BB* tradition is followed in using separate transformers for analogue and digital electronics respectively. These are board mounted along with the rest of the power supplies and analogue circuitry, while a second board carries the Arcam ADIC and input logic plus the two bitstream chips, one for each channel.

The ADIC already has the double differential facility available, while the bit-

stream chips are mounted with some added physical damping, prior to filtering and differential summing op-amps. TL471 shunt regulators abound, along with *Black Gate* decoupling capacitors.

## Lab Report

The only real sign of weakness on our sample was a channel balance error of around 0.5dB, which was at least consistent with frequency and so correctable by a balance control. Output is a little too high, while the low output impedance is well suited to long cable runs.

Low level linearity is superb, as is expected with low-bit systems. Full level distortion is good enough, while HFIM and low level harmonic distortions are both very good. Noise levels and dynamic range are satisfactory, if less than the best, de-emphasis accuracy is acceptable and slight clip was detected on the white noise overload test. The frequency response shows a slight rolloff in the final octave of audibility, which will probably add a touch of sweetness to the sound.

## Sound Quality

Listening began with the *Delta 170* transport as source, quickly establishing that the electrical connection sounded superior to the optical route, especially in terms of pace and timing. (The optical connection is only really useful if mutual interference between player and decoder causes muting.)

The *BB3* was initially compared to the multi-bit *BB2*, each achieving a roughly comparable overall ranking, though with clear distinctions between the two. The 3 shows its strength in purity, stereo depth and low level resolution, while the 2 remains stronger in terms of drive, pace and dynamics.

However, trying alternative transports showed that the *Delta 170* itself was limiting the performance of the *BB3*. The

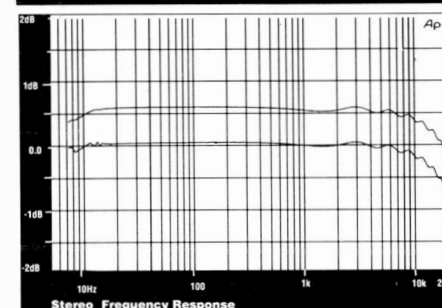
digital output from the Micromega *Optic* produced worthwhile gains, and the (unlikely) combination with a Meridian *208* raised the sound quality still further, firming up and extending the bass while improving rhythm and timing.

## Conclusions

In the final analysis the *BB3* is superior to the *BB2*, sufficient to justify its price premium and merit formal Recommendation. But finding the right transport to do it justice may not be too easy. Using a common or garden Philips type CD player, or even Arcam's own dedicated transport, the '3 offers little advantage over the '2. Paradoxically, the recent £50 price cut on the older *Black Box 2* now demands its belated recognition as a Best Buy rating!

## TEST RESULTS

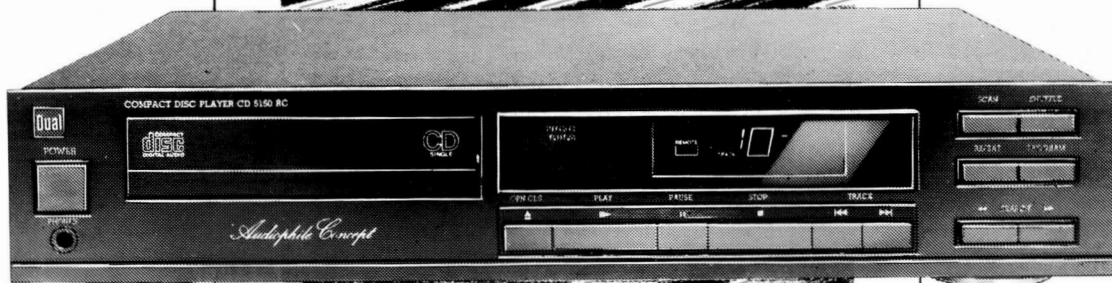
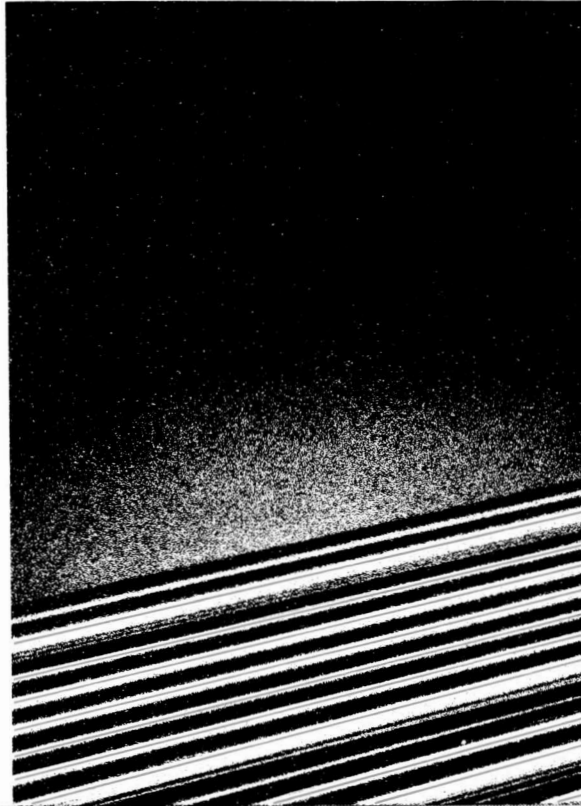
Test resolution (L/R av)		16 bits
Output level, dB rel 2V, Source	2.27V, 0.86dB, 21ohms	
Effective dynamic range (-70dB thd + N + dither)		90dB
Harmonic distortion	20kHz 1.0kHz 20kHz	
Full level ref 0dB	-82dB -81dB -89dB	
at -70dB encode + dither		-44dB, 0.63%
Stereo separation	95dB 94dB 92dB	
Stereo balance L/R	0.55dB 0.55dB 0.60dB	
Frequency response (ref 1kHz) 20Hz to 20kHz		±0.68dB
Audible high frequency intermodulation		-95dB
Audible electrical noise		-88dB
Audible mechanical noise		low
Ultrasonic noise		-96dB
Error correction		4mm gap
Shock/vibration resistance		very good
De-emphasis		±0.57dB to 5kHz
White noise overload test		slight clip
Size (w x h x d)		43 x 6.4 x 28cms
Typical price inc VAT		£350



# Dual

## au' diōphīle cōn' cēpt n. (-'sept-)

*comb. form.* hearing, as: ~LOGY (-ō'l-) *n.*, science of hearing, whence ~LOGIST (-ō'l-) *n.*; ~METER (-ō'm-) *n.*, instrument for testing hearing; ~PHILE *n.*, **devotee of high-fidelity sound reproduction**; ~vi'sual, using both sight and sound. [f. L. *audire* hear + -o-]



### CD5150

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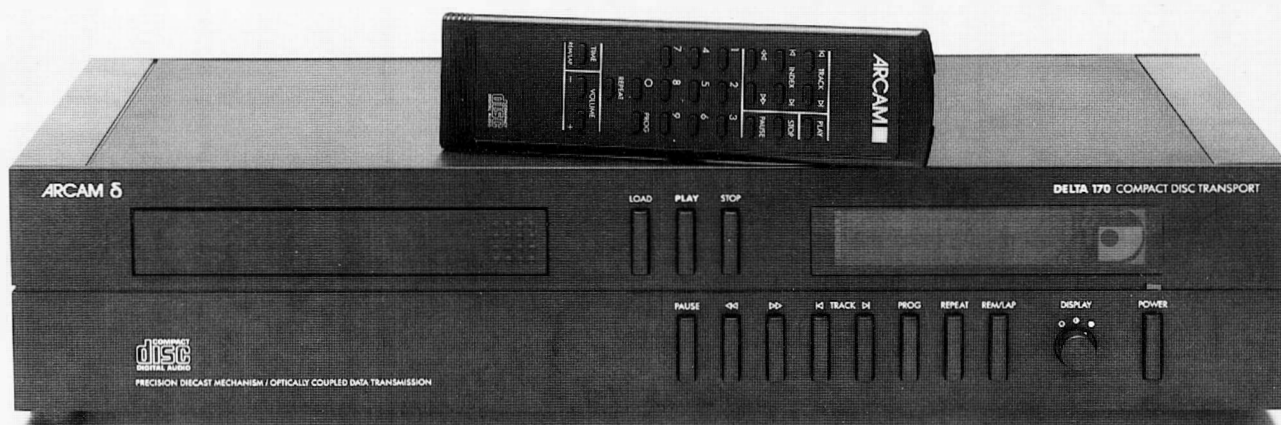
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To audition the Dual CD5150 contact your Hi-fi dealer or, in case of difficulty, contact Ram Projects Ltd. Unit 27 Stretford Motorway Estate, Barton Dock Road, Stretford, Manchester M32 0ZH. Tel: 061-866 8101.

**Ram**  
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# Arcam Delta 170/II

A&R CAMBRIDGE LTD., DENNY END IND. CENTRE, WATERBEACH, CAMBRIDGE CB5 9PB. TEL: (0223) 861550.



A year ago Arcam's *Black Box* became the *Black Box 2*, and the company also came up with its first transport-only CD mechanism, designed to provide a no compromise digital bitstream output for feeding to such a separate decoder unit. The original *Delta 170* transport and *BB2* were tested in *Choice November '89*, but now the former has undergone (slight) revision while the latter is joined by the *Black Box 3*, utilising the new Philips low-bit decoding chips in place of the *BB2*'s multi-bit arrangement.

The *Delta 170* was Recommended in the original review, though not without a little soul-searching regarding the highish (£600) pricetag. The current version costs the same and incorporates some minor revisions, but the need to fully evaluate the new low-bit *BB3* makes this reassessment of its partnering transport well worthwhile. The changes specifically include improved clock accuracy, holding the digital output frequency to within  $\pm 50$ ppm, plus a revised digital output synchronisation arrangement.

It's quite a tall unit at over 9cms, but the horizontal fascia split helps to deceive the eye by creating something of a slimline impression. Apart from sensibly separating the three main operating controls from the rest, there is little concession to ergonomics, as all buttons are the same size and shape, distinguished only by small adjacent legends. Still, the remote handset is a rather nice piece of kit, being a slim and easily handled early Philips type with good graphics and ergonomic layout.

There's not much in the way of fancy

frills either (since audiophiles tend rather to cherish the hair shirt approach), though the ability to dim and switch off the display will be welcomed, since 'display off' does tend to bring a small but worthwhile improvement in sound quality. The display itself is a little larger than usual too. The rear panel naturally only provides digital data outputs, but this is available in electrical or optical form.

Furthermore, the whole thing feels solidly built and properly screwed together. Special feet with Sorbothane inserts are fitted in order to improve vibration isolation. Inside the construction closely resembles the *Delta 70.2* CD player that was its original inspiration. The transformers are located on the opposite side from that used by most Japanese components, so take care if stacking it with a mix of different brands.

The recent modifications serve to reduce jitter, but the basic components are much as before, using the Philips cast alloy subchassis transport with Hall effect motor and swing arm laser, decoupled on a spring suspension. Two separate transformers are used, the original Philips one for the display and control circuitry and a heavily regulated Arcam one for the output board.

## Lab Report

Tested in combination with the *BB3* processor, the total range of lab tests is much the same as usual, but the tests which relate purely to the transport section are rather sparse. Track access is fast enough, shock and vibration immu-

nity is very good, error correction is excellent, while the digital data waveform shows good definition.

## Sound Quality

If the lab tests are limited, the opportunity to ring the changes between different outboard processors brings extra spice to the listening tests. For starters, the optical connection clearly sounds slower and less incisive than the electrical link, and should only be used if interference between the two wired components gives muting problems.

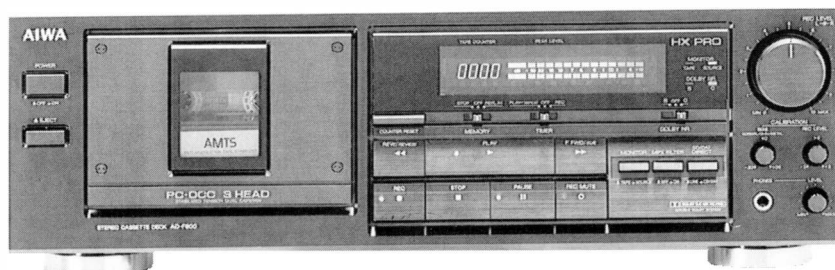
Using the electrical connection, the obvious starting point was with the *BB3*. Results are good, to be sure, but not by a particularly large margin over those which may be obtained using a good quality CD player as transport. Further comparisons show that the *Delta 170* acts as something of a limiting factor on the performance of the *BB3*. Compared to some transports it adds a little sharpness and brittleness to the tonal character, tending to negate the inherent treble sweetness of the low-bit converter to a degree. However, stereo images are generous and impressively well focused and defined, and both pace and timing are very satisfactory.

## Conclusions

Though good, the *Delta 170* is also expensive, and the combination with Arcam's *BB3* processor is not entirely felicitous. Although capable of bettering the digital output quality of a good quality conventional CD player, the margin of improvement is really insufficient to justify the price premium.

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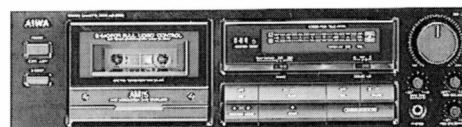
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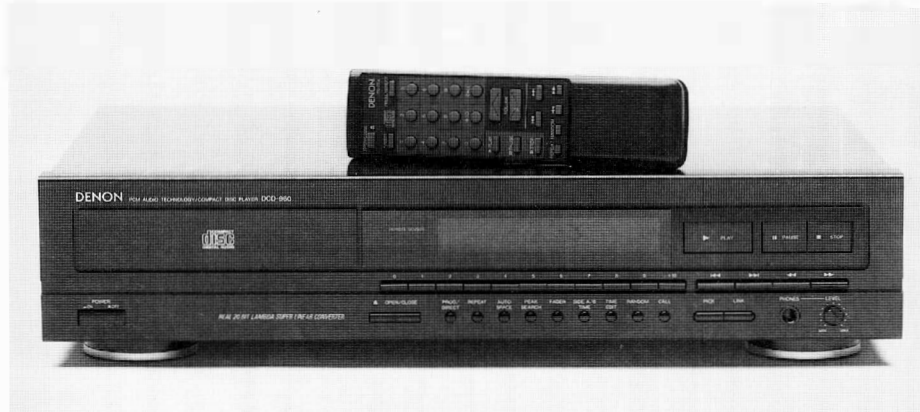
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# Denon DCD960

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The Denon brand has enjoyed several years of rapid growth in the UK hi-fi separates marketplace – success which is all the more impressive since it was one of the last of the Japanese brands to become established over here. The reasons behind this are many, amongst them being the high quality cassette decks that the company makes.

The 960 is a brand new model for the 1990 Autumn season, and represents an update on the 920 which *Choice* reviewed only six months back. Certainly there are cosmetic changes, with a new, slimmer fascia and revised control surfaces, perhaps reflecting the shift from Japanese to West German manufacture. This might also help account for the decision to set the price at £300 instead of the more awkward £319 of its predecessor. Which provides a nice bonus for the purchaser, even though it really only reflects the continuing annual erosion in the price of CD players.

Build is pretty solid and substantial, sitting on gold-trimmed cosmetic feet. There's a profusion of buttons on the fascia, but ergonomics are assisted by the nice control layout with sensible grouping and shape discrimination to help. The feature count is pretty generous, including all the usuals alongside elaborate tape editing. A peak search function scans the compact disc to find and play the loudest passages so that home recordists can set record levels optimally.

The display area is a decent size, with comprehensive flags but smallish read-out digits. Front panel propaganda stresses the: "real 20bit Lambda super linear converter", which is no more than its predecessor used, though it does serve to confirm that the 960 retains the orthodoxy of multi-bit D-to-A conversion, rather than following the rather dubious current fashion for 'low-bit' decoding. The rear has fixed and vari-

able phonos, together with electrical and optical digitals.

Inside all is nice and tidy, though there's nothing particularly special in terms of audio componentry or engineering. The board mounted power supply transformer and associated components is nothing more than adequate. Sony digital control chips operate alongside a custom Denon microprocessor, feeding an NPC digital filter and two Burr Brown *PCM61P* DACs. The transport is a plastic worm drive type on rubber suspension, in this case the clamp dropping down onto the disc.

## Lab Report

The lab test programme gives little grounds for criticism, though it's perhaps more interesting to contrast the 960's performance with its predecessor. The most dramatic improvement is in the low level linearity, which is much more accurate in this new model, rating excellent rather than merely adequate.

Many of the other measurements are pretty similar, though in nearly every case the 960 has the edge over its predecessor, which shows that things are moving in the right direction. As before there's a channel balance disparity, of some 0.24dB on this occasion, though again it's consistent throughout the frequency range and therefore of little importance. Shock and vibration rejection and error correction capabilities are both improved, though the latter is still below average.

## Sound Quality

If this Denon's lab performance has been steadily moving forward from generation to generation, the same cannot be said of the sound quality, which seems to have been marking time over the same period – a period during which other manufacturers have been steadily forging ahead.

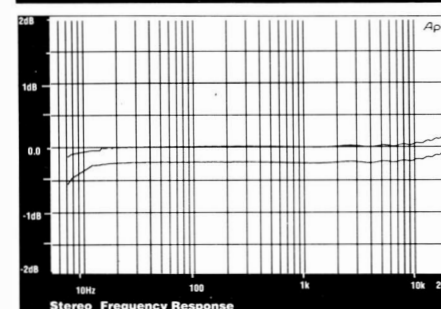
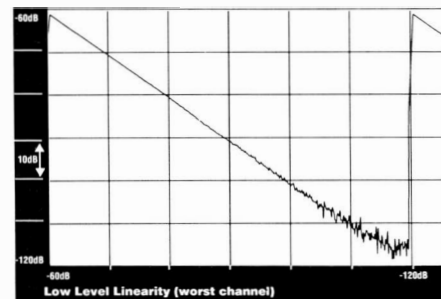
Though it does have the capability to produce a measure of weight and authority, the bass has below average definition and both timing and dynamics are barely average. There's also sufficient old fashioned hardness and roughness in the sound to add a measure of coloration compared to other models.

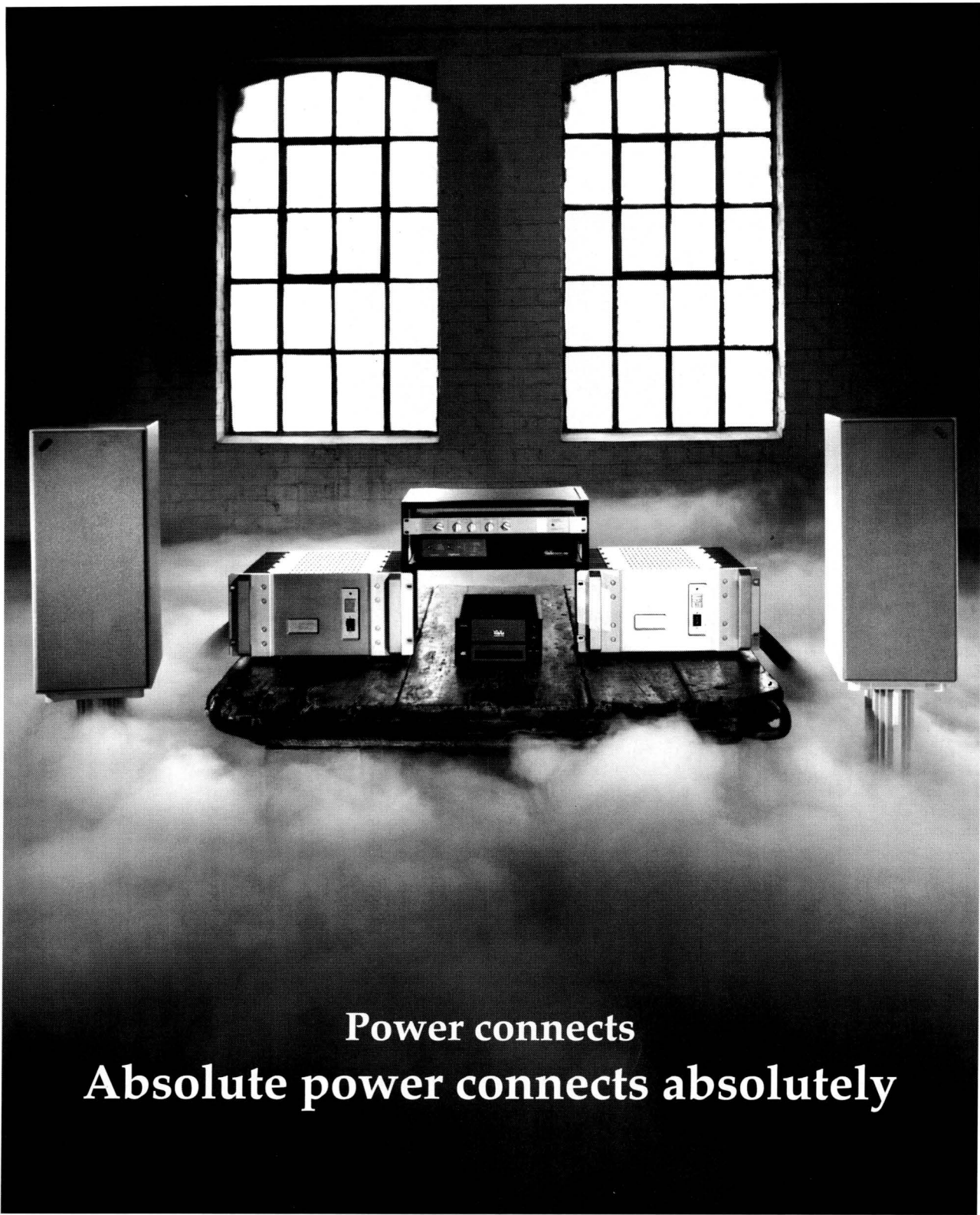
## Conclusions

Though Denon seems quite capable of refining the lab performance, technology and appearance of its players to meet the challenge of a competitive marketplace, the sound quality seems to have become stuck in time somewhere along the way, so that premium price models such as this become increasingly difficult to justify.

## TEST RESULTS

Test resolution (L/R av)	16 bits		
Output level, dB rel 2V, Source	1.92V, -0.35dB, 680ohms		
Effective dynamic range (-70dB thd + N + dither)	103dB		
Harmonic distortion	20kHz	1.0kHz	20kHz
Full level ref 0dB	-88dB	-89dB	-90dB
at -70dB encode + dither	-44dB, 0.63%		
Stereo separation	104dB	104dB	86dB
Stereo balance L/R	0.25dB	0.24dB	0.24dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.2dB		
Audible high frequency intermodulation	-97dB		
Audible electrical noise	-101dB		
Audible mechanical noise	low		
Ultrasonic noise	115dB		
Error correction	1.5mm gap		
Shock/vibration resistance	excellent		
De-emphasis	±0.1dB to 16kHz		
Track finding speed (15, YEDS 2)	2.5 secs		
White noise overload test	OK		
Size (w x h x d)	43.4 x 10.1 x 28cms		
Typical price inc VAT	£300		





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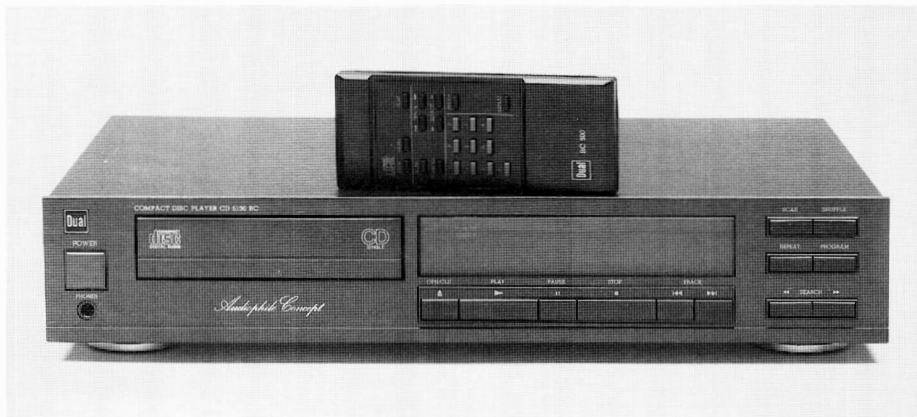




# Dual CD5150

**Best Buy**

RAM PROJECTS LTD., UNIT 27, STRETFORD MOTORWAY ESTATE, BARTON DOCK ROAD, STRETFORD, MANCHESTER M32 0ZH. TEL: (061) 886 8101.



This long established West German brand's main claim to fame has always been an extensive range of budget and medium priced record decks. Indeed, the name Dual refers to the fact that its original model combined clockwork and electric power sources! Distributed by Hayden Labs, these record players have dominated the UK budget hi-fi market since Garrard and BSR faded from the scene a decade ago, though the brand's other lines – amplifiers, cassette decks, CD players and so on – have not had the same attention from a distributor which also handles the successful Denon line.

That may be about to change, because Dual now has a new distributor and will presumably renew its efforts to distribute its electronics products through the well established network that already handles the turntables. Whether this will be sufficient to overcome historical handicaps like distinctly continental styling and highish prices must remain to be seen.

However, the new distributor RAM Projects seems to be adopting a sensible softly, softly approach. Instead of taking every model from the large Dual catalogue, it is cherry-picking selected components that suit the UK scene. The CD5150 RC that is the subject of this review in fact carries a £280 pricetag, which looks on the expensive side for what superficially seems to be on offer. But as the review programme progressed it became clear that there's more to the 5150 than meets the eye. . .

The front panel proudly proclaims this as an Audiophile Concept, the sort of assertion that reviewers encounter all too often, but which in this case turns out to have more than a germ of truth. On the surface it is basically a simple Philips based machine, decently built with metal fascia, wrap and tray, if a bit sharp around the corners.

The control layout is nice and simple, while the display is modest in overall size but has big digits for easy reading at a distance. The remote handset is a little bulky (ie wide) and adds a keypad to the normal basic functions. The small buttons are well laid out with some discrimination. Output is either from a fixed level stereo pair or an electrical digital phono for external DAC connection.

Under the skin, this player turns out to be rather more than a simple Philips clone. In fact it uses Philips building blocks on a Rotel mother board and wraps it all up in a Dual case. The 7120 control chip is not the latest, but is widely used in some of the better sounding players around, while the familiar 16-bit 4x oversampling multi-bit DAC system is fed from film-decoupled current sources.

## Lab Report

Despite the multi-bit DAC, low level linearity is still well maintained down to -110dB, albeit with a mild 3dB error at -90dB. Output level is bang on the spec, from a nice low output impedance. Distortions are all very low, especially high frequency intermodulation. Noise is equally impressive, ensuring a wide dynamic range figure of 106dB.

The frequency responses are essentially flat, with good stereo separation and channel balance. Shock and vibration resistance is very good, while the fine error correction coped with the difficult 4mm gap with just a couple of clicks.

## Sound Quality

The listening tests preceded the lab work, so after rating the 5150 roughly on a par with the Best Buy Rotel RCD 855 tested last November, it was subsequently gratifying to discover the two machines were so closely related.

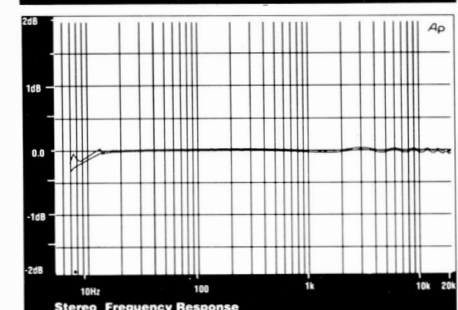
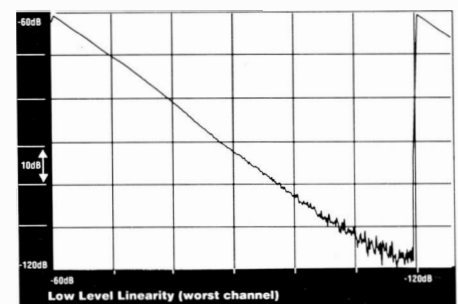
In terms of pace, timing and rhythmic coherence, much of the competition is left sounding tame and slow by comparison. Dynamic shading is most impressive, while stereo soundstages are well formed, with abundant detail, good focus and fine depth. Clarity is consistently high, though the tonal balance is a shade bright with it.

## Conclusions

Capable of matching the sound quality of players twice its price, the 5150 well deserves its Audiophile Concept logo, and is an obvious Best Buy. Those who place honest sound quality and simplicity ahead of the more dubious complexities of the digital disc medium can ask for little more at the price.

## TEST RESULTS

Test resolution (L/R av)	15.7 bits
Output level, dB rel 2V, Source	2.04V, 0.19dB, 200ohms
Effective dynamic range (-70dB thd + N + dither)	106dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Full level ref 0dB	-86dB -86dB -90dB
at -70dB encode + dither	-37dB, 1.41%
Stereo separation	116dB 110dB 92dB
Stereo balance L/R	0.01dB 0.01dB 0.02dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.06dB
Audible high frequency intermodulation	-107dB
Audible electrical noise	-107dB
Audible mechanical noise	low
Ultrasonic noise	-111dB
Error correction	4mm gap
Shock/vibration resistance	excellent
De-emphasis	±0.10dB to 5Hz
Track finding speed (15, YEDS 2)	3 secs
White noise overload test	OK
Size (w x h x d)	44 x 9.0 x 32cms
Typical price inc VAT	£280



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# Goodmans GCD 435

GOODMANS LOUDSPEAKERS LTD., 1 & 3 RIDGWAY, HAVANT,  
HAMPSHIRE PO9 1JS. TEL: (0705) 492777.



Though first and foremost one of Britain's longest established loudspeaker specialists, Goodmans has long used its well known brand to market a variety of imported electronics products, from audio portables to microwave cookers. Amongst these, budget priced CD players have featured for several years, the Taiwan-sourced *GCD 435* being the latest of the breed, priced at a very competitive £140.

Competitive is a euphemism for cheap, and the '435 makes little attempt to disguise the fact. Although the top plate consists of an undamped steel sheet wrap, the rest of this player is pure plastic, so the whole affair is very light and feels somewhat flimsy in consequence, having more in common with midi system than hi-fi separates construction, despite its full 430mm width. Styling is pretty nondescript, the sharp edged flat fascia intelligently placing the five main operational keys immediately below the tiny display.

Less important functions such as repeat, search and programming (including random play for the indecisive) have correspondingly smaller buttons. Serving merely to emphasise the beer budget priorities, only the front two feet have been accorded the dignity of a gold stripe! The rear carries just a captive mains lead and a pair of phono output sockets. The handset too is very basic, simple, small and rather cheap in feel.

The internals reflect the budget exterior, the unshrouded mains side consisting of a small transformer with the minimum of regulation. Most important functions are carried out on a single PCB, whose wiring harness looks a little messy; though some components are actually glued to the board, others look less securely located. Analogue circuitry is the standard mixture of in line and conventional op-amps.

The basic multi-bit technology – control chips and digital filtering – come from Yamaha, the '435 in some ways resembling a price-shaved *CDX1*. The standard worm-drive transport uses a spring-loaded clamp, and the plastic tray slides on a well decoupled steel chassis.

## Lab Report

Again reflecting the low price, the results of the lab tests were generally below average. The frequency responses show close channel balance but a 1dB lift at high frequencies. Linearity fails below -85dB, corresponding to 14.8-bit resolution. Harmonic and intermodulation distortion levels are poorer than average at all levels and frequencies, HF IM registering worse than -50dB.

Noise levels and error correction are satisfactory, but channel separation is below average, shock and vibration rejection is poor and track accessing took a tardy 6secs on our test track.

## Sound Quality

Below average in both price and lab performance, this Goodman fills a similar slot in the sound quality stakes. In some senses it represents the dividing line between 'audio' and 'hi-fi', and in truth is more the sort of performance associated with midi systems than hi-fi separates.

The bass sounds slow and soft, while the mid and treble adds some grain and a degree of hardness. Detail is veiled, focus is weak and the stereo soundstage lacked precision, scale and depth. Dynamics, however, were rather more convincing than the cheapest of the latest low-bit machinery.

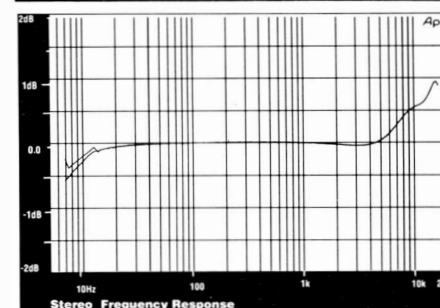
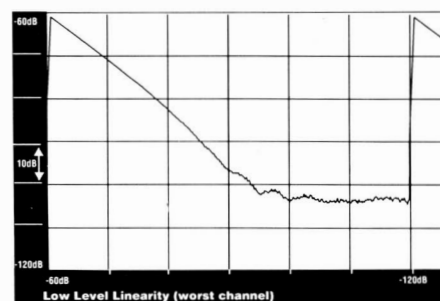
## Conclusions

The *GCD 435* does little more than provide midi system performance and build in a full width package. Cheap it

certainly is, but it also sounds, looks and feels that way too, sufficiently so to preclude formal recommendation.

## TEST RESULTS

Test resolution (L/R av)		14.8 bits
Output level, dB rel 2V, Source	2.23V, +1.01dB, 1kohms	
Effective dynamic range (-70dB thd + N + dither)		93dB
Harmonic distortion	20kHz 1.0kHz 20kHz	
Full level ref 0dB	-65dB -65dB -44dB	
at -70dB encode + dither	-29dB, 3.55%	
Stereo separation	82dB 82dB 73dB	
Stereo balance L/R	0.0dB 0.0dB 0.08dB	
Frequency response (ref 1kHz) 20Hz to 20kHz		±0.95dB
Audible high frequency intermodulation		-47dB
Audible electrical noise		-92dB
Audible mechanical noise		average
Ultrasonic noise		99dB
Error correction		1.25mm gap
Shock/vibration resistance		poor
De-emphasis		±0.35dB to 16kHz
Track finding speed (15, YEDS 2)		6 secs
White noise overload test		OK
Size (w x h x d)		43 x 9.3 x 26.5cms
Typical price inc VAT		£140



# Uxbridge Audio

Dear Sir

Wembley Park,  
Middlesex.

The EXCELLENT service, personal attention and professionalism I found with your staff, compels me to write this letter.

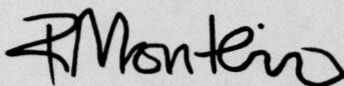
Having embarked on the daunting task of looking for the right music system I visited many Stores and purchased a lot of literature. I was attracted by your advertisement in What Hi-fi magazine. First class sound quality was my top priority and from another article in the same magazine I had made up my mind to purchase a system recommended therein.

A quick phone call to your Shop to find out whether you had them in stock and I was lectured on how a Music System should be purchased . . . "HAVE YOU LISTENED TO IT? HOW DO YOU KNOW YOU WILL LIKE IT'S SOUND? It isn't the same as buying a washing machine, when it has to be taken on faith that it will do the job as you want it. It is more like buying a musical instrument, where personal preference dictates. You do not need to be an expert, you only need to listen to it and decide for yourself . . ."

Not too keen on the lecture, I was, none the less, taken up by what he said, and decided to pay you a visit. This turned out to be quite an experience! After listening to a few systems I had already decided I would be buying my own combination and not the one recommended in the magazine. A MUSIC SYSTEM SHOULD, INDEED, BE LISTENED TO, BEFORE PURCHASING. In addition, the personal attention, friendly, untiring and "non pushy" attitude of your sales assistant, Jas, turned the daunting prospect of choosing the right hi-fi into A MOST PLEASANT EXPERIENCE.

When I first read the letter from a satisfied customer in your advert I didn't think it genuine. But after my experience I know just what he meant. I echo him in commanding you and your staff and I will not hesitate to recommend you. I, once again, thank you for the help in choosing my system and the excellent service and attention I have received at and since it's installation.

Wishing your Company every success



Mrs. F. Monteiro



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# JVC XL-V231

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



Since its invention of the VHS video format, JVC has focused much of its attention on the new imaging technologies. Midi systems have remained very much on the agenda throughout, but hi-fi separates seem to have taken a bit of a back seat in the last few years. That is a situation the company is determined to change, and this new £150 CD player will clearly form a crucial component in the 1990 strategy.

Nominally reviewed as the £150 manual control XL-V231, there's a full remote '331 sister model which sells for about £20 more. However, whichever is chosen, both these models also feature the company's CompuLink interface system which links them into the remote control systems of complete JVC separates systems.

Despite the 'made in Japan' logo, the '231 somehow conveys a very lightweight and rather plasticky 'feel'. Construction is the usual metal chassis and wrap, while the fascia is a deep and rather hard edged plastic moulding; no attempt has been made to provide any environmental isolation.

The key controls for power on/off, tray open/close and disc play/pause are nicely distinguished, if a little clunky in feel, while the subsidiaries for pre-programming and searching are sprinkled about 'neath a generous enough display, albeit one with tiny numbers. Some stress is laid on JVC's own particular implementation of 'low-bit' digital decoding - the so-called 'PEM DD' Converter, a description which is further elaborated as a 'Pulse Edge Modulation Differential Linearity Errorless D/A Converter, combining 4th order noise-shaping DAC with 8x oversampling/n-s digital filter'!

Besides the simple and compact remote handset with keypad convenience, the only other extra which is featured on the more expensive '331 but

left out on the '231 is an electrical digital (phono) output.

At this sort of price, basic commercial grade components are all that can be expected. The transformer is small, and construction is based upon a solitary single-sided board, with surface-mounted control chips. The low-bit DAC is JVC's own implementation, again surface-mounted and showing some operational similarity to the MASH converters. The transport is a familiar enough combination of rubber suspended plastic components, with a fixed magnetic clamp.

## Lab Report

Whatever the ins and outs of this particular low-bit converter recipe, this JVC turned in a pretty distinguished set of lab measurements. Linearity is superb, right down to -115dB, and dynamic range is good too. Noise is low and all distortions measured at the various spot frequencies and levels are excellent results.

The output level is a little above the standard, and comes from a fairly high source impedance. Error correction, de-emphasis and track access speeds are all fine, though shock resistance is only fair.

## Sound Quality

Perversely perhaps, in view of the textbook lab performance, the '231 proved a disappointment in the listening tests. Specific criticism was made of the quality of the stereo image, and the lack of focus in particular. The sound is not particularly clear and music rendition is somewhat lifeless, due in part to a lack of timing and drive at the bass end of things. Image depth is significantly curtailed and the otherwise well balanced treble has a mildly grainy quality.

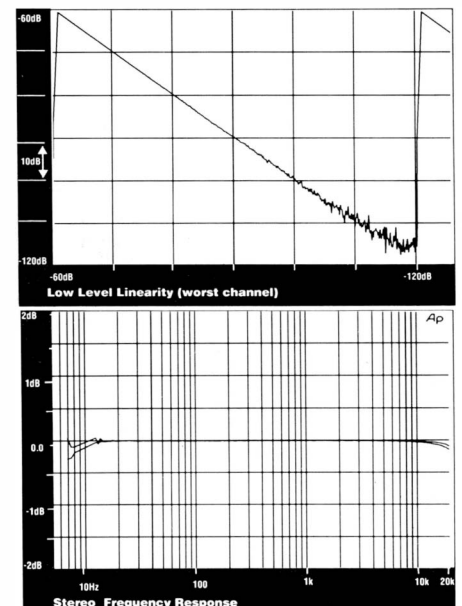
## Conclusions

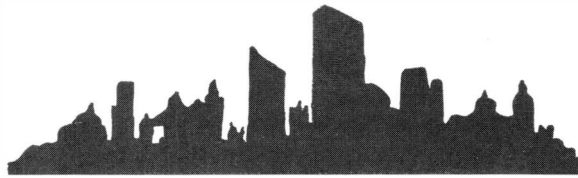
Even without the remote control option,

the '231 looks a pretty competitive package from the point of view of technology, presentation and lab performance. But like so many of the new generation low-bit machines, the sound quality suffers from an overall blandness that does not enhance reproduction of the musical discourse.

## TEST RESULTS

Test resolution (L/R av)			16 bits
Output level, dB rel 2V, Source	2.22V, 0.91dB, 900ohms		
Effective dynamic range (-70dB thd + N + dither)			98dB
Harmonic distortion	20kHz	1.0kHz	20kHz
Full level ref 0dB	-87dB	-93dB	-88dB
at -70dB encode + dither			-45.5dB, 0.53%
Stereo separation	116/108dB	99dB	73dB
Stereo balance L/R	0dB	0.02dB	0.07dB
Frequency response (ref 1kHz) 20Hz to 20kHz			±0.15dB
Audible high frequency intermodulation			-99dB
Audible electrical noise			-96dB
Audible mechanical noise			low
Ultrasonic noise			-97dB
Error correction			2.5mm gap
Shock/vibration resistance			v good
De-emphasis			±0.15dB to 16kHz
Track finding speed (15, YEDS 2)			3 secs
White noise overload test			OK
Size (w x h x d)			43.5 x 8.9 x 29.5cms
Typical price inc VAT			£149





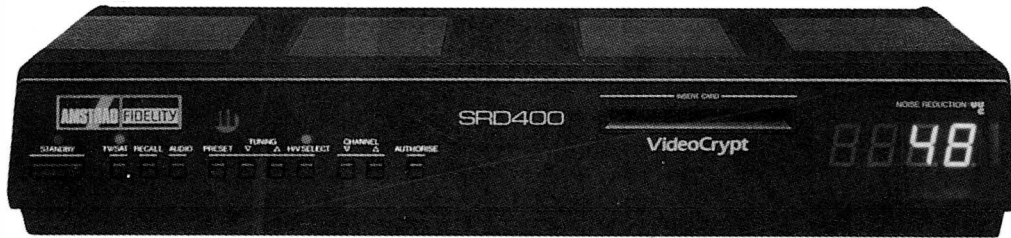
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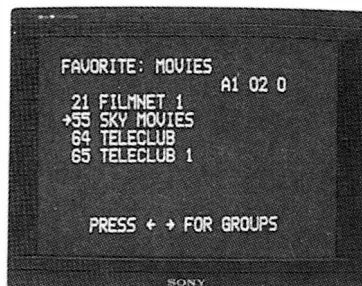
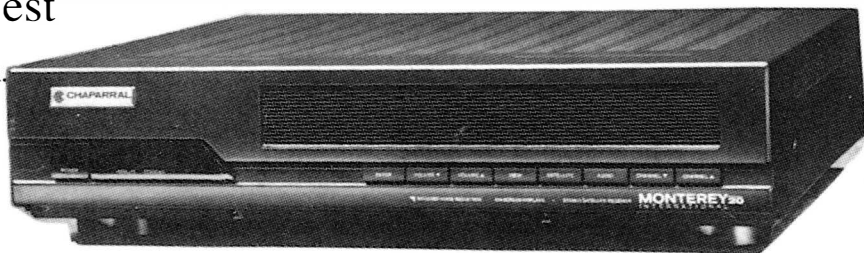
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# Luxman D105u

LASERLOCK LTD., 310 COMMONSIDE EAST, MITCHAM, SURREY  
CR4 1HX. TEL: (081) 646 6418.



Luxman has always operated at the premium end of the market, and this bulky Japanese built player feels solid and substantial – as it should in order to justify a price close to £700. The imposing package emphasises the thermionic content – one of Luxman's trademarks – by placing the two pretty valves behind a small inspection window (so you can see them glow).

The complex large display and drawer mechanism are close to the centre of the unit, leaving the right hand side and lower full width strip to accommodate a fairly hefty button count. The main functions are at least clearly distinguished and readily accessible, while the less important smaller buttons have neat enough legends and the propaganda is minimal.

Construction is certainly beefy, with metal casework and fascia trim providing reassuring solidity. The feet are no more than cosmetic however, while the back panel offers the option of fixed or variable phono outputs, electrical or optical digital outputs plus remote system interfacing.

The handset is a little wide, with lots of identical buttons, but graphic discrimination is very good and the feature count – keypad, volume etc – is comprehensive. Our sample suffered a slightly banana shaped profile!

Given the impressive nature of the presentation, the inside was a little disappointing. Though the valves are given great prominence in both design and propaganda, their actual function seems almost cynically cosmetic, operating in line with conventional op-amps. The power supply is fairly modest, the single transformer backed by half a dozen regulator chips. Some copper foil capacitors are used in the audio filtering, while the variable output is buffered by IC op-amps.

The transport is a pretty conventional

example of the Japanese approach, with ordinary worm drive linear tracking. The control chips are from Sony, while the NPC SM5813 digital filter feeds a pair of Burr Brown PCM 1710P DACs – the latest generation 18-bit devices. The Alps motorised volume control is fitted with a shaft encoder to enable the visual readout of the attenuation setting in dBs (and is none too accurate at low levels).

## Lab Report

Although the lab test programme generated satisfactory enough results, the 105u only really excels in providing excellent immunity from shock and vibration, which is handy seeing that error correction capabilities are below average. Low level linearity is good, with resolution at 15.8-bits, but harmonic distortion is only average and intermodulation is poorer than average. Channel balance is close, separation only average.

The frequency response shows a mild HF rolloff, down about 1dB at 20kHz, which is audible but harmless enough. De-emphasis could be more accurate, while the output level is a shade high, and comes from a high source impedance (halved when using the buffered variable output).

## Sound Quality

The listening tests only served to confirm that the beauty of this player is largely confined to its undoubtedly impressive surface. Sonically it is rather bland, thanks in part to the heavy, softened bass quality which lacks articulation and cohesion with the pace generated further up the range.

The midrange was criticised for a rather syrupy effect which tended to smooth over the subtler aspects of orchestral string tone. The treble is undoubtedly sweet, if a little lacking in definition, and dynamics too are rather

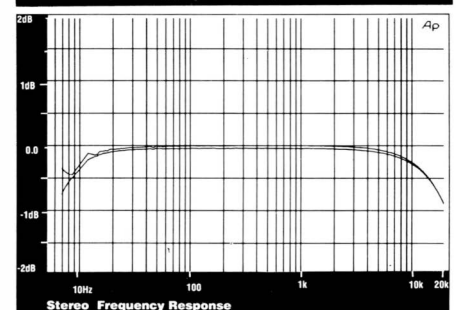
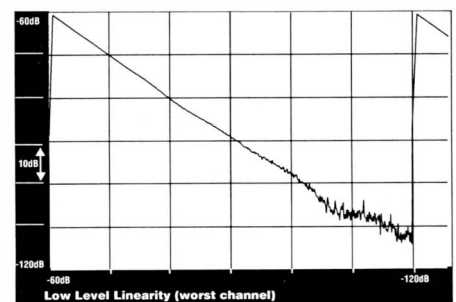
soft. Inevitably perhaps, the stereo soundstage lacks sharp focus and depth is only average.

## Conclusions

The impressive looking exterior of this machine may go some way towards justifying the high asking price and some listeners might well find the easy-going nature of the sound very appealing. But neither sound quality nor lab performance back up the appearance.

## TEST RESULTS

Test resolution (L/R av)	15.8 bits
Output level, dB rel 2V, Source	2.1V, 1.2kohms
Effective dynamic range (-70dB thd + N + dither)	95dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Full level ref 0dB	-71dB -70dB -89dB
at -70dB encode + dither	-43dB, 0.71%
Stereo separation	90dB 87dB 57dB
Stereo balance L/R	0.04dB 0.04dB 0.02dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.9dB
Audible high frequency intermodulation	-71dB
Audible electrical noise	-91dB
Audible mechanical noise	low
Ultrasonic noise	-106dB
Error correction	1.0mm gap
Shock/vibration resistance	excellent
De-emphasis	±0.7dB to 5kHz
Track finding speed (15, YEDS 2)	3 secs
White noise overload test	OK
Size (w x h x d)	43.7 x 14.3 x 34.5cms
Typical price inc VAT	£699



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# Marantz CD-40

**Best Buy**

MARANTZ AUDIO (UK) LTD., 15-16 SAXON WAY IND. EST., MOOR LANE, HARMONDSWORTH, MIDDX UB7 0LW. TEL: (081) 897 6633.



Though part of the Philips empire and sharing much of the same technology, Marantz remains a hi-fi – as distinct from a consumer electronics – company, operates largely autonomously, and in fact is responsible for manufacturing some of the upmarket Philips hi-fi equipment.

The current Marantz range only serves to emphasise the brand's separateness, with a styling that's more than a shade idiosyncratic. No fewer than five models are based on similar building blocks, varying in price, features and sound quality from the £200 CD-40 assessed here up to the now £350 60SE covered last June.

All to date have been based on the familiar and highly successful Philips transport and 4x oversampling 16-bit DAC, though as we are about to go to press comes news of a new CD-41 model, which incorporates bitstream (low-bit) decoding and costs an extra £50 over the '40 – and therefore £20 less than the physically larger and less elegant CD-50. Prospective purchasers now have the Marantz option. . .

The '40 is very much the budget model of the range, and to some eyes the prettiest as well, lacking the rather exaggerated height of its peers and consequently having a better balanced fascia layout. Less is claimed for both internal and external specifications, though all the basics are in place and the omissions seem unlikely to affect the basic functional performance to any substantial degree. You don't get FTS (Favourite Track Selection) or the same direct track entry sophistication, but the basic simplicity of the front panel is its own reward, and the slim 24-key handset is arguably more elegant and easier to use.

Built into a honeycomb-reinforced plastic chassis/case with metal top plate, the main board is to the latest Philips layout with short signal paths,

and the same applied to the transport drive and data handling chips. The well isolated plastic moulded swing arm transport is bang up to date too, and all is neatly laid out and assembled, though the basic components are all of normal commercial grade.

## Lab Report

The test results all look pretty much in order, with no apparent evidence that component grades and tolerances here are poorer than those of the more expensive CD-60. Indeed close comparison shows an almost identical set of measurements, the '40 only falling short of its stablemate in terms of error correction performance and de-emphasis accuracy. The similarity of the test results for these two players merely emphasises the impressive manufacturing consistency of Philips' Hasselt plant!

## Sound Quality

Although the CD-40 does not match its bigger brother on sound quality, it comes very close and certainly takes its rightful place in the hierarchy, as a solid performer that is excellent value at £200.

Solidly above average by virtue of the firm, strong bass line and engagingly lively and dynamic character, stereo focus is good and depth respectable. There's a degree of hardness and brashness when compared with the achievements of the best low-bit players, but clarity is nonetheless consistently high, and it only gives best to the '60 in terms of presentation elegance.

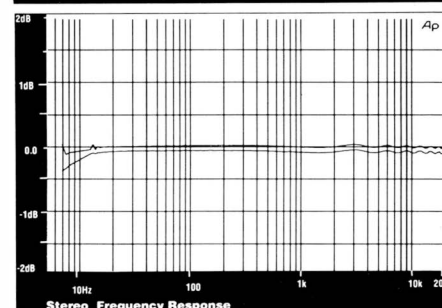
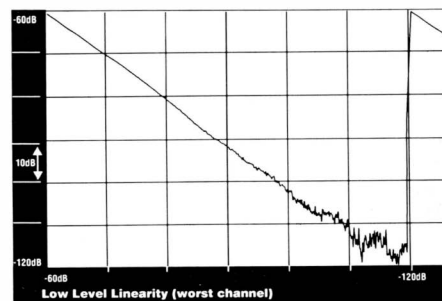
## Conclusions

Although lacking a little of the sweetness and transparency of the more expensive models in the Marantz range, plus a few of the frills and furbelows expected on more upmarket machinery, the CD-40 is just as attractive a package in many ways, and even more so when

the budget price is taken into account. A Choice Best Buy rating is mandatory, but the curious should also try to check out the new CD-41 'low-bit' derivative, which should make for an interesting comparison.

## TEST RESULTS

Test resolution (L/R av)		15.8 bits
Output level, dB rel 2V, Source	2.0V, 0dB, 200ohms	
Effective dynamic range (-70dB thd + N + dither)		107dB
Harmonic distortion	20kHz 1.0kHz 20kHz	
Full level ref 0dB	-93dB -86dB -90dB	
at -70dB encode + dither		-39dB, 1.12%
Stereo separation	125dB 115dB 96dB	
Stereo balance L/R	0.09dB 0.09dB 0.08dB	
Frequency response (ref 1kHz) 20Hz to 20kHz		±0.06dB
Audible high frequency intermodulation		-103dB
Audible electrical noise		-106dB
Audible mechanical noise		low
Ultrasonic noise		-110dB
Error correction		2.4mm gap
Shock/vibration resistance		v good
De-emphasis		±0.56dB to 5Hz
Track finding speed (15, YEDS 2)		3.5 secs
White noise overload test		OK
Size (w x h x d)		42 x 11 x 30cms
Typical price inc VAT		£200



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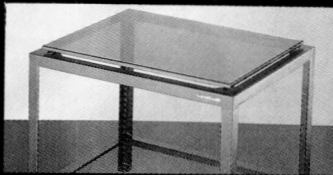
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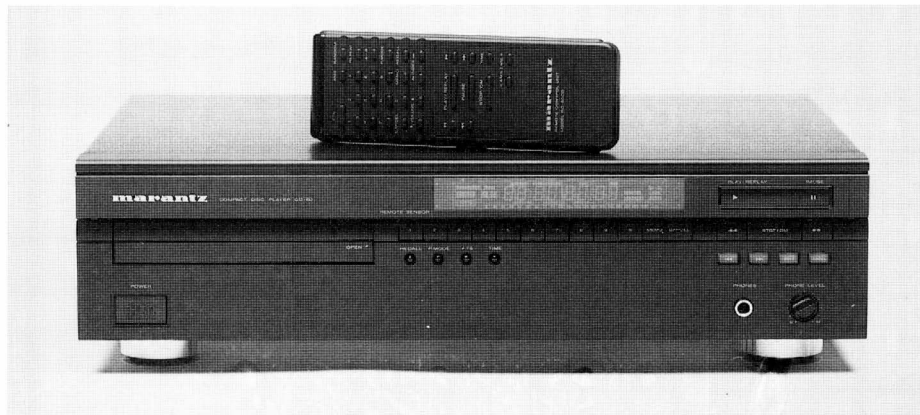
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# Marantz CD-60

**Best Buy**

MARANTZ AUDIO (UK) LTD., 15-16 SAXON WAY IND. EST., MOOR LANE, HARMONDSWORTH, MIDDX UB7 0LW. TEL: (081) 897 6633.



American in origin, Japan-based yet owned by Dutch multinational Philips, Marantz has nevertheless turned out to be one of the leading players in UK compact disc separates. The recipe is to take an established hi-fi brand with good distribution throughout the specialist hi-fi trade, add top quality Philips technology, spice with astute niche marketing and allow to grow for several years.

The earlier Marantz models looked uncomfortably similar to their Philips equivalents, but for the latest models Marantz has invested in its own distinct cosmetics. Certainly this has created a quite separate identity, though it's also true to say the results have more of a US than European influence.

In the last batch of CD players, *Choice* covered both the *CD-50SE* and *CD-60SE*, both of which gained Best Buy ratings at £330 and £380 respectively. These have each had £30 price reductions, which at least no longer means that the *50SE* costs the same as the £330 '60 reviewed here. Predictably this particular package leaves out the *SE* modifications but offers the more elaborate feature roster. (For the uninitiated, *SE* stands for Special Edition, and represents a package of component changes specifically to improve the sound quality.)

By implication, the '60 won't outperform the '50SE, though that doesn't mean it cannot be a good value product in its own right, and there are several extra buttons and facilities, after all. FTS (which can store a specific selection of tracks for each of the discs in a collection) now has its own button on the machine, there's a wide range remote (motorised) volume control, optical as well as co-axial digital outputs and so on.

There are various repeat modes, and editing to tape may be performed via a

wired remote to a Marantz cassette deck. The handset is the current ridged style, which means it's a little wide and nothing special in terms of button layout and discrimination.

Internal inspection confirms the latest Philips 16-bit 4x oversampling board layout, with the latest control chips for the plastic swing-arm transport. A Marantz addition is the high quality Alps motor potentiometer, on its own sub-board with extra 5532 buffering and transistor muting. Multiple cross-bracing reinforces the casework, while the back panel has copper plating to minimise eddy currents. Components are standard enough apart from audio grade Nichicon bi-polar coupling capacitors.

## Lab Report

There's little to distinguish the measured performance of this model from the two *SE* models we tested six months previously, though if anything this sample from latest production shows a mild improvement.

Despite the multi-bit DACs, low level linearity is now consistently very good, holding to -110dB. All other parameters measure well too, with low distortion, very good separation and channel balance and fine dynamic range. Shock and vibration is handled very well and error correction is to the highest order, while the output level closely matches the standard, and from a nice low source impedance.

## Sound Quality

It came as no surprise to find the *60* matching its stablemates' highly competitive sound quality. Clearly standing out from the herd, this variation more or less matches the *50SE*, somewhere between the *50* and the *60SE* and a few points ahead of the *40*.

The main strength is as usual the

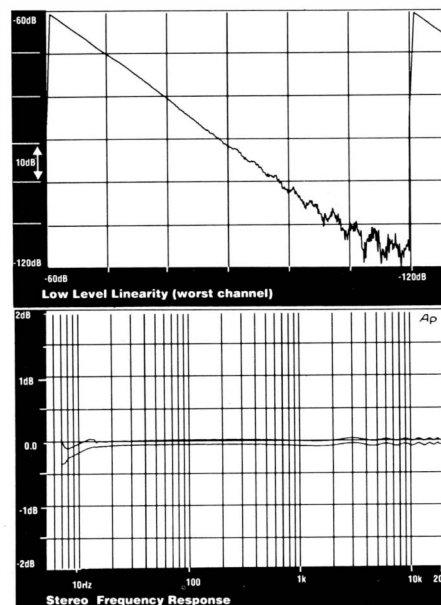
decent, lively pace and good sense of timing, based on a strong and articulate bass delivery. Stereo imaging is stable and well formed and dynamics are firm, though the midrange sounds a little lean. Arguably a little less lively than the *40*, the *60* provides a more elegant presentation.

## Conclusions

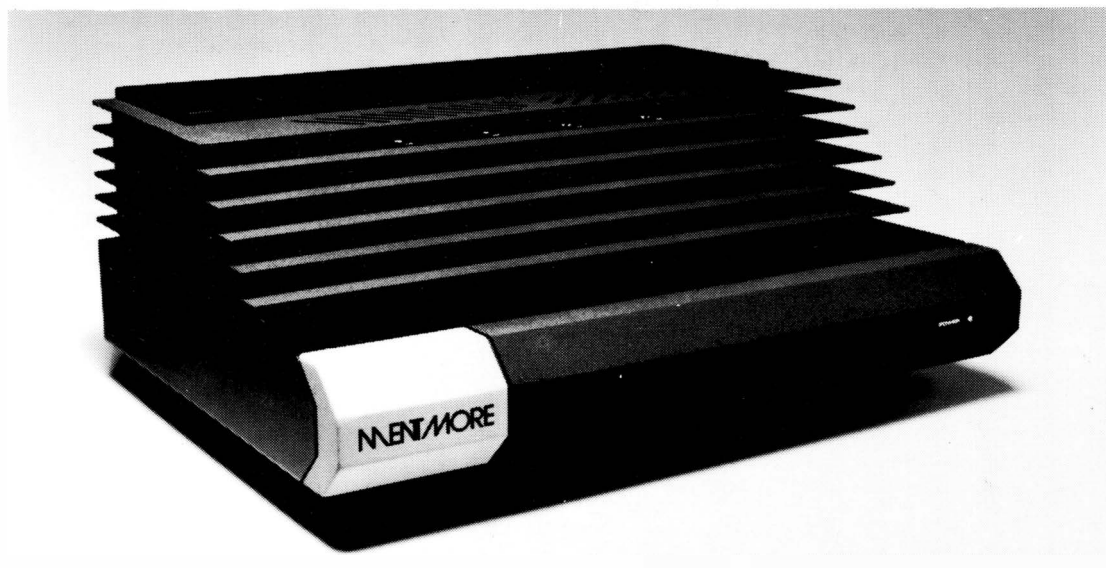
The *CD-60* slots naturally into the Marantz hierarchy, justifying its price on both performance and the generous feature count. Once again a Best Buy rating is entirely appropriate.

## TEST RESULTS

Test resolution (L/R av)		15.8 bits
Output level, dB rel 2V, Source	1.995V, -0.02dB, 200ohms	
Effective dynamic range (-70dB thd + N + dither)		105dB
Harmonic distortion	20kHz 1.0kHz 20kHz	
Full level ref 0dB	-93dB -86dB -90dB	
at -70dB encode + dither	-35dB, 1.78%	
Stereo separation	121dB 117dB 99dB	
Stereo balance L/R	0.07dB 0.06dB 0.06dB	
Frequency response (ref 1kHz) 20Hz to 20kHz		±0.06dB
Audible high frequency intermodulation		-101dB
Audible electrical noise		-105dB
Audible mechanical noise		low
Ultrasonic noise		-112dB
Error correction		4mm gap
Shock/vibration resistance		v good
De-emphasis		±0.07dB to 5KHz
Track finding speed (15, YEDS 2)		3.5 secs
White noise overload test		OK
Size (w x h x d)		42 x 12 x 29cms
Typical price inc VAT		£330



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# Memorex CD1650

TANDY UK LTD., TANDY CENTRE, LEAMORE LANE, BLOXWICH, WALSALL, W. MIDLANDS WS2 7PS. TEL: (0922) 710000.



Memorex may be one of the UK's most successful and widely distributed brands of video and audio tape, but when it comes to hardware the brand is only likely to be found in stores belonging to the Tandy franchise chain. As the back panel points out, it is "custom manufactured in Singapore for Intertan UK Ltd, Memorex and Intertan being trademarks of Tandy Corporation."

The 1650 is a simple and straightforward mid-size player that sells for £200. Apart from infra red remote control there's nothing much in the way of frills, but the metal wrap casework makes it a little heavier than some of the immediate competition.

The plastic moulded fascia avoids any nasty sharp edges and incorporates nicely radiused control buttons. All is laid out neatly enough for intuitive operation of the major functions, though the aesthetic effect is not enhanced by the profusion of feature propaganda. The display area is generous enough, though the inclusion of a track calendar menu has kept the other numbers rather small.

The rear panel has simply a captive mains lead and a pair of phono sockets for the stereo analogue output. A cute little handset covers just basic functions alongside a 10-digit keypad. Some graphics aid the user, but the buttons are identical and almost identically spaced.

Under the skin, the technology is almost nostalgic, the 2x oversampling 16-bit converter being a familiar sight some three years ago. A Sony control chip set operates in conjunction with NEC microprocessor, a Sony digital filter, and a single time-shared Burr Brown PCM56P DAC. All components are standard commercial quality, laid out and neatly assembled on a single board. The power supply is rather modest, and the transport the familiar rub-

ber suspended worm drive mechanism with fixed clamp.

## Lab Report

The frequency response shows much more variation than one has come to expect from modern CD players, the result in some ways imitating that of a typical analogue (vinyl) record player. Low level linearity is poor too, as can be clearly seen from the accompanying graphs, resolution amounting to only 12.5-bits, and disappearing below -80dB.

Low level distortion is much worse than usual, but high level results are quite acceptable. Mild clipping was detected on peak level white noise, but shock and vibration rejection is good, and error correction satisfactory. Though competent enough in many areas, the overall picture is disappointing in the context of the quality of players available today at this price point.

## Sound Quality

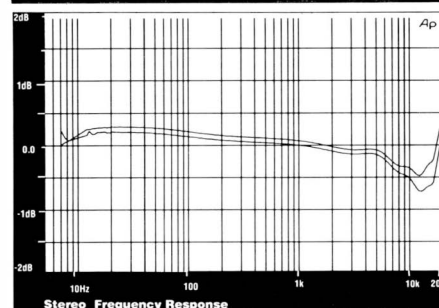
The disappointment of the lab measurements was echoed by the findings in the listening room, which only serve to confirm that the Memorex stands firmly on the bottom rung of this particular test group, on sound quality if not price. The bass sounds soft, uneven and slow, the midband thickened and confused, and the treble edgy and grainy. Timing is slow, stereo focus relatively weak, depth is compressed and there's little sense of space and ambience around instruments.

## Conclusions

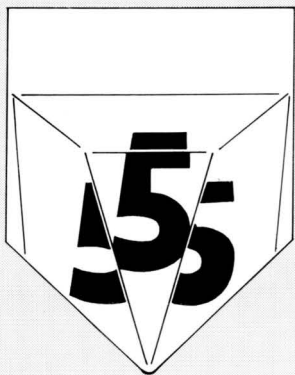
The Memorex CD1650 bears all the hallmarks of a midi system add-on from two or three years ago. What it's doing on the market today – and still at the same £200 such a machine might have commanded back then – must remain one of life's mysteries.

## TEST RESULTS

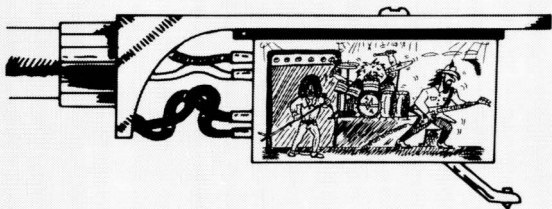
Test resolution (L/R av)	12.5 bits
Output level, dB rel 2V, Source	1.97V, -0.13dB, 1kohms
Effective dynamic range (-70dB thd + N + dither)	90dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Full level ref 0dB	-82dB -82dB -74dB
at -70dB encode + dither	-20dB, 10%
Stereo separation	77dB 82dB 81dB
Stereo balance L/R	0.08dB 0.08dB 0.2dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.72dB
Audible high frequency intermodulation	-78dB
Audible electrical noise	-89dB
Audible mechanical noise	low
Ultrasonic noise	93dB
Error correction	1.0mm gap
Shock/vibration resistance	good
De-emphasis	±0.35dB to 16kHz
Track finding speed (15, YEDS 2)	3.5 secs
White noise overload test	some clip
Size (w x h x d)	36 x 8.5 x 30.5cms
Typical price inc VAT	£200



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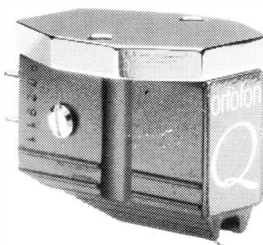
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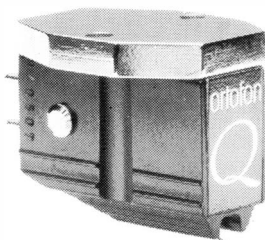
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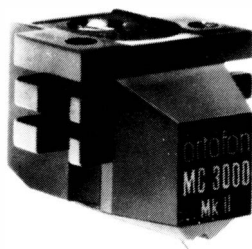
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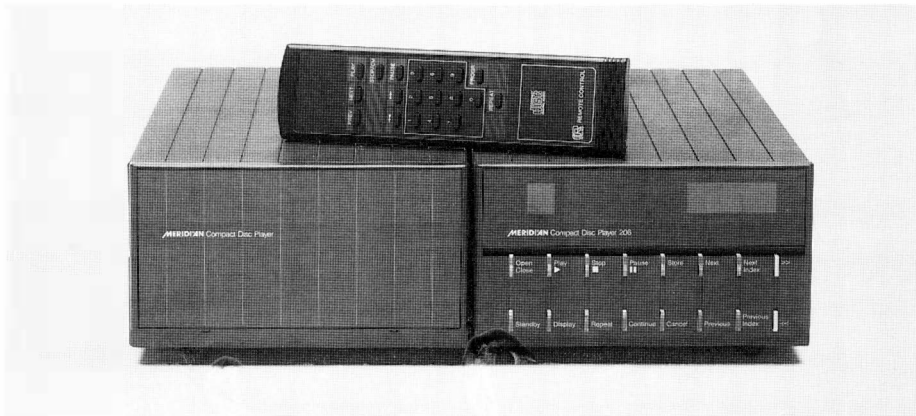
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# Meridian 206B

**Recommended**

MERIDIAN AUDIO LTD., 13 CLIFTON ROAD IND. EST., HUNTINGDON, CAMBS PE18 7EJ. TEL: (0480) 52144.



Meridian was the first British hi-fi specialist to get into CD, and the company has worked hard and effectively to maintain its lead in the audiophile sector. Extra money and management arrived from KEF a couple of years back, and the result is now seen in the rapid introduction of a number of new models, all based on the same basic proprietary engineering and technology, but tailored to create a real element of choice for those who are more interested in performance than price.

The current surge of activity really began with the 206 and 208 models which were introduced in early 1990 and reviewed (very favourably) in our June issue. The 206B covered on this occasion is a logical extension.

All are built onto the same very attractive chassis. The original 206 is a straight – though very refined – standalone CD player based on Philips multi-bit DACs and transport alongside Meridian components, selling for £800. The 208 went straight to the top of the price ladder, the £1,490 pricetag (more or less) justified by a more elaborate remote control unit, a built in high quality preamplifier and – most important of all – it was the very first commercial CD player to incorporate the Philips bitstream (low-bit) DAC, and in an unusually advanced application.

The new £900 206B is a logical development of the above, taking the basic 206 standalone player but replacing the multi-bit DAC with a bitstream implementation similar to that used in the 208. It's not quite that simple of course, since ongoing incremental improvements are made to all players, with the availability of new devices – on this occasion an improved control microprocessor now permits direct music drive from load, for example. Incidentally, another new model introduced at the same time is the 200 CD transport,

which leaves out the DACs and audio circuitry and costs £750.

Build is reassuringly solid, especially the substantial disc drive/drawer mechanism, and controls have good feel. Recalling the radical two-box 207 of several years ago, the unit is effectively made up from two separate side-by-side sections, keeping transport, control chip and power supplies away from the processing and audio electronics. A deep and substantial drawer mechanism takes up the left hand half, and this seals against the alloy casework to provide a measure of acoustic isolation for the playing disc.

The Philips Hall motor swing arm transport is mechanically stiffened and mounted on Sorbothane decoupling. Two bitstream DACs are used in true differential mode, an external shift register and logic circuitry sorting out the timing. Good quality analogue components and circuitry is used throughout.

## Lab Report

It almost goes without saying that the 206B produced a textbook series of test results. What's rather more interesting is to compare and contrast the findings with those from the 206 and 208 before. And in almost every respect, the 206B matches the results obtained with the expensive 208 – notably the superb low level linearity but also including the slight peak clipping on white noise overload, 0.3dB de-emphasis error and slight channel separation asymmetry.

## Sound Quality

Sound quality too matched the industry reference standard which was set by the 208 – indeed, the 206B seems to have a slight edge in terms of dynamics and grip. Stereo staging is superb, with excellent width and depth, while focus and definition are very precise.

By absolute standards the 206B still

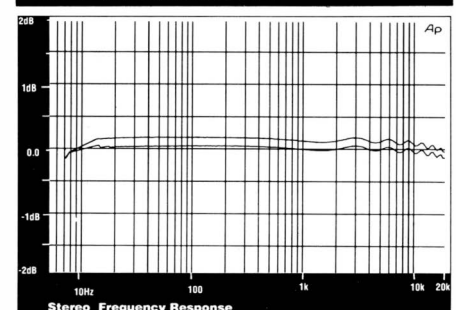
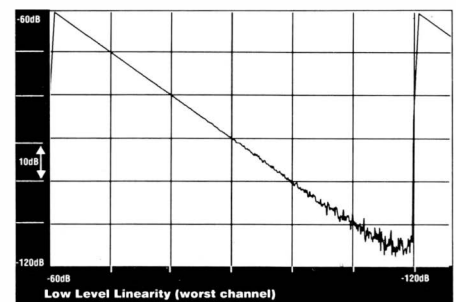
shows the fundamental character which some regard as the Achilles heel of low-bit processing to date. The bass sounds a little reticent and compressed, and the full dynamics of expression are somehow a little muted. But the strengths are there in abundance too: in the neutral balance, natural vocals, the sparkling and almost grainless treble and the purity of violin sounds – virtues for which many would willingly sacrifice a little get-up-and-go.

## Conclusions

The 206B's £900 pricetag precludes Best Buy status, but it handsomely deserves the heartiest of Recommendations, setting a new standard of sound quality amongst CD players regardless of price.

## TEST RESULTS

Test resolution (L/R av)	16 bits
Output level, dB rel 2V, Source	2.18V, 0.75dB, 12ohms
Effective dynamic range (-70dB thd + N + dither)	100dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Full level ref 0dB	-94dB -91dB -90dB
at -70dB encode + dither	-47dB, 0.447%
Stereo separation	126dB 123/110dB 116/103dB
Stereo balance L/R	0.15dB 0.13dB 0.10dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.13dB
Audible high frequency intermodulation	-108dB
Audible electrical noise	-97dB
Audible mechanical noise	v low
Ultrasonic noise	-98dB
Error correction	1.5mm gap
Shock/vibration resistance	good
De-emphasis	±0.3dB to 5Hz
Track finding speed (15, YEDS 2)	3 secs
White noise overload test	slight peak clip
Size (w x h x d)	32 x 10 x 33.5cms
Typical price inc VAT	£899



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# Micromega Duo BS

THE MUSICAL DESIGN COMPANY, PO BOX 13, LONDON E18 1EG.  
TEL: (081) 989 0692.



French-based Micromega makes a variety of distinctive looking CD players. The company also manufactures an expensive (£1,600) CD transport, previously called the *Digital* but now sharing the *Duo* designation with the £499 outboard 'bitstream' *Duo BS* digital-to-analogue converter assessed here.

Every CD player already has its decoding 'second half' already built in, so there's no need to spend several hundred pounds extra to do the job. There's no need, but doing so is more or less guaranteed to improve the sound quality of the player and system, which is why audiophiles – particularly those soldiering on with early generation CD players and enthusiastic to try the new low-bit conversion technology – regard the purchase of an outboard DAC as an interesting proposition.

Note that you can only use such an outboard unit alongside a player fitted with a digital data output (which means most of the serious players around, but not all the cheap ones). This can either be in electrical form, usually using a single phono socket, or in optical form, using a fibre-optic link between the units. Our overwhelming preference is at present for the serial electrical interface on sound quality grounds, though with some combinations of equipment muting interference may arise, in which case an optical alternative will sort out the difficulty.

To get back to the unit in hand, the *Duo BS* is configured as a long narrow square tube, and should look discreet enough parked alongside a CD player or amplifier. It's pretty enough in its way, and nicely furnished too. Two front panel switches select between electrical and optical inputs, and invert the absolute phase of the system. The rear has the mains switch, the optical and electrical data inputs and the two output stereo audio phonos. C'est tout.

There are close conceptual parallels between the *Duo BS* and the similarly priced Deltec *PDM One* DAC unit assessed last June. This Micromega uses an elaboration of much the same componentry as that incorporated inside the *Optic* front-loading player. Transformer is from Holden & Fisher, with seven separate bridge rectifiers followed by eleven large electrolytics and ten chip regulators. A single Philips 'bitstream' (low-bit) chip is used with 'LF356' op-amps in the filter stage. The DC coupled output buffer uses discrete transistors and polystyrene filter caps, and the designer even found time for a bad French joke, by deliberately wiring the stereo left and right channels in reverse!

## Lab Report

As with the *Optic* (and also the Deltec for that matter), one result of using a single Philips low-bit decoder chip is a rather indifferent set of test results, though to be fair the *Duo* is certainly better than the *Optic* (and more than a match for the Deltec too).

Low level linearity is certainly flawed below 85dB, achieving only 15.2 bits resolution, and there was some suggestion of hum modulation in the DAC. Distortion is unexceptional, as are noise and dynamic range, though both are significantly better than the *Optic* implementation. Output level is accurate, from a flexibly low source impedance. The response is smooth, channel balance close and stereo separation is good. Slight clip was noted on the white noise overload test.

## Sound Quality

If the lab findings were nothing special, the *Duo* vindicated itself in the listening tests, driven primarily with *Optic* and Meridian 206 transports. The overall sense of coherence is very good, placing this DAC firmly in the audiophile class,

**Recommended**

aided by the tidy, well mannered musicality of the typical bitstream sound. Considerable detail is retrieved, even on more complex material, and presented with fine and consistent focus in a generous and well formed soundstage.

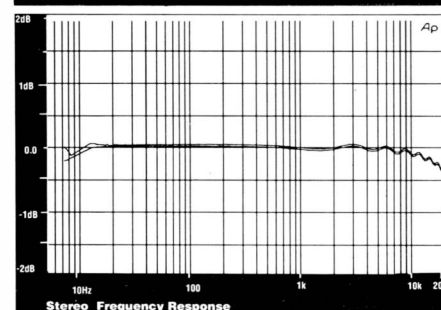
Bass slam, rhythm and timing are not quite in the same league. Pace is slower than it should be and consequently the overall effect is just a little too laid back and relaxed.

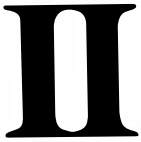
## Conclusions

Despite the highish price, the *Duo BS* deserves Recommendation simply because of the fine sound quality it is capable of producing. It is certainly capable of delivering the delightful transparency of top quality low-bit de-processing, the caveat being to ensure that an appropriately high quality transport mechanism supplies the source data.

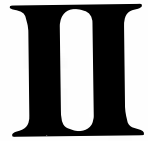
## TEST RESULTS

Test resolution (L/R av)	15.2 bits	
Output level, dB rel 2V, Source	2.07V, 0.30dB, 10ohms	
Effective dynamic range (-70dB thd + N + dither)	96dB	
Harmonic distortion	20kHz	1.0kHz
Full level ref 0dB	-91dB	-90dB
at -70dB encode + dither	-35dB, 1.77%	
Stereo separation	101dB	96dB
Stereo balance L/R	0.03dB	0.02dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.35dB	
Audible high frequency intermodulation	-88dB or 0.00398%	
Audible electrical noise	-94dB (CCIR ARM 1kHz)	
Ultrasonic noise	-97dB	
De-emphasis	±0.40dB to 5Hz	
White noise overload test	very slight clip	
Size (w x h x d)	8 x 9 x 31.5cms	
Typical price inc VAT	£499	





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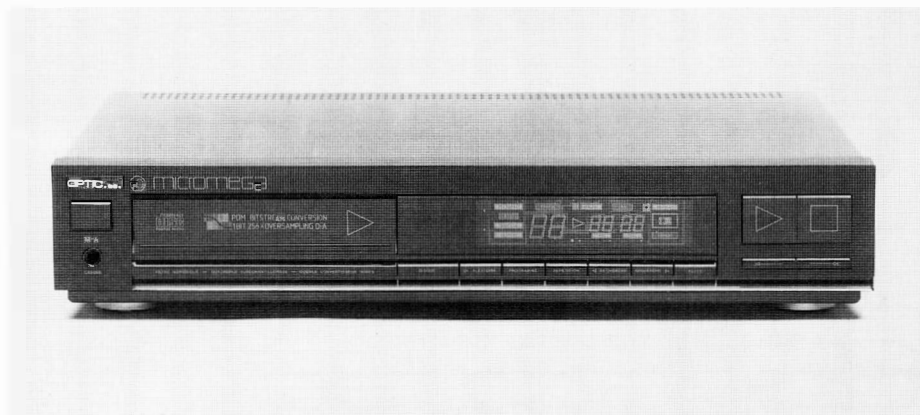
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Micromega is a small specialist hi-fi company that has built something of a reputation amongst audiophiles for its CD players. Though the name doesn't give much of a clue, this is actually a French company. The fact that it's based on the Quai des Martyres-de-la-Resistance in Conflans-Sainte-Honorine only serves to whet the curiosity still further. In fact it was founded in 1986 by an ex-chief designer from Mark Levinson Audio Systems, and has been steadily building a word of mouth reputation for a fine-sounding and decidedly unusual looking range of CD players, transports and outboard DACs.

Priced £1,200-£1,400, the new 'bitstream' top-loading *Solo* is available in at least three totally different cabinet styles, each a million miles from the black stacking slabs we all rush out and buy. However, the *Optic* in question here is something rather less impressive from an appearance point of view, but selling at an altogether less extravagant – though still expensive – £695. At heart it's fundamentally just a cheap Philips player, but the inside – and presumably the soul along with it – has been given a generous helping of the Micromega treatment, so as to turn it into something rather more distinctive – and altogether more valuable – soundwise.

Stylish it's not, though there must be some sort of cachet in having your front panel legends written in French. The main control graphics are nicely executed too, and the large blue display track number can easily be read from right across the room. A classically original – nay minimalist – touch is the cute little mini-handset with just seven buttons, and again an indefinable touch of class (though I expect I'd soon find the vocabulary when it gets lost in the sofa).

You get little apart from the basics as far as features are concerned, but the basic build is compact, slim and reassuringly

solid. The rear panel carries the usual (fixed output) phono pair plus an electrical (coaxial) digital output.

What started out as a standard Philips 16-bit 4x oversampling machine has, however, undergone considerable internal modification. An extra double-sided board is fitted with a Holden & Fisher transformer, four separate bridge rectifiers and banks of electrolytics. The existing multi-bit DAC is removed from the main board and digital signals rerouted to the new board, whereon a single Philips 'bitstream' (low-bit) chip is sited, surrounded by regulators and FET filter op-amps. The DC coupled output buffer uses discrete transistors and polystyrene filter caps.

## Lab Report

One result of all this work is to downgrade the performance of the standard machine, if assessed purely on the basis of the lab measurements. (Which only confirms that lab measurements alone don't predict the sound quality of CD players, but that's another story!)

Resolution is certainly flawed below 80dB, achieving only 15 bits, and this is confirmed in the unexceptional distortion results, especially at low level. The background noise is rather high in this particular (single chip) bitstream implementation too, limiting the attainable dynamic range. Separation is only average, but the response is smooth, channel balance close, error correction excellent and shock/vibration rejection very good.

## Sound Quality

While not the most dynamic of machines, the *Optic* nevertheless clearly deserves a good rating for sound quality, and deserves special praise for its unusually natural and expressive mid-range.

The excellent mid detail and fine

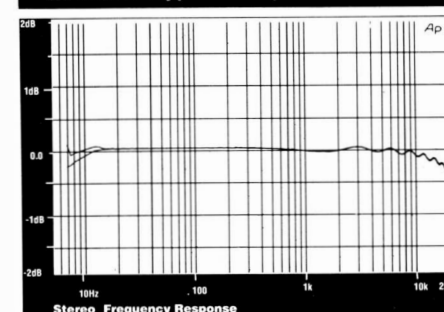
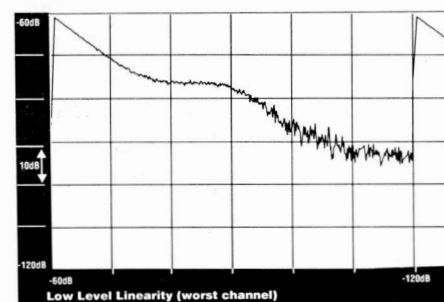
depth tends to dominate the perception, rather in the way it does with valve amplifiers and panel speakers, but the treble here is also altogether very nice and sweet in the low-bit manner, and virtually free from audible distortion. The problems come down in the bass, where softness and slowing are both evident.

## Conclusions

A trifle hair-shirt in some respects – especially when compared to the *CDF1* – the *Optic* nevertheless manages to add its own touch of Gallic style. The sound quality doesn't really justify £699, and the lab results are a little depressing, but the relaxed and naturally detailed character well deserves to be heard.

## TEST RESULTS

Test resolution (L/R av)	15 bits		
Output level, dB rel 2V, Source	2.0V, 0dB, 1.7ohms		
Effective dynamic range (-70dB thd + N + dither)	85dB		
Harmonic distortion	20kHz	1.0kHz	20kHz
Full level ref 0dB	-85dB	-81dB	-84dB
at -70dB encode + dither	-22/18dB, 7.94/12.59%		
Stereo separation	93/103dB	88/98dB	86dB
Stereo balance L/R	0.01dB	0.01dB	0.02dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.28dB		
Audible high frequency intermodulation	-88dB		
Audible electrical noise	-83dB		
Audible mechanical noise	low		
Ultrasonic noise	-88dB		
Error correction	4mm gap		
Shock/vibration resistance	very good		
De-emphasis	±0.21dB to 5kHz		
Track finding speed (15, YEDS 2)	3 secs		
White noise overload test	slight clip		
Size (w x h x d)	42 x 8.5 x 29.5cms		
Typical price inc VAT	£695		



# Carver approach hi-fi from a different angle

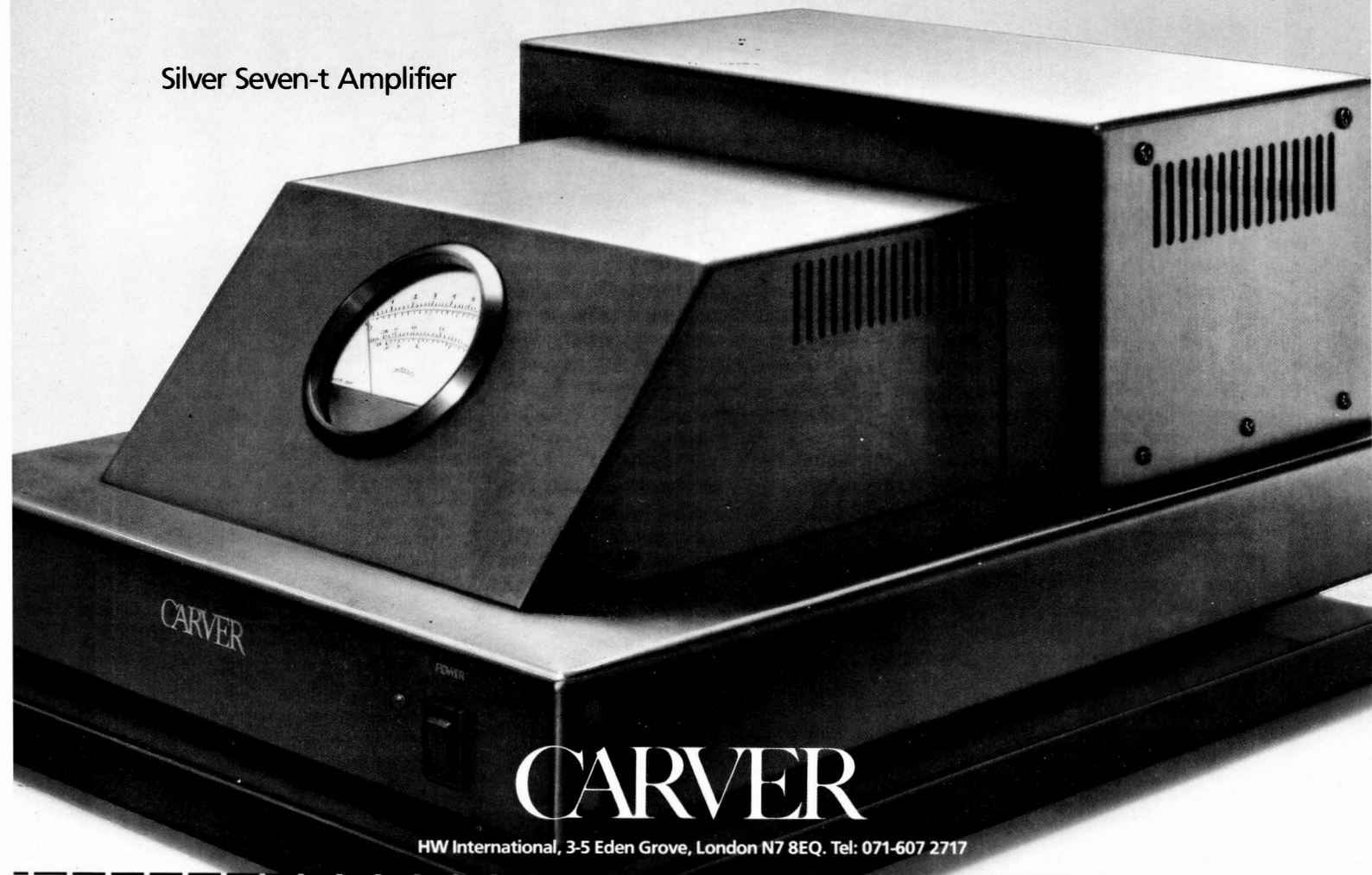
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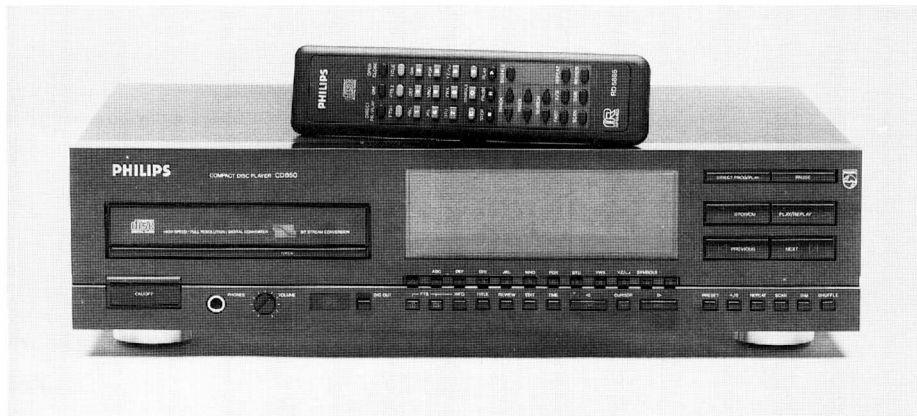
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# Philips CD-850

**Best Buy**

PHILIPS ELECTRICAL LTD., CITY HOUSE, 420-430 LONDON RD., CROYDON, SURREY CR9 3QR. TEL: (081) 689 2166.



CD was originally a Philips concept, though it took the cooperation of other multinationals like Sony to get the new format established across the world. Yet despite having not much of a track record in hi-fi separates, Philips has managed to maintain its technological pre-eminence throughout, first with its oversampling multi-bit DACs, and now with the so-called 'bitstream' low-bit decoding technique.

Back in the summer of '89 the company managed a real PR coup by introducing the 'low-bit' concept, creating considerable pent-up demand for a player which had yet to go into production. When it eventually did arrive, the £350 CD-840 was an instant sell-out, and rated Best Buy in our last CD player group test (June 1990).

Yet hardly had the electroluminescence faded from our word processing screens than the news arrived that the 840 was to be no more, and that it was to be replaced from August by a CD-850, the subject of this review. The bad news is that the price has gone up fifty quid to £400, but the good news is that the money has gone on improvements in the build quality and refinements to the original design.

For the 840, Philips effectively took a £250 multi-bit machine called the CD630 and charged an extra £100 for those wishing to be first on the block with a bitstream player. The new 850 is less of a bastard by nature, and has a heavier base and more attractive alloy faceplate to emphasise the fact. Most of the internal changes relate to re-engineering the analogue board layout.

From the point of view of operating features and facilities, the '850 is much the same as its antecedents, which in turn implies practically everything including the kitchen sink. That puts the button count inevitably high, though all is quite nicely set out and arranged.

There's some evidence too that Philips has taken care to preserve maximum sound quality when there's conflict with convenience features, since the stereo analogue output is at fixed level only, the front panel knob only adjusting headphone level. There are gold plated phono sockets, and an optical as well as an electrical digital output.

Inside the similarity to the 840 is unmistakable, and there's again evidence that Philips has gone to some lengths to get the best out of its new devices. Like the Meridian applications there are two separate dual channel bitstream chips, though the -R and -L channels are derived using a simpler logic inversion arrangement than Meridian's shift register approach. Thereafter the signals are summed for differential operation, ensuring good linearity and S/N ratios.

## Lab Report

A major justification for low-bit decoding is that low level linearity is more easily and accurately achieved. That did not turn out to be the case with one of our 840 samples, though the 850 serves to set our minds to rest, showing excellent resolution down to -112dB.

Elsewhere the 850 tends to better the '840 by small margins here and there. All measured distortions are low, but noise - in and beyond the audio band - is significantly poorer than multi-bit machines.

## Sound Quality

The engineering refinements are happily reflected in a modest increase in the sound quality rating of its predecessor, which was already regarded as the best sounding Philips CD player thus far.

However, the value judgement is not a simple one. The bitstream DAC certainly creates a different overall character from the familiar Philips multi-bit

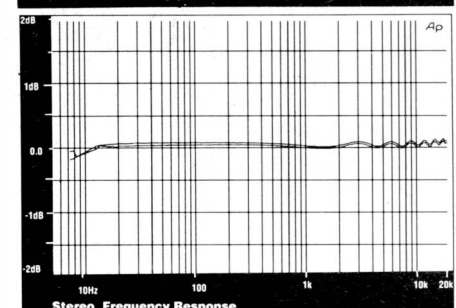
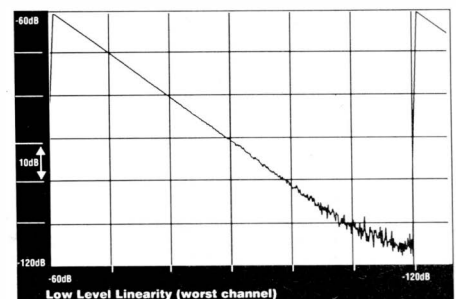
sound, but part of what it gains on the swings of an exceptionally sweet treble, fine imaging and midband neutrality is sacrificed on the roundabouts of pace and dynamics, slam and weight. Reactions to the different emphasis may well vary from one individual or system to another, though fortunately the basic performance is more than good enough to make such carping largely irrelevant.

## Conclusions

The CD-850 does a good job of tidying up the rather hastily conceived '840 package. The extra build quality looks and feels more appropriate to the £400 asking price, and the refinements are reflected in improvements to an already very competitive sound quality.

## TEST RESULTS

Test resolution (L/R av)	16 bits	
Output level, dB rel 2V, Source	2.15V, 0.63dB, 260ohms	
Effective dynamic range (-70dB thd + N + dither)	97dB	
Harmonic distortion	20kHz	1.0kHz 20kHz
Full level ref 0dB	-93dB	-90dB -90dB
at -70dB encode + dither	-41dB, 0.89%	
Stereo separation	93dB	95dB 95dB
Stereo balance L/R	0.02dB	0.01dB 0.03dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.10dB	
Audible high frequency intermodulation	-103dB	
Audible electrical noise	-95dB	
Audible mechanical noise	low	
Ultrasonic noise	-93dB	
Error correction	4mm gap	
Shock/vibration resistance	v good	
De-emphasis	±0.18dB to 5Hz	
Track finding speed (15, YEDS 2)	3.5 secs	
White noise overload test	slight clip	
Size (w x h x d)	42 x 11.6 x 29.5cms	
Typical price inc VAT	£400	



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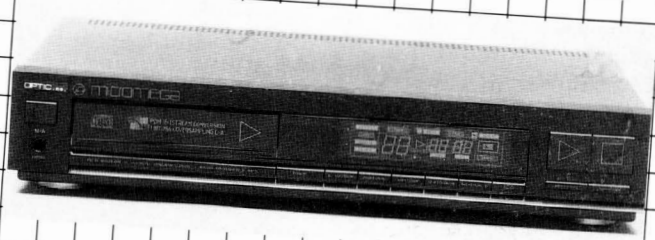
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# Pioneer PD-7500

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



Pioneer has developed particular expertise in optical disc transport systems, which accounts for its world leadership in the related and rapidly emerging field of Laserdisc video disc replay. But it has also shown impressive commercial judgement in creating the right package of build, features, performance and price to establish a substantial market share in both midi systems and hi-fi separates sectors – not to mention a worthwhile niche in ‘multi-play’ (auto-changer) CD players.

Although other current Pioneers continue with multi-bit processors, the £280 PD-7500 and its cheaper 6500 sibling introduce Pioneer’s variation on the ‘low-bit’ digital-to-analogue conversion theme, in mid-priced full feature packages. Though arguably too busy for its own good, the gilt lettering and highlights on the fascia somehow give this Pioneer a touch more class than many of its rivals. Construction isn’t particularly special, with the usual metal wrap and fascia trim sitting on silly cosmetic feet, but the company’s proprietary honeycomb-formed base probably adds a measure of worthwhile extra stiffness.

Though almost over-burdened with buttons, thanks in no small part to a 20-key direct track entry array, the 7500’s main controls are easily distinguished and well sited just below a very comprehensive display that has rather small digits. The slimmish handset has too many buttons for simple use, but layout is OK and its compatibility comprehensive.

Features are extensive, covering tape editing and synchro recording via a special rear socket (for driving Pioneer cassette decks). The only apparent distinction between 7500 and 6500 is that the former incorporates extra on-set buttons for auto-fade and index search – both of which are already more conveniently available via the handset. An optical digital output is provided alongside the

conventional phono audio pair.

Internal construction is very neat. All the important work takes place on a single board, and extensive ribbon cable is used for electrical links. The power transformer is modest, though the attendant capacitors are shrouded in perforated copper foil. Sony chips control the spring and rubber decoupled plastic worm drive transport mechanism. An NPC digital filter feeds a Pioneer’s proprietary PD7007 ‘Direct Linear Conversion’ low-bit DAC.

Based on 5238 op-amps, the audio stage is a symmetrical double mono design, the two channels separated by a copper screen. Components generally are of good commercial quality, with some examples including copper foil polystyrene caps clearly selected for their superior audio performance.

## Lab Report

The 7500 distinguished itself in the lab, delivering fine linearity down to a low -110dB, alongside very low distortion throughout the spot measurement selection. The source impedance is on the high side for long cable runs, and output level is nearly 2dB above the standard, which means that attempts to make A/B comparisons against other players will favour the Pioneer unless care is taken to match levels.

The frequency response shows a (sensible?) slightly band-limited shape, with extreme treble slightly down in level. Channel balance might have been better, but stereo separation is first class, shock and vibration rejection very good and error correction fine.

## Sound Quality

Although the 7500 is clearly better than many of the new ‘low-bit’ players, the sound quality is unexceptional, lacking most obviously in weight, slam and bottom end power.

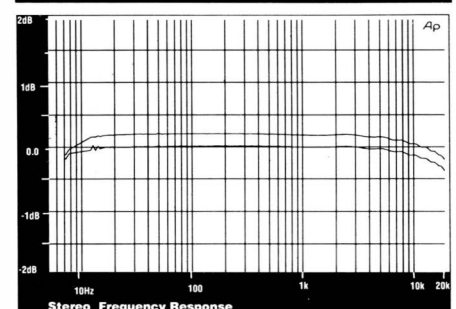
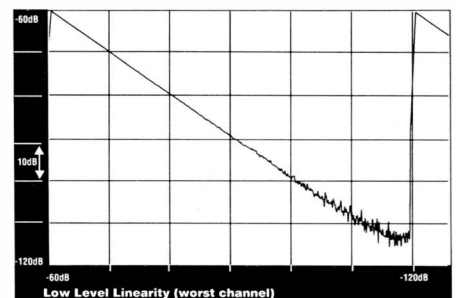
Subjective speed and timing is quite respectable, though rhythmic integrity falls a little short of the standard set by previous mid-priced Pioneers. The midrange has an attractive sweetness, with residual grain and hardness well controlled. Stereo focus is unexceptional and depth rather limited; more detail would have been welcome too.

## Conclusions

The sound quality of the 7500 would be fine in the context of a budget player, though with prices continually dropping it’s difficult to see how it can fully justify the premium price of £280 even though the build, presentation and feature count all make worthwhile contributions.

## TEST RESULTS

Test resolution (L/R av)	16 bits
Output level, dB rel 2V, Source	2.51V, 1.97dB, 1.4kohms
Effective dynamic range (-70dB thd + N + dither)	103dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Full level ref 0dB	-88dB -90dB -90dB
at -70dB encode + dither	-46dB, 0.50%
Stereo separation	113/163dB 102dB 90dB
Stereo balance L/R	0.20dB 0.20dB 0.18dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.4dB
Audible high frequency intermodulation	-99dB
Audible electrical noise	-100dB
Audible mechanical noise	low
Ultrasonic noise	90dB
Error correction	2.5mm gap
Shock/vibration resistance	very good
De-emphasis	±0.3dB to 16kHz
Track finding speed (15, YEDS 2)	3 secs
White noise overload test	OK
Size (w x h x d)	42 x 10.8 x 33cms
Typical price inc VAT	£280





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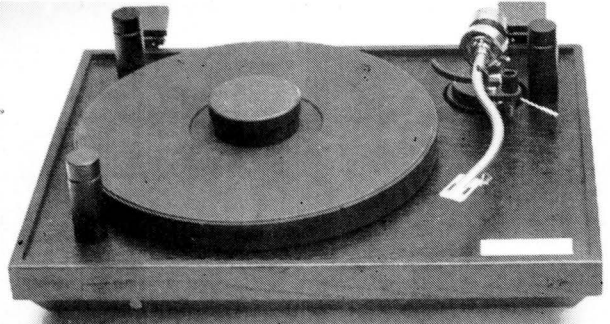
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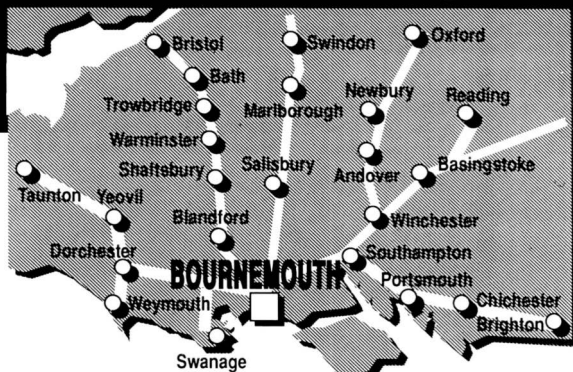
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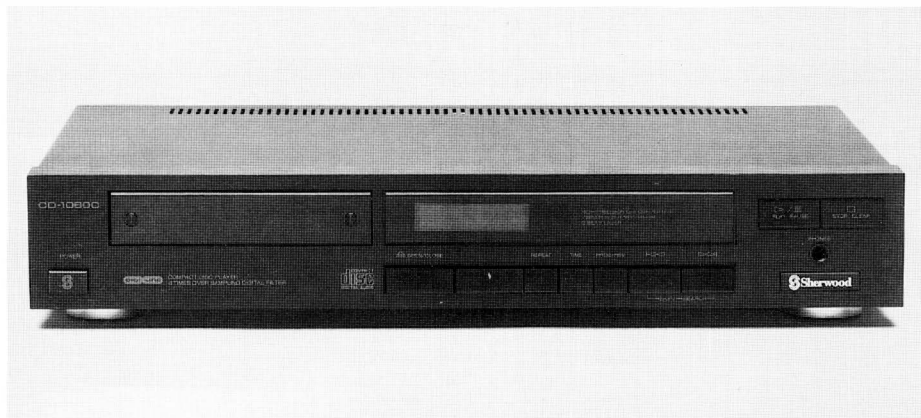
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# Sherwood 1060C

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



Sherwood is a name that will probably be unfamiliar to British hi-fi people, though in fact it has been around for no fewer than thirty five years, concentrating on the US home market with products that are primarily known for offering good value for money.

The current US catalogue lists dozens of models, right across the gamut of source and amplification components, though only the less expensive models feature in Hayden Labs' initiative to launch this brand onto the UK market, presumably to avoid conflict with this importer's more upmarket Denon brand.

The CD 1060C is very much a bottom-of-the-line CD player, selling at the beer budget price point of £129. The other CD player being imported is an 1182R, which is top of the four-strong range at an extravagant £149 – clearly Americans have a finer appreciation of the subtleties of a price point ladder than we British. In fact all four models look remarkably similar, though the 1060 inevitably has the smallest feature count, most significantly lacking any form of remote control except when it has been integrated with a complete Sherwood system.

This slimline player is actually built in Korea, though construction is typical of normal commercial practice for budget players, with a metal tray and wrap plus moulded plastic fascia, sitting on feet which incidentally are strictly cosmetic in function.

The matt black front panel has sharpish edges and corners, and styling is pretty nondescript, not helped by various lines of propaganda. A row of six buttons plus a blank (utilised for auto space and random play functions on the 1182) are arrayed below the miniscule display, while an additional and easily distinguished pair perform play/pause and stop/clear, next to the fixed level

headphone socket.

One thing this Sherwood does confirm is that Korean standards of electronics build are improving all the time. All the parts here fit neatly, and the wiring harness isn't too messy either. Most of the activity takes place on a solitary single-sided PCB, which uses a lot of links and surface-mount components. The power supply uses only a tiny transformer and the minimum of regulators.

A 4x oversampling digital filter feeds a multi-bit Goldstar DAC, with standard op-amp buffering and filtering thereafter. The transport looks very similar to the Far Eastern norm, with rubber decoupled plastic mouldings, worm drive and fixed clamp arm.

## Lab Report

Despite using a multi-bit converter, the 1060 shows fine low level linearity, evidence of good DAC quality control. However, the frequency response shows some minor inter-channel anomalies, a mild treble rise and some bass cut. The noise floor is not particularly low, and this reduces the available dynamic range somewhat.

Distortions are a little poorer than average, and the motor itself makes more mechanical noise than most, but error correction is adequate and shock resistance quite good. The output level is a little below the standard – not sufficiently so to matter in itself, but enough to make comparative listening tricky.

## Sound Quality

Though the 1060C is not a particularly impressive performer, it doesn't take a great deal to justify a price tag as low as this, and the 1060's sound quality is best summed up as fair enough, all things considered. The saving grace is that timing is better than most cheap machines can manage, and dynamics are at least

par for the course too.

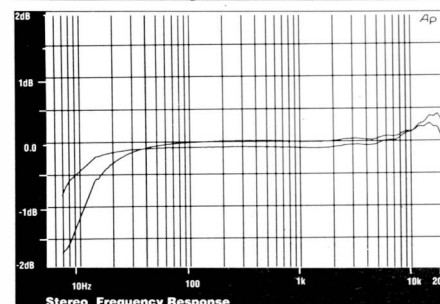
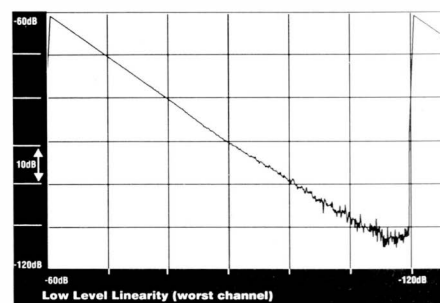
Stereo images are disappointing, with reduced width, impaired focus and indifferent depth. The bass too managed to sound both lumpy and slowed, but this felicitously helped to counterbalance the mildly strident treble.

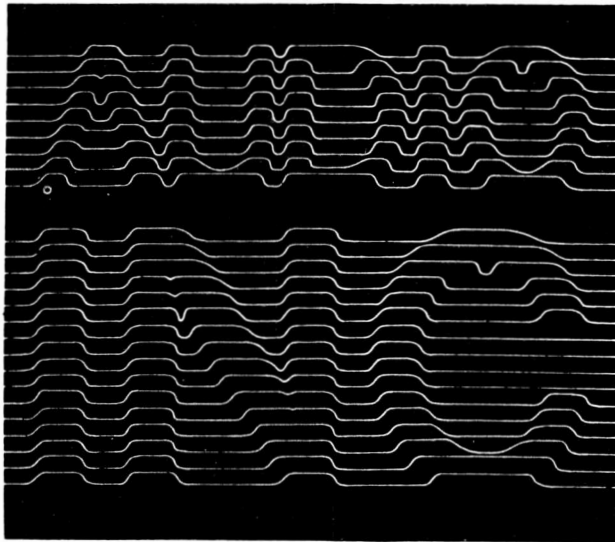
## Conclusions

This is not a particularly inspired example of the CD player maker's art, but it's still pretty reasonable value for money. The sound is basically honest enough for the price, and no attempt has been made to burden the package with spurious and expensive technohype. It falls slightly short of the standard necessary for recommendation, but remains worth considering nevertheless.

## TEST RESULTS

Test resolution (L/R av)	16 bits		
Output level, dB rel 2V, Source	1.87V, -0.58dB, 700ohms		
Effective dynamic range (-70dB thd + N + dither)	90dB		
Harmonic distortion	20kHz	1.0kHz	20kHz
Full level ref 0dB	-66dB	-65dB	-82dB
at -70dB encode + dither	-35dB, 1.78%		
Stereo separation	108dB	102dB	70dB
Stereo balance L/R	0.14dB	0.09dB	0.31dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.4dB		
Audible high frequency intermodulation	-55dB		
Audible electrical noise	-87dB		
Audible mechanical noise	average		
Ultrasonic noise	99dB		
Error correction	1.25mm gap		
Shock/vibration resistance	good		
De-emphasis	±1dB to 16kHz		
Track finding speed (15, YEDS 2)	3 secs		
White noise overload test	OK		
Size (w x h x d)	44 x 8.2 x 26cms		
Typical price inc VAT	£130		





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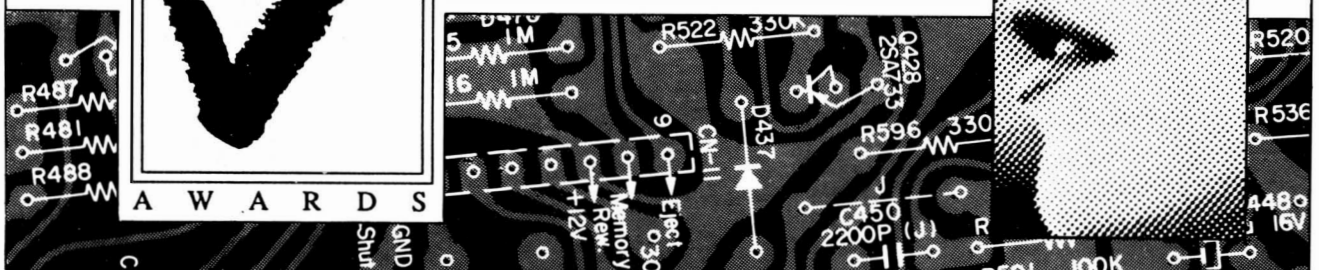


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# Sony CDP-790

SONY UK LTD., SONY HOUSE, SOUTH STREET, STAINES, MIDDLESEX TW18 4PF. TEL: (0784) 467000.



Sony was in right at the start of compact discs, sharing much of the early development work with format originator Philips. The company's marketing and design skills are legendary, and it has since successfully seized on every commercial opportunity to exploit this early advantage, in personal and midi system sectors as well as hi-fi separates.

There must be around a dozen different Sony CD players currently aimed at the hi-fi separates market, about half of which we've managed to test. There are in fact two quite distinct ranges, the regular (common or garden) models at popular price points and the upmarket ES series that starts at £400. The £200 CDP-790 tested here is one of the hoi poloi, though it sits a clear step above the beer-budget '590.

In fact it's the replacement and update of the CDP-770 assessed and Recommended last June. Both share the same vital £199.95 price point and full width presentation that inevitably makes this just about the most important model in any manufacturer's range. Both also share the same high standards of finish in a generously featured, ergonomically straightforward package.

But there's a singularly important difference lurking beneath the pretty skin: the 770 used conventional multi-bit digital-to-analogue decoding while this 790 has Sony's PLM (pulse length modulation) variation on the low-bit theme - an approach not too dissimilar to the PWM/MASH system. It uses a 50MHz clock and 8x oversampling 45-bit digital filter with 3rd order noise-shaping, just in case you're interested.

The remote handset is a little chunky but nicely laid out for easy use. Both player and remote have imposing looking 20-key track entry pads, and the variable-only rear phono outputs (and headphone sockets) are all driven by a remote controlled motorised poten-

tiometer. The display is more than comprehensive, tape editing and fading is facilitated and several different play modes are available.

Inside all is neat and tidy, and it's interesting to note the way the boards are steadily shrinking as the sophistication of the chips increases. The small power supply transformer has few regulators, while the effectively spring-suspended transport uses rack-and-pinion laser drive and a fixed clamp arm.

## Lab Report

Our June example of the 770 showed rather disappointing low level linearity, which is a common characteristic of low-cost multi-bit machinery, and the move to low-bit processing for the 790 is reflected in a major improvement in this respect, with full 16-bit resolution, down to -112dB.

Noise is low and the dynamic range very good. Distortion is low too, HF intermodulation particularly so, while output level is 0.4dB below the standard, a point to consider if undertaking comparative listening. Frequency response is flat, with excellent stereo separation and a consistent channel balance. Error correction is less than the best.

## Sound Quality

This turns out to be yet another example of a player using the latest low-bit decoding technology which sounds less good than its multi-bit predecessor. The 770 wasn't anything too special sound-wise, but it passed muster for the price; the new hi-tech 790 falls short of its predecessor by several percentage points.

The treble is tidy, subjectively low in grain or distortion but also somewhat lacking in fine detail. Contrasting the engaging 'bounce' of its multi-bit predecessor, the bass here is soft and slow, with relatively indifferent rhythmic sense or timing, though in this respect

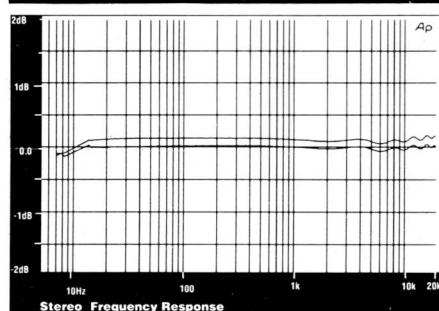
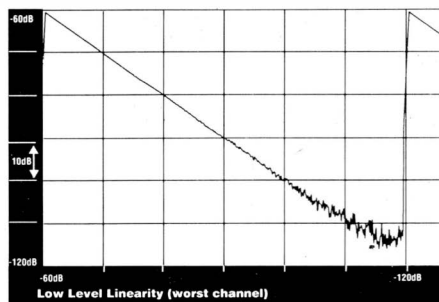
it's by no means the worst offender in the test group. Stereo image presentation is average, while the midband shows a slight thinning, with mild veiling of detail and muting of dynamics.

## Conclusions

Our experiences with this key Sony model merely serve to confirm the unpalatable conclusion that this year's players sound on average a little worse than the equivalent models from the 1989/90 ranges. The finger of suspicion is firmly pointed at the new 'low-bit' decoder systems, though it should be stressed that this is the first year these have been used, whereas multi-bit decoders have benefited from several years of painstaking refinement.

## TEST RESULTS

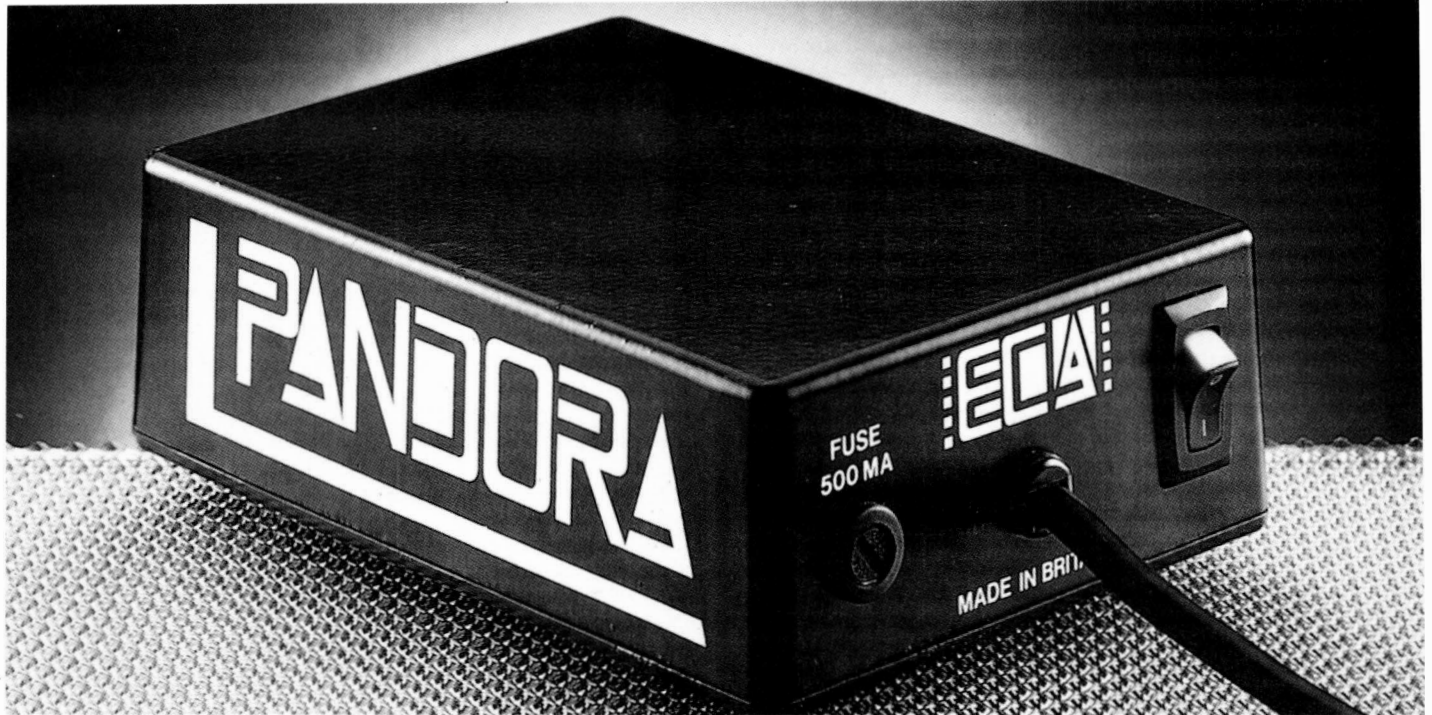
Test resolution (L/R av)	16 bits
Output level, dB rel 2V, Source	1.90V, -0.42dB, 450ohms
Effective dynamic range (-70dB thd + N + dither)	103dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Full level ref 0dB	-90dB -86dB -88dB
at -70dB encode + dither	-40dB, 1%
Stereo separation	120dB 116dB 100dB
Stereo balance L/R	0.13dB 0.13dB 0.16dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.1dB
Audible high frequency intermodulation	-102dB
Audible electrical noise	-100dB
Audible mechanical noise	low
Ultrasonic noise	-106dB
Error correction	1.25mm gap
Shock/vibration resistance	good
De-emphasis	±0.15dB to 5Hz
Track finding speed (15, YEDS 2)	3 secs
White noise overload test	OK
Size (w x h x d)	43 x 11.2 x 28cms
Typical price inc VAT	£200





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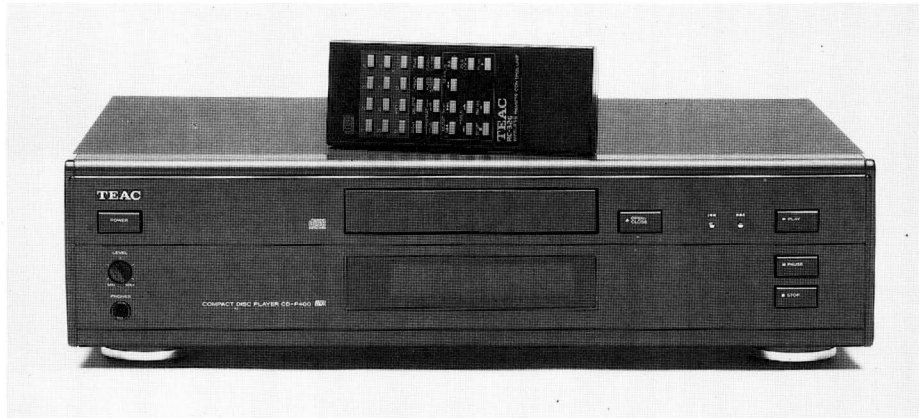
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# Teac CD-P400

TEAC (UK) LTD., 5 MARLIN HOUSE, THE CROXLEY CENTRE, WATFORD, HERTS WD1 8YA. TEL: (0923) 225235.



The £249 CD-P400 is the less interesting, but also the cheaper of a pair of new mid-priced models. It shares the same instruction manual as a £350 Z500, which should ensure that the two are virtually identical, though in fact there are four important differences. First, the Z uses multi-bit instead of low-bit D-to-A decoding; secondly, and no less important is that it shares the distinction of a champagne gold finish with the earlier Z5000 'flagship' model. And you don't get to switch off the display or adjust the volume on the cheaper model either.

The '400 remains repetitively black, though the ergonomics are refreshingly unusual in attempting to limit the sanity damage normally induced by button overkill. Build quality seems nothing special from a superficial inspection, the standard steel wrap and base sitting on strictly cosmetic feet.

The fascia is very nicely finished, with attractively radiused edging, while the central drawer sitting above the display adds a nice touch of symmetry. The display itself is pretty comprehensive, though the numbers are small and our sample was slightly lopsided. In the interests of simplicity and clarity (not to mention cost), there are precious few buttons on the machine itself, the larger ones switching power on/off, opening/closing the drawer and executing play, pause or stop, backed by some tiny track-skip buttons and a headphone socket with attendant volume control.

The neat little handset could have had better button layout and discrimination, though it includes luxuries such as keypad programming. Perhaps surprisingly considering Teac's tape background, there are no particular features to assist home recording. The rear carries a fixed level phono pair, an optical only digital output and the remote interface socket for Teac system builders.

The central disc drive mechanism neatly divides the player into two halves internally, with the analogue circuitry on the left and the digital processing on the right. Separately supplying the two sections but from smallish reservoir capacitors, the mains transformer is tucked behind the metal subchassis, rubber decoupled, worm drive transport.

Control chips come from Sony, while the DAC is a Delta Sigma modulation variation on the low-bit converter theme, incorporating a 33.86MHz crystal. Attention to detail is seen in the metal screen placed behind the display. Chip regulators and selected capacitors are used in strategic places, though most components are standard commercial grades. The in-line output op-amps add minimal analogue output filtering.

## Lab Report

The frequency response is basically very flat, with just a mild rolloff at HF. Separation and channel balance are very good too. Thanks to the low-bit decoding technique, low level linearity is superb, right down to -110dB. The output level is a shade too high, and the source impedance is also on the high side.

Distortion spot measurements are all very good at all frequencies and levels. Mechanical and electrical noise is low and shock and vibration rejection is very good, though error correction capabilities are less than the best. De-emphasis is reasonably accurate.

## Sound Quality

Though there's plenty of evidence that some care has been taken over the audio engineering, the listening tests were not very positive, the overall rating falling a little below average. Poor timing seems to be the root of the problem, complex rock material tending to sound con-

fused and disconnected in consequence.

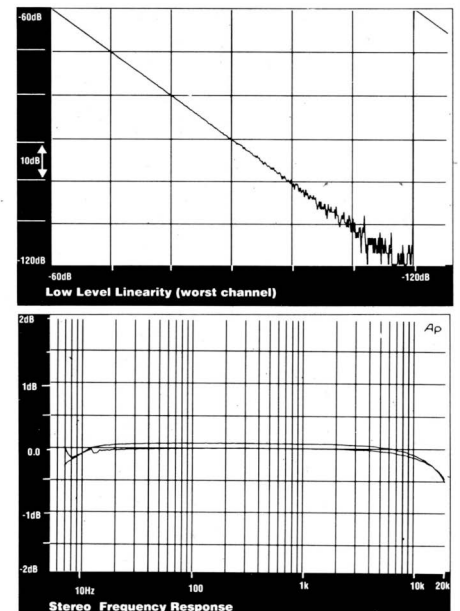
In contrast, the tonal balance is noticeably sweeter than usual, particularly in the purity of the treble. Stereo perspectives are well formed, with reasonably good depth and focus.

## Conclusions

Competent but uninspiring would seem to sum up the P400. It's attractive enough, and the presentation of the machine itself is certainly more user-friendly than most of the button-festooned monsters that stalk this sort of price point. But one feels that the pretty gold Z500 sister model, with technical ingredients that could also improve the sound quality, might well prove the better bet.

## TEST RESULTS

Test resolution (L/R av)			16 bits
Output level, dB rel 2V, Source	2.13V, 0.55dB, 1kohms		
Effective dynamic range (-70dB thd + N + dither)			102dB
Harmonic distortion	20kHz	1.0kHz	20kHz
Full level ref 0dB	-92dB	-92.5dB	-87dB
at -70dB encode + dither			-48dB, 0.398%
Stereo separation	105/125dB	106/113dB	89dB
Stereo balance L/R	0.08dB	0.08dB	0.04dB
Frequency response (ref 1kHz) 20Hz to 20kHz			±0.5dB
Audible high frequency intermodulation			-94dB
Audible electrical noise			-99dB
Audible mechanical noise			low
Ultrasonic noise			99dB
Error correction			1.0mm gap
Shock/vibration resistance			v good
De-emphasis			±0.38dB to 16kHz
Track finding speed (15, YEDS 2')			3.5 secs
White noise overload test			OK
Size (w x h x d)			43.5 x 10.6 x 30cms
Typical price inc VAT			£249



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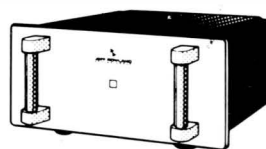
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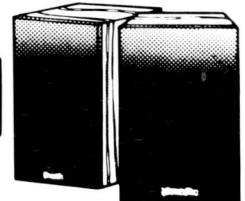
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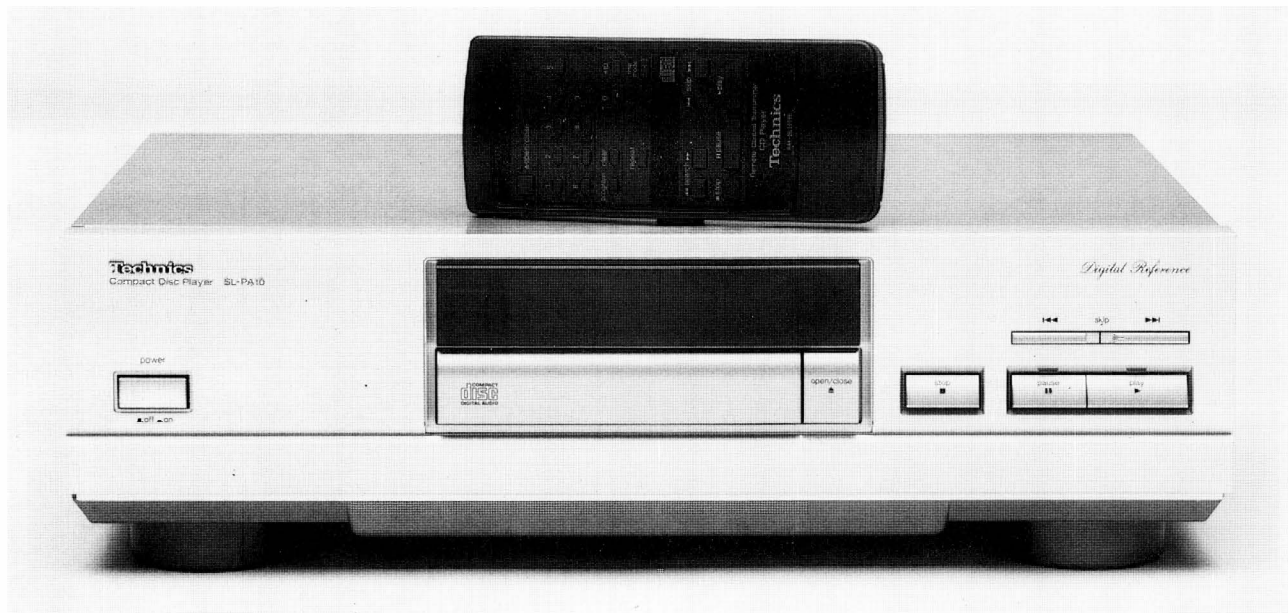
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# Technics SL-PA10

PANASONIC UK LTD., PANASONIC HOUSE, WILLOUGHBY ROAD, BRACKNELL, BERKS RG12 4FP. TEL: (0344) 862444.



Past masters of creating mass market products with the widest possible consumer appeal, Technics (the hi-fi wing of Panasonic) also has the engineering and resources to explore some of the less mainstream niches in the market, which is presumably where the *SL-PA10* comes in. It's a £450 CD transport unit, and is basically intended to partner the *SU-MA10* – a powerful upmarket digital integrated amplifier.

It's a configuration that seems a little strange in a UK context, where large powerful integrated amplifiers (digital or otherwise) are the exception rather than the rule, most upmarket purchasers opting for simpler specialist pre-/power combinations. And unfortunately the amplifier didn't arrive in the UK in time to be included in this assessment.

Technics' illustrious history in high quality vinyl turntables is somehow reflected in the elaborate engineering of this disc drive, which somehow manages to look both fashionably advanced and yet mildly nostalgic at the same time. Partly it's the rather refreshing return to a lightly gilt fascia, now that black is finally starting to exhaust its appeal.

Other features distinguish it from the herd too. The Technics designers have had the good sense to recognise that it's quite unnecessary to litter the fascia with dozens of dust-catching buttons. All subsidiary functions are better confined to the handset, leaving the fascia attractively uncluttered and user-friendly. The *PA10* itself therefore just has the basic power/drawer/stop/

pause/play, plus a couple of track skip bars.

The handset, in contrast, has lots of buttons, twenty providing direct track access; it's a little bulky but clear and well laid out. The display is fairly elaborate, though this machine makes no attempt to incorporate the complexities of tape editing so often found on cheaper machinery.

The drawer mechanism is centrally located, which should ensure that any structure-borne vibration is fed symmetrically to the drive mechanism. The unit is also reassuringly solid and much heavier than any normal CD player, and plenty of attention has been paid to contending with possible sources of vibration or shock. The one surprise is that the output from this deck is only available in optical form; there's no parallel electrical/coaxial socket. And in our experience this is bound to limit the available sound quality.

Internal examination confirms the elaborate vibration precautions, with a damped top panel and a heavy die-casting bolted to the base. The transport is Technics' top-of-the-range device, with linear tracking laser held on a die-cast base. There are relatively few components, including several surface-mounted chips, and assembly is neat and tidy, with ribbon cabling. The small transformer combines with unusually large, mechanically damped Nichicon power supply capacitors.

## Lab Report

No surprises here, but then there's not much to test either. Error correction is

pretty good, track access is very fast, mechanical noise is very low, and shock and vibration resistance is very good.

## Sound Quality

The need to use an optical connection to some form of outboard DAC imposes its own constraints on the sound quality, tending to give a sweeter yet slower sound compared to a direct electrical connection. It was nevertheless possible to compare the sound of the *PA10* with other optically connected high quality transports and so gain some insight into its own particular character.

It's a character that is laid back almost to a fault. Dynamic expression is a little muted and bass a little soft. The tonal balance is generally neutral, though there's a hint of glare in the upper mid and a slight loss of clarity.

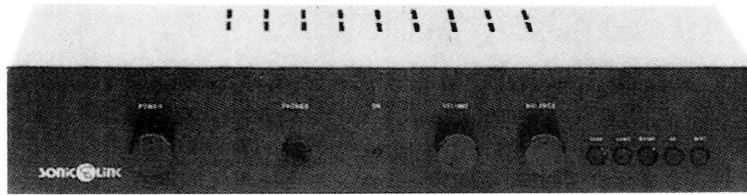
## Conclusions

The optical-only digital output must be sufficient constraint to limit the appeal of this CD transport as far as the UK audiophile is concerned. However, it's a nice piece of design and engineering which can still be appreciated for its easygoing temperament, and will probably make a logical and uncomplicated companion for its matching *MA10* digital amplifier.

## TEST RESULTS

Audible mechanical noise	very low
Error correction	2.4mm gap
Shock/vibration resistance	very good
Track finding speed (15, YEDS 2)	2 secs
Size (w x h x d)	42.8 x 13.5 x 32.5cms
Typical price inc VAT	£450

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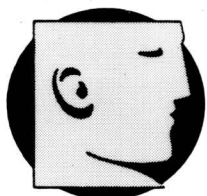
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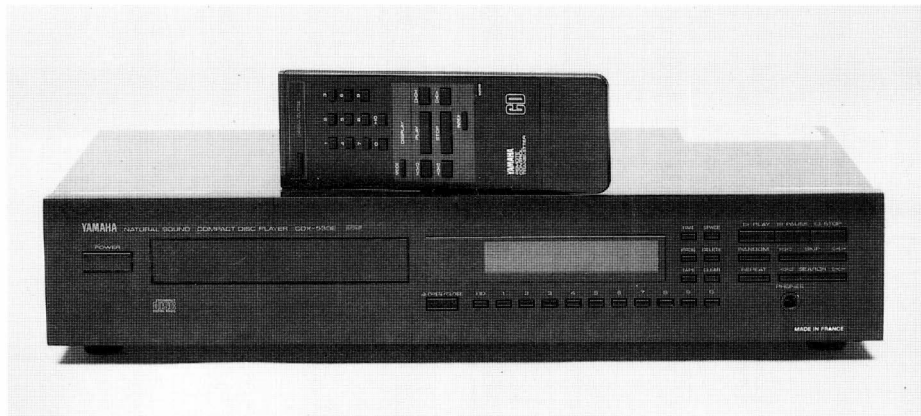
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# Yamaha CDX-530E

YAMAHA ELECTRONICS UK LTD., YAMAHA HOUSE, 200 RICKMANSWORTH ROAD, WATFORD, HERTS WD1 7JS. TEL: (0923) 33166.



A quick check in our Directory confirms that this must be the first Yamaha CD player *Choice* has examined in many moons. Quite why this should be the case is something of a mystery, compounded by the observation that no fewer than six cassette decks are in the listings. The comparatively short marketplace lifespan of CD players may be a contributing factor, but it's certainly time to redress the balance, so the 530E is one of two models included on this occasion, representing the two extremes of a four-strong range.

Yamaha itself has long been an important specialist hi-fi brand in the UK, besides having many interests in musical instruments and other related fields. It was certainly a pacemaker in the early days of CD, and has remained a strong contender in the hi-fi separates market, while eschewing the midi system rat race in favour of some decidedly interesting new 'lifestyle' products.

The player under scrutiny here costs a modest enough £180. It's slim, compact and commendably discretely styled, if thoroughly lightweight as well. The alloy faceplate is attractively contoured and delightfully finished by a silky smooth matt 'brushed' effect.

The control layout is equally impressive, combining most of the more useful features including direct track entry while managing to avoid clutter and confusion. The feature list is pretty basic and the display area rather small, while the rear panel has just a single pair of line output phonos and a captive mains lead. The remote handset is nicely laid out if monochromatic, the buttons varying in both shape and layout. There's no volume adjustment here, but a track entry keypad and tape drive facilities are both fitted.

Bearing a 'made in France' logo, presumably in order to avoid EEC import duties and aid price competitiveness,

build is very much standard budget practice, with a lightweight steel wrap and no attempt to provide any environmental isolation. Inside, a quarter of the single-sided main PCB is empty, presumably because the same board is used to cover the complete range; there are many wire links.

Components and construction are no more than one would expect from a player of the price. The power supply transformer is tiny, and the transport the familiar worm drive laser arm with fixed disc clamp. Control chips are Yamaha's own devices while two separate Analogue Devices DACs are used prior to the in-line op-amp buffer output.

## Lab Report

This player certainly passes muster on the lab tests, though there's nothing particularly impressive about the findings either. The slightly low output level combined with a high (2kohm) source impedance could well be sufficient to give misleading results when comparing with other players. The frequency response shows a very slight treble rise, while low level linearity drifts a little out at around -80dB, though the trend remains smooth to -100dB. Distortion is fairly low overall and dynamic range good, while error correction is satisfactory.

## Sound Quality

Although the overall rating is a little below average, in the context of a budget model such as this that is a respectable enough result. It was also slightly better than the much more expensive and pretentious '1030 managed to achieve, but that story is continued overleaf. . .

The '530 has respectable dynamics, rhythm and timing, sufficient to convey a good impression of the life and atmo-

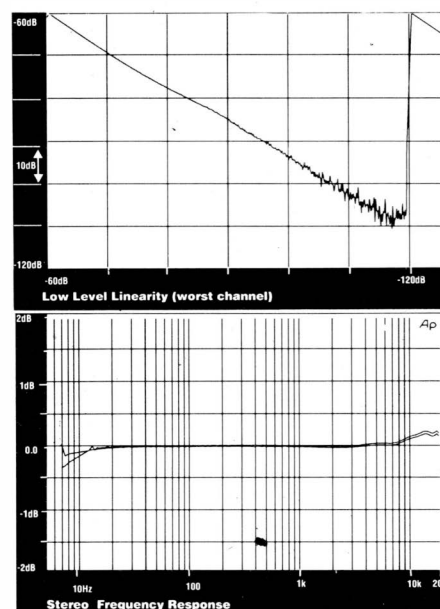
sphere in the recordings. Things are apt to become a little confused on more complex passages, but stereo images are well formed with quite good depth and focus. The tonal balance is on the bright side of true neutrality, but not to an excessive degree, so the overall assessment is basically of a pretty well balanced performer.

## Conclusions

Though sonically insufficiently distinguished for formal recommendation, the CDX-530 is a respectable all round performer with pleasing ergonomics and a good feature roster, especially for those who indulge in home taping.

## TEST RESULTS

Test resolution (L/R av)	15.2 bits		
Output level, dB rel 2V, Source	1.90V, 0.45dB, 2kohms		
Effective dynamic range (-70dB thd + N + dither)	97dB		
Harmonic distortion	20kHz	1.0kHz	20kHz
Full level ref 0dB	-90dB	-88dB	-86dB
(20kHz in-band products only)	0.00316%	0.00398%	0.005%
at -70dB encode + dither	-31/35dB or 2.82/1.78%		
Stereo separation	117dB	85dB*	60dB
Stereo balance L/R	0.0dB	0.0dB	0.02dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.25dB		
Audible high frequency intermodulation	-88.99dB		
Audible electrical noise	-99dB		
Audible mechanical noise	low		
Ultrasonic noise	97dB		
Error correction	1.25mm gap		
Shock/vibration resistance	good		
De-emphasis	±0.3dB to 16kHz		
Track finding speed (15, YEDS 2)	3.5 secs		
White noise overload test	OK		
Size (w x h x d)	43.5 x 9.1 x 27cms		
Typical price inc VAT	£180		





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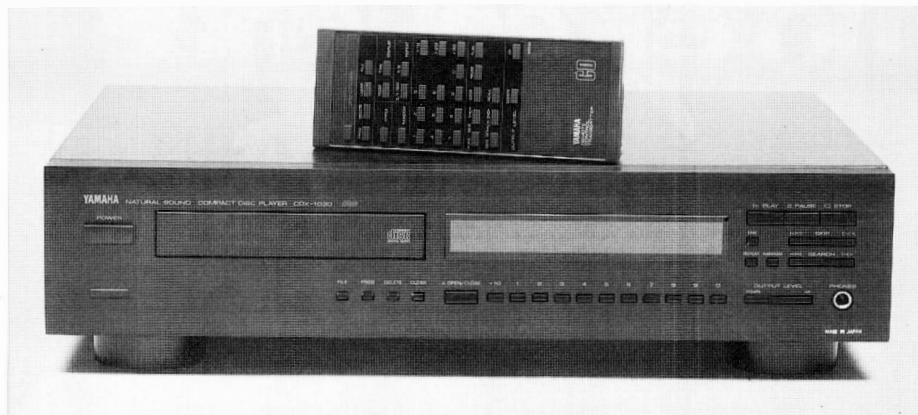
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# Yamaha CDX-1030

YAMAHA ELECTRONICS UK LTD., YAMAHA HOUSE, 200 RICKMANSWORTH ROAD, WATFORD, HERTS WD1 7JS. TEL: (0923) 33166.



Though it looks superficially remarkably similar to the budget 530 tested on the previous page, Yamaha's *CDX-1030* is quite a different proposition. You'll be lucky to get a pint of beer's worth of change from £500, for starters. It's also significantly deeper, much heavier and built in Japan, each of which will account for part of the increase. In fact the *1030* is the top model in a four-strong range, so the insides too will be heavily decorated with advanced technology.

In fact when you count the buttons on the fascia, the *1030* turns out to have exactly the same number as the *530*, though there are a number of detail differences and both the display and the remote handset are significantly larger and more complicated. One significant distinction is that the *1030*'s analogue outputs are variable, from the machine or handset, with no fixed alternative for maximising sound quality. There are also optical and electrical digital outputs, which presumably represents the audiophile option.

Besides being considerably heavier than most players, the *1030* is fitted with feet which look as if they might actually do useful work in isolating the player from the environment, rather than merely looking pretty. The control layout manages to avoid clutter and confusion while also incorporating most of the more useful features including track entry. The classy looking silver grey handset is a bit wide to use with one hand, but feels quite nice, has plenty of buttons with quite a sensible layout arrangement, though no colour coding.

Opening the lid reveals that much of the extra weight is due to a double skin construction, with further stiffening provided by a central divide. The laser transport is an expensive linear motor affair, the loading tray an alloy extru-

sion. A fair size transformer is backed by huge Nichicon 'Great Supply' audiophile capacitors, and there are plenty of regulators and decoupling caps besides.

The DAC uses a PWM low-bit decoding technique, known as *S-bit* in Yamaha terminology. The analogue output circuitry receives special attention, mounted separately on its own board and using top quality copper foil polystyrene caps and in-line op-amps. Layout is fairly neat.

## Lab Report

The efficiency of the low-bit conversion system is seen in the excellent low level linearity which is clearly far superior to its cheaper stablemate. Noise too is very low indeed, though in other respects the differences between the two machines are much less obvious. The superiority of the linear transport is seen in the very rapid track access time and good resistance to shock, though not in an error correction capability which is only average.

Distortions are all low, the responses are flat with good separation and channel balance. (Maximum) output level is very slightly high, from a low output impedance well suited to long cable runs.

## Sound Quality

Although all the ingredients look decidedly promising, the *1030* turned out to be a disappointment in the listening room, paradoxically rating slightly below the overall standard set by its budget stablemate. The responsibility for this situation may (or may not) lie with the low-bit decoding system, but criticism rather than praise was very much the order of the day.

Quite good depth was apparent on occasions, but this was not consistent and seemed to vary with the complexity of the music. The treble is decidedly

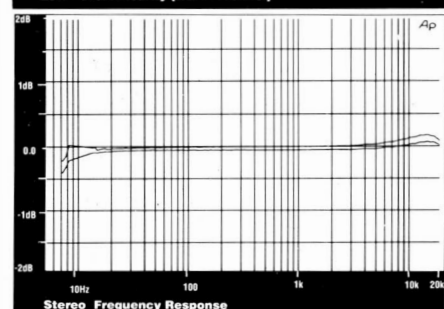
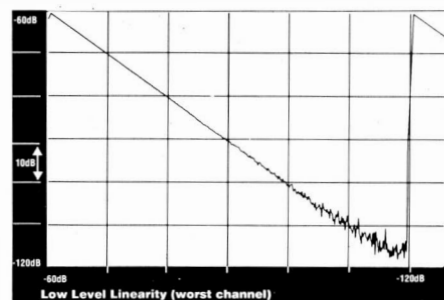
bright with some measure of grain, while the midrange adds some nasal coloration and string tone tends to have a wiry quality. The bass is soft and slow, lacking power and definition, while pace and rhythms are not convincingly defined.

## Conclusions

This upmarket CD player would appear to have all the ingredients to provide excellent results, but such expectations were confounded in the listening room, where the sound was considered significantly below average – a victim perhaps of its sheer complexity, or of the new-fangled low-bit decoding technology that is employed on this occasion and in this application.

## TEST RESULTS

Test resolution (L/R av)	16 bits
Output level, dB rel 2V, Source	2.38V, 1.51dB, 320ohms
Effective dynamic range (-70dB thd + N + dither)	114dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Full level ref 0dB	-92dB -92dB -90dB
at -70dB encode + dither	-47dB or 0.56%
Stereo separation	112dB 110dB 106dB
Stereo balance L/R	0.04dB 0.04dB 0.04dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.1dB
Audible high frequency intermodulation	-101dB
Audible electrical noise	-115dB
Audible mechanical noise	v low
Ultrasonic noise	97dB
Error correction	1.25mm gap
Shock/vibration resistance	v good
De-emphasis	±0.26dB to 16kHz
Track finding speed (15, YEDS 2)	2 secs
White noise overload test	OK
Size (w x h x d)	43.5 x 11.3 x 34.5cms
Typical price inc VAT	£500



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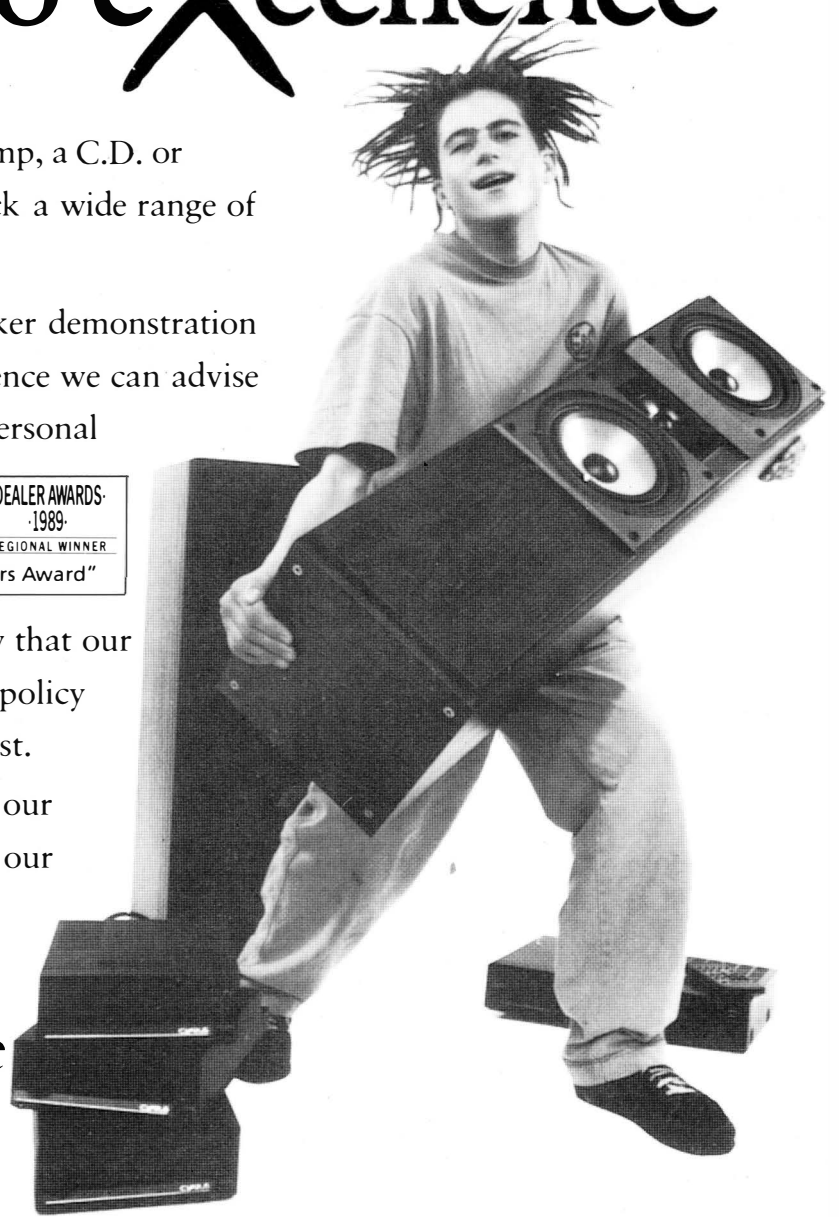
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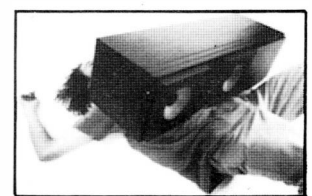
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# Tech Talk

*Our test programme included complete laboratory analysis as well as thorough auditioning of each player. Here we explain the review approach and test methods.*

The sound quality of top of the range record players remains beyond question, but CD players are winning more and more sales from analogue.

The general consensus seems to be that CD provides a reliably good baseline of audio quality, which is more than satisfactory for the majority of non-enthusiast applications. Given this baseline the more critical listener can discern significant and important differences in CD player sound quality. In context, a CD player can be auditioned much as one investigates an audio preamplifier; indeed many of the subjective effects may be described in amplifier sound parlance.

The advantages which are indisputably offered by compact disc players over vinyl disc playing equipment can be summed up as follows:

- 1) Up to 1 hour 15 minutes uninterrupted playing time.
- 2) Freedom from surface noise, clicks and pops.
- 3) Discs are comparatively damage and wear-proof (provided some care is taken).
- 4) No complications of stylus wear, contamination or alignment.
- 5) Full automatic facilities, track programming etc, many players having comprehensive remote control.
- 6) All the usual 'cheap turntable' problems such as pitch stability, wow and flutter etc, are absent.
- 7) CD players can be small.
- 8) High level 'flat response' output can obviate the pre-amplifier, and many players also have competent headphone outputs.
- 9) High lab specifications for distortion, balance, separation and signal-to-noise ratio.
- 10) Some immunity to acoustic feedback and reasonable levels of shock

and vibration resistance.

11) The sound is relatively neutral, with a wide open frequency characteristic as well as notably good bass, since arm/cartridge subsonic resonances are avoided. Stereo is usually very stable and well focused, with much separate detail.

That said, there remain enthusiasts who continue to prefer their music from vinyl LP sources, complaining of a slightly 'amusical' quality about the sound of CD. Lower disc prices remains a further major vinyl incentive.

As regards the more subtle aspects of sound reproduction, CD players can vary in their stereo presentation – some have a more relaxed 'distanced' perspective while others seem more direct and 'up-front'. Differences can be found in the far space or depth region behind the frontal image plane, while some players may also show a softening of definition in the bass or treble extremes. The treble may also appear a touch 'grainy' and fatiguing. The mid can vary in tonal quality, with a thinner, 'harder' effect on some players, and a sweeter, more natural balance on others.

## Laboratory Tests

The format for the presentation of the CD test programme was first introduced in issue 64 last November, replacing the existing version which had been used for some years.

A new technical test was used on all the players in this month's crop. The *CBS 1* test disc contains a fade to noise track for exploring the low level linearity of CD players. This is a dithered 500Hz signal starting at -60dB and over a 30 second period it fades linearly to -120dB. Using the computer controlled Audio Precision System One test set with a very wide dynamic range, it

is possible to track this tone down to the noise floor of the CD player. Any linearity error is easily assessed and, although the graphs produced by this method have not been published, comments as to the strength of the players in this department have been mentioned in the reviews where appropriate.

The frequency response test runs over a test range of 10Hz to 20kHz and an intermodulation graph was taken (but not published) on a logarithmic frequency scale from 500Hz to 25.5kHz, to reveal the audible band distortion products and also the presence of nearby higher frequency components.

The measurements include a readout of the -90dB recovered sinewave, achieved by triggered time averaging. The encode signal is dithered (from CBS disc CD1) which means that any deviations from a pure sinewave are very much the responsibility of the players. Also measured was a spectrum analysis of that signal clearly showing both the distortion harmonics present and the audible noise floor.

The test results tables include a figure for effective dynamic range, the amplitude window available from MSB peak or a nominal 2 volts down to the practical noise and distortion floor. Distortion results are given in dB and percentage to aid comparison with other tests and specifications, and player resolution is expressed directly in bits, this estimated from a combination of low level distortion and linearity and the accuracy of level recovery from -70 to -100dB recorded modulation at 1kHz.

The standard surface gap error test has been expanded from the previous maximum of 0.8mm up to 4mm, and while most players do pretty

well these days, with error protection for 0.8 to 1.2mm of data gap loss, a few examples are still quite amazing, with enough processing power to stay audibly clean on up to 3mm of missing data – a huge chunk in context of the very high density of data storage on the disc.

For frequency response, a high resolution graph has been used. Left and right channels are both assessed to ensure that no balance errors occur. Other tests include checking for correct de-emphasis; testing response alignment; output impedance (important when using passive control units); output level; track location speed (assessed as the time taken to access track 15 on the Sony test disc YEDS2). Weighted and unweighted signal-to-noise ratios were measured with and without pre-emphasis and each player's mechanical noise was also assessed.

## Listening Tests

After a reasonable conditioning/ warm-up period, each player was auditioned by a small group of experienced listeners using a wide range of source material, paying particular attention to establish consistency of rating against previous reviews.

The basic reference system included bi-wired Celestion *SL700* loudspeakers on Celestion stands and Spendor *SP2/2s*, driven by a variety of exotic cables from Musical Fidelity *MA100* power amplifiers, fed from a high quality passive volume control. Reference was made to vinyl reproduction from a Linn *Sondek* with Ekos arm and a van den Hul *MC Two* cartridge. The software used ranged from early choral music with solo voice, through chamber music, full orchestral pieces to a selection of jazz, rock, and pop tracks.

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### Illustrated

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Quad CD Player	£449.00	Arcam Delta 80 Tuner	£299.90
Epos ES14 Speakers	£385.00	Arcam Delta 70 CD	£599.90
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# Conclusions, Best Buys and Recommendations

*It's time to sum up this month's batch of reviews, highlighting which CD players most impressed our listening panel.*

It has to be said that the findings of this latest review project, covering some 22 components in the context of at least half a dozen established reference points, are somewhat depressing overall.

CD player technology is currently right on the cusp of a significant change in the way the digits which are read off the disc are handled prior to feeding a conventional analogue signal on to the amplifier and loudspeakers.

In simple terms we are moving from an era when 'multi-bit' processors were the norm to one in which a new generation of 'low-bit' converters are threatening to take over.

The converter in a CD player is actually by definition a semi-digital and

semi-analogue device, and one attraction of 'low-bit' systems to CD player manufacturers is that they are 'more digital' than the multi-bit processors. This in turn makes them more consistent and predictable in performance, reducing the need for expensive and tricky quality auditing.

The approach involves using the latest high speed devices to 'preprocess' the datastream read off the disc in the digital domain. The 16-bit PCM digital audio code is converted into a faster, simpler code that only needs one (or three) bits resolution in the final decoding.

Although some early low-bit examples appeared in 1989, 1990 is really the first year that a reasonable variety of applications have become

available from the majority of manufacturers.

Following some very effective PR by Philips in particular, low-bit conversion technology acquired during 1989 an almost mystical reputation as the universal panacea for all CD's sonic ailments. The experiences of 1990 only serve to confirm what experienced aficionados have always understood. In hi-fi, there's no such thing as a universal panacea.

Low-bit decoders do change the CD sound quality rules, and indeed are to be welcomed for the extra diversity they bring. But the experiences of comparing a variety of the former against the established multi-bit technology only emphasises that the gains made on the

roundabouts of transparency, sweetness and smoothness are lost on the swings of pace, timing and rhythm.

The regrettable conclusion from these latest tests is that although certain examples of low-bit decoding do help advance the state of CD sound quality, the average sound quality has actually deteriorated somewhat, mainly as a result of the changeover.

This unpalatable conclusion is almost inescapable when one confronts the top and bottom models of the latest Yamaha range, for example, where the 'budget' multi-bit model sounded better than the hi-tech 5-bit (low-bit) flagship model, at any rate to our panel under our listening conditions. Much the same is

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**IN HI-FI**



true of the contrast between the low-bit Sony *CDP-790* and its multi-bit *CDP-770* predecessor.

It is apposite to point out our judgements on sound quality should not be regarded as absolutes. They are based on the opinions of several experienced listeners, and show good consistency and repeatability with the passage of time. But any judgement of overall quality involves attempting to achieve a balance between several different – often somewhat contradictory – criteria.

Those in search of superior quality hi-fi equipment should certainly find our assessment useful. But it is difficult to attempt to weigh up, say, the smooth sweetness of a low-bit player against the dynamic bounce of a multi-bit example. Much comes down to personal taste, both in sound and music, so each individual ought really to take the time and trouble to formulate his or her own opinion.

As a postscript, if the experiences with the latest mass market machinery has proved a source of some despondency, the growing signs of maturity and continuously improving performance on offer in the latest products from the specialist hi-fi sector provide real grounds for optimism.

Slower than the mass market manufacturers in exploiting the new medium's initial growth, specialist hi-fi manufacturers are finally getting into their stride. The recent products from firms like Meridian, Arcam and Micromega show that what was once a narrow performance edge over the mainstream is threatening to widen into a gulf.

Compact disc still falls well short of the promise of perfection made by its original major protagonists, but its commercial success is now a fait accompli. With increasing experience and the availability of greater engineering diversity, the enthusiast-led specialist hi-fi

sector is at last beginning to deliver some of the musical quality that detractors have long claimed the CD medium lacked.

## Best Buys & Recommendations

The actual list of Best Buy and Recommended models looks alarmingly unbalanced on this occasion. Which perhaps only reflects the fact that according to our analysis the best are continuing to get better while the mediocre are actually deteriorating, at any rate as far as sound quality is concerned.

From a total of 22 different components, no fewer than four deserve the Best Buy accolade for delivering exceptional performance for the price. However, only two more players, alongside two outboard converter units, fall into the Recommended category that combines the 'best of the rest' cheapies with those delivering exceptional performance at whatever price. This is only half the 'hit rate' we found in the CD reviews the *Choice* team conducted for our June issue.

## Best Buys

The £200 Marantz *CD-40* is a conventional multi-bit 'budget' machine which we couldn't get hold of in time for the last project. It's a humdinger of a machine for £200, with all the pace and life of the more expensive *50* and *60*, just lacking some of the politeness and refinement of the upmarket models. It's also rather better proportioned and better looking, unless you're planning to partner a Marantz integrated amplifier.

Note, however, that Marantz has just introduced its first 'low-bit' player, the *CD-41* selling at a £50 premium over the *40*. We couldn't get hold of one in time for this test, but readers interested in the low-bit/multi-bit debate should find this an interesting comparison.

Notwithstanding any UK preconceptions about the

sound quality of this company's electronics, the £280 Dual *CD 5010* simply established a standard in the listening tests that many more costly players were unable to match, especially in terms of drive and dynamics. The reason later became apparent when we opened the lid, and recognised Rotel as the source of manufacture, and the *RCD 855* as the source of inspiration. The latter was in fact a Best Buy in our June 1990 issue, and this Dual variation sells at a similar enough price to deserve the same accolade.

Sharing many components with the *CD-40*, the £330 Marantz *CD-60* provides quite a few worthwhile extra features such as FTS and a good quality remote volume, in a slightly larger case, which more or less justify the price premium. The sound is a little more refined than its smaller brother, if less so than the *SE* variants.

Replacing the short-lived *CD840* (Philips initial foray into low-bit decoding) the £400 Philips *CD850* is close to the upper price limit for Best Buy acceptability, but deserves the endorsement just as richly as its predecessor, the £50 price premium being justified by the better presentation and greater completeness of this second generation design. The seductive transparency of low-bit decoding is immediately apparent in this full feature package.

## Recommended

Actually assembled in Britain, the £149 Aiwa *XC-333* has a real polyglot pedigree, bringing together components sourced from around the world. The results are in no way exceptional, but this is nonetheless a big hearted, well featured player giving good value for money.

Two new low-bit outboard decoders were tested. The £350 Arcam *Black Box 3* and the £499 Micromega *Duo BS* both deserve recommendation, since both are capable of very good sound quality – always provided that the signal source (CD player or transport) is of sufficiently high quality.

Indeed it's worth pointing out that the reduced price on the older *Black Box 2* is sufficient to elevate this earlier model to Best Buy status. It's not better than the new low-bit devices, but it is likely to get close when used from the digital output of a normal CD player.

However, the real standing ovation goes to the £899 Meridian *206B*. One feels that the arrival of a single-box low-bit player that redefines the performance of the medium for less than £1,000 deserves something more than a mere Recommended flag. But rules are rules and that will have to suffice for what is probably currently the finest single-box CD player available, at any price.



There's more to CD sound than bits and sampling rates.







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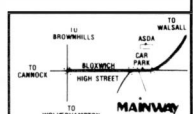
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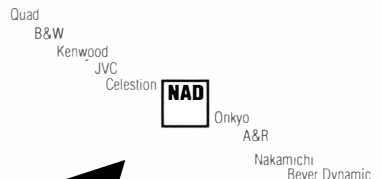
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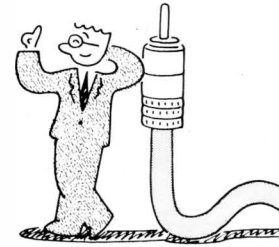
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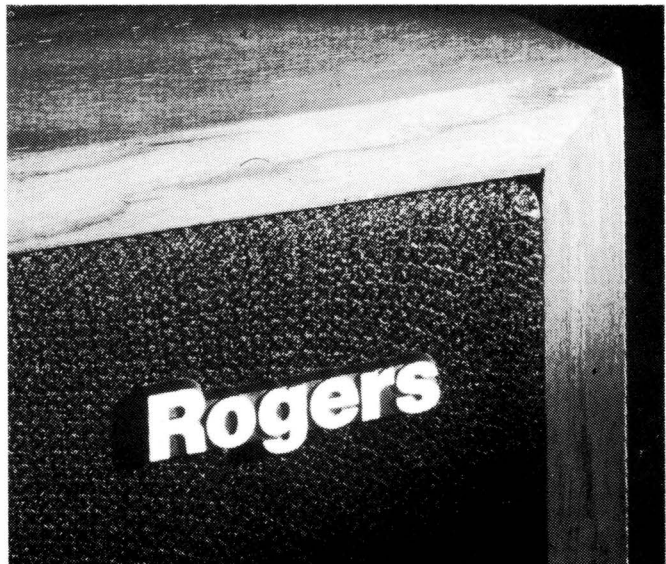
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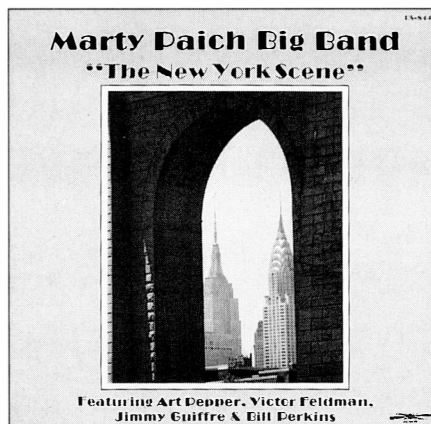
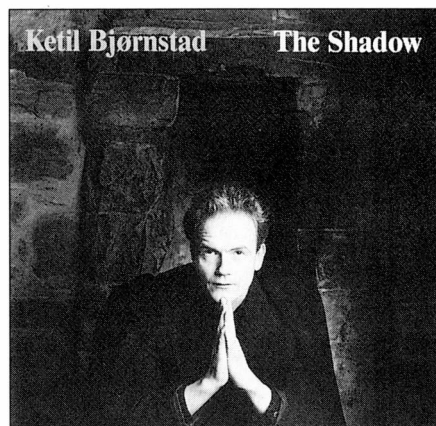
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# Audiophile Recordings

*Our mail-order service allows Hi-Fi Choice readers to buy some of the world's best audiophile records and CDs.*



**A**s top-quality 'audiophile' recordings seem to be becoming more and more difficult to find in High Street record shops, *Hi-Fi Choice* is making a determined effort to source some of the best recordings from around the world and make them available to readers by mail order.

You might stumble across one or two of these records in some specialist record shops, but for the most part these records and/or CDs are not readily available in the UK. You certainly won't find them in your local record store! We have already added many exciting discs from specialist American record labels such as Reference, Wilson and Sheffield - and we expect our catalogue of LPs and CDs to expand considerably during the next few months.

## **RADKA TONEFF: Fairytale**

Ref LP1 £12.95

Ref CD1 £14.95

The well known audiophile (digital) recording of female voice and piano. Worth the asking price alone for the opening song, *The Moon's A Harsh Mistress*. Odin CD03/LP03

## **ARNE DOMNERUS' KVARTETT: Blatoner fra Froldehaugen**

Ref LP34 £12.95

Ref CD34 £14.95

A selection of Grieg 'miniatures', imaginatively arranged for a jazz quartet. Superbly vivid sound. For-X, FXLP65/FXCD65.

**NEW!**

## **KETIL BJØRNSTAD: The Shadow**

Ref LP35 £12.95

Ref CD35 £14.95

Recorded in Oslo and released earlier this year, *The Shadow* features the delightful voice of Randi Stene in a collection of compositions inspired by the Poems of John Donne. Bjørnstad is one of Norway's finest session players. For-X, FXLP93/FXCD93.

**NEW!**

## **SMITH/RICCI: Paganiniana**

Ref LP10 £14.95

Ref CD10 £17.95

Breathtaking purist analogue audiophile recording of classical works performed on piano and violin. On the

American Water Lily Acoustics label, recorded by Kavi Alexander and sponsored by Conrad-Johnson. An essential addition to any audiophile's collection. Water Lily CJD/CJLP

## **TOTTI BERGH: I Hear A Rhapsody**

Ref LP4 £12.95

Ref CD4 £14.95

On the Gemini label, saxophonist Totti Bergh plays a selection of jazz standards. *Jazz Journal* magazine described this as "A delightful 'wee small hours' album".

Gemini GMCD48/GMLP48

## **MARTY PAICH BIG BAND: The New York Scene**

Ref LP13 £12.95

Featuring Art Pepper, Victor Feldman, Jimmy Guiffre and Bill Perkins, this soundful set includes extended modern stylings of some classic Broadway musical tunes by the likes of Cole Porter and Rodgers & Hammerstein. Discovery DS-844

## **MARTY PAICH: What's New**

Ref LP14 £12.95

Another superb recording of big band 'swing' jazz, this time featuring mostly Marty Paich original compositions. It doesn't seem possible that this was recorded in 1957. Like *The New York Scene* LP, which dates from 1959, the

sound is quite breathtaking: vibrant, dynamic, and with a superbly natural soundstage. They knew what they were doing in those days. Discovery DS-857

## **OPUS 3 TEST RECORD 1: Depth Of Image**

Ref LP11 £12.95

Ref CD11 £14.95

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, containing examples of the work of many of its recording artists. Opus CD7900/LP7900

## **OPUS 3 TEST RECORD 3: Dynamics**

Ref LP12 £12.95

Ref CD12 £14.95

Another compilation on the Swedish Opus 3 label, with musical extracts carefully chosen to illustrate what is meant by musical dynamics and comprehensive liner notes to show you what you should be listening for. How good is your hi-fi system? Opus 3 CD8300/LP8300

## **GREX VOCALIS: Renaissance For Kor**

Ref LP15 £12.95

Ref CD15 £14.95

A capella performances of Renaissance and medieval songs, beautifully

recorded in natural acoustic environments for the Norwegian For-X label.

CD: For-X FXCD39

LP: For-X FXLP39

**YTRE SULOENS JASS-ENSEMBLE / BARBARA ANN SHORTS: A Stone For Bessie Smith**

Ref LP16 £12.95

Ref CD16 £14.95

Blues and gospel singer Barbara Ann Shorts, backed by a small jazz ensemble with musical roots in the New Orleans tradition, plays tribute to the great US blues singer Bessie Smith who died in 1937. This collection of songs includes a fascinating re-working of Sting's *Moon Over Bourbon Street*. For-X FXCD69/FXLP69

**ROAR ENGELBERG / STEIN-ERIK OLSEN: Mosaic**

Ref LP17 £12.95

Ref CD17 £14.95

Scandinavia's only professional pan flautist, Roar Engelberg, plays a collection of arrangements with Stein-Erik Olsen (classical guitar) — pieces by Ravel, Bach, Faure, Desportes and more. Superb dynamics! For-X FXCD81/FXLP81

**JIM BROCK: Tropic Affair**

Ref CD18 £15.99

Ref LP18 £15.99

Vibrant contemporary jazz, recorded live to two-track by Reference Recordings' Prof. Johnson. Remarkable clarity and a tremendous 3-D soundstage. RR31



**WILLIAM WALTON: Facade Suite**

Ref CD19 £15.99

Ref LP19 £15.99

One of the Reference label's earlier analogue recordings (these days the company concerns itself with improving digital techniques), featuring the superb playing of Chicago Pro Musica. "A true state-of-the-art recording", said *The Absolute Sound* magazine. RR16

**STRAVINSKY: L' Histoire du soldat Suite**

Ref CD20 £15.99

Ref LP20 £15.99

Chicago Pro Musica again. The US underground magazine *The Absolute Sound* reckoned this to be one of the best (analogue) recordings ever made! RR17

**VIVALDI / BACH: Sinfonia in C; Trio Sonata in C, etc**

Ref CD21 £15.99

Ref LP21 £15.99

An exemplary digital recording of the Helicon Ensemble playing Baroque music from Vivaldi and Bach. The CD contains an extra track, Bach's *Prelude in C*. RR23

**COPLAND: Appalachian Spring Suite**

Ref CD22 £15.99

Ref LP22 £15.99

The *Appalachian Spring Suite* in its original version for thirteen instruments, recorded with a Nakamichi DMP-100 digital encoder. Plus the Pacific Symphony Orchestra in a world premiere recording of *Eight Poems of Emily Dickinson*. The CD contains an extra (analogue) recording of *An Outdoor Overture* (8m 50s). RR22

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Conductor Lowell Graham leads performances of John Williams' *Liberty Fanfare*, Samuel Barber's *Commando March* and many more. A pure analogue audiophile recording from 1988 using John Curl's Ultramaster recorder. W8823, WCD8823

**JAMES B. WELCH: Concert**

Ref LP24 £15.99

**JAMES B. WELCH: Recital**

Ref LP25 £15.99

Two of the Wilson Audiophile label's famous recordings of classical organ works. On a big system these discs are truly breathtaking — watch out for your woofers!

Ref CD24/5 £15.99

Tremendous value: both *Concert* and *Recital* on one compact disc! W177, W278, WCD177/278

**The Choir of Grace Cathedral, San Francisco**

Ref CD26 £15.99

Ref LP26 £15.99

W805, WCD794/805.

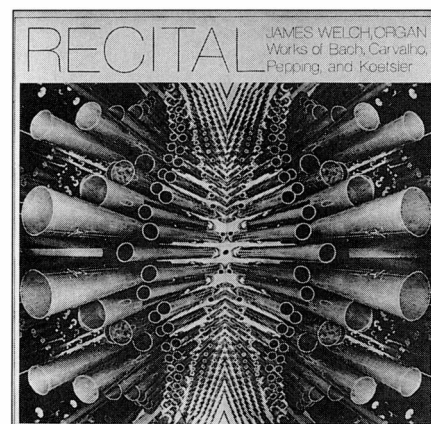
Another breathtaking example of Wilson Audiophile's pure analogue recordings, used as reference discs by hi-fi gurus around the world. The discs are hard to find in the UK.

**THELMA HOUSTON & PRESSURE COOKER: I've Got the Music In Me**

Ref LP27 £15.99

Ref CD27 £15.99

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! Sheffield ST200, CD2. Listed below are further highly collectable Sheffield Labs discs which are astonishing in their sense of realism and truly awesome dynamics:

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LAB20, CD14/20.

**JAMES NEWTON HOWARD: James Newton Howard and Friends**

Ref LP33 £15.99

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**SPECIAL OFFER**

Order any 3 LPs or 3 CDs and receive a **FREE** copy of *First Sampling* (RRS1CD), Reference Recordings' compilation CD featuring a variety of classical tracks from its catalogue.

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**Totti Bergh: *I Hear A Rhapsody***

- Ref LP4 (£12.95)
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- Ref LP10 (£14.95)
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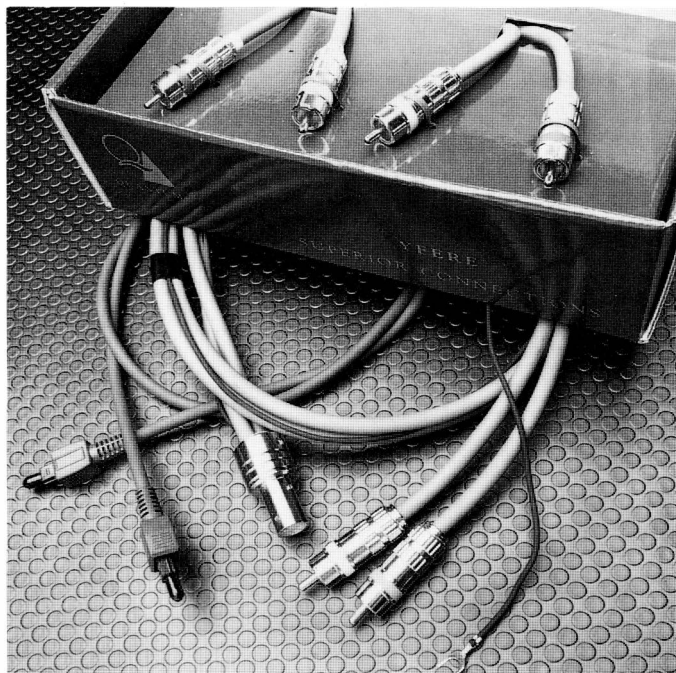
*Goods are usually dispatched within 10 days of receipt of order. Whilst we endeavour to maintain stocks, some of these discs are extremely rare - so please bear with us in the event of any delays.*

**Available to UK readers only**



# Quantum Cables Offer

Improve the sound quality of your hi-fi system with these top quality LC-OFC interconnects, PC-OCC speaker cables and save pounds.



**Y**FERE and YBLENT cables and plugs are the latest accessories to be distributed here by Quantum Audio of Scotland. These high quality cables all use linear crystal oxygen free copper wires (LC-OFC) and beautifully crafted solid copper phono plugs which are gold plated. There are two basic configurations: Twin and Quad. The Twin leads employ two LC-OFC conductors of 22 strands, whereas the Quad leads use four conductors of 20 strands.

The *Superior* range of cables really are a gorgeous addition to your hi-fi system. However, for those of you who are on a tighter budget there is also the YFERE *Super* range which uses the Twin wiring configuration but the leads are terminated with less elaborate plugs.

For digital aficionados there is also a high quality fibre optic cable (yes, cables really do make a difference even in the digital domain). And the analogueophiles looking to get the best from their record collection might care to upgrade their arm cable with the *Superior* tonearm cable which uses YFERE's Quad wiring.

Also new to this country are *Furukawa* loudspeaker cables. All are two-core cables (twisted in the FS2T20 and '35 versions, flat in the FS2T09) using PC-OCC wire with a high density polyethylene dielectric and flexible PVC jacket.

Thanks to an exclusive deal with Quantum Audio *Choice* is able to offer its readers these cables at discount prices. With the *Furukawa* speaker cables, you can have your leads terminated with 4mm banana plugs or spade connectors free of charge!

Simply fill in the form opposite and leave the rest to us.

All our prices are inclusive of postage, packing and VAT. Please allow 28 days for delivery.

## TO ORDER QUANTUM CABLES

(Tick selections)

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### SUPERIOR

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<input type="checkbox"/>	004-012 LC-OFC Phono Quad 1.5m pair	£95.00	£91.95
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FS2T09 (0.09mm<sup>2</sup>, 33-strand)

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FS2T35 (3.5mm<sup>2</sup>, 7 x 20 strand)

<input type="checkbox"/>	2 metre pair	£100.00
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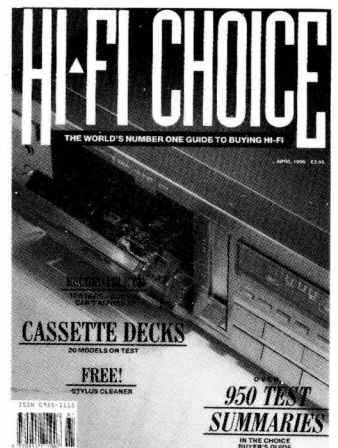
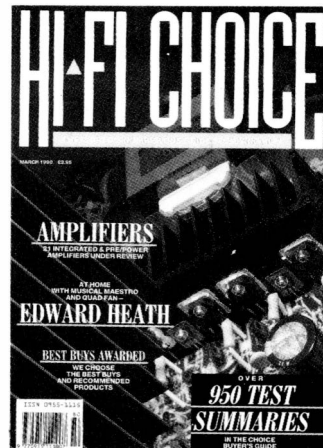
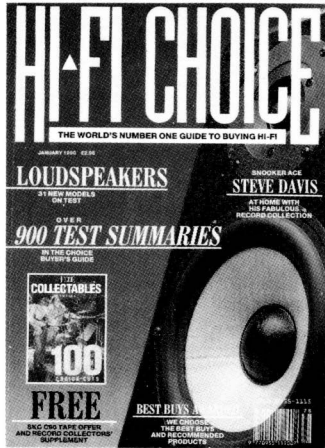
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# THE DIRECTORY

The *Hi-Fi Choice Directory* was conceived as a reference guide to all the audio products reviewed by *Choice* that are currently available. The products are split into suitable categories, each with its own introduction containing information about the product type and its applications. They are particularly relevant to the uninitiated first time buyer and help sort out the order of priorities when buying a piece of equipment.

Each product along with its retail price is placed in its respective category in alphabetical order. For instance the Acoustic Research *EB101* is presently at the beginning of the Turntables and Tonearms section; however, the Ariston *Superior* heads the Motor Units section as it is sold and was reviewed as a separate component – requiring a separate arm. Where there are several products with the same name but different model numbers these are in price ascending order.

Then come the ratings for the standard achieved in laboratory and listening tests, with the exception of certain product groups where lab tests

were not carried out. One important point to remember is that they cannot be used to compare products from different categories – ie a cassette deck rated 'excellent' in sound quality will not usually offer the same standard of fidelity as a similarly rated turntable or CD player (unless you can get hold of first generation copies of the master tape!).

The Comments column contains a potted summary based on the original review, emphasising the salient points of a product's character and sonic performance. The space available doesn't allow for great detail but in the 20 or so words we have attempted to put across the essence of the review, in some cases using quotes from the review itself. Obviously, important information on compatibility or auxiliary equipment used in the test cannot be included, and it is best to refer to the original review for this, of which more later.

The next column(s) varies from category to category but is usually either features or specifications, the former being facilities available on a cassette deck or amplifier or the type of drive

system on a turntable.

Specifications vary with product type but usually relate to suitability or capability, for instance arm matching figures are given with the cartridges which tie in with the mass figures for the tonearms themselves, making it easier to avoid compliance/ mass mismatches.

Perhaps the most influential letters in the Directory are those found in the Value column, the *Rs* and *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. An ideal situation would be to choose suitably priced Best Buy or Recommended products from relevant categories and create a Best Buy system, but, due to

the variety in tonal balance that exists in much audio equipment (especially the electromechanical elements – ie cartridge and speaker) system building is not quite that simple. These ratings make a useful guideline for shortlisting components, but only experiencing the actual combination will tell you whether it works for you.

The final column contains a reference to the issue of *Hi-Fi Choice* which featured the complete review. If you wish to get a better idea of a product by reading the complete review it is possible to order a copy (if still in print) through our back issues department. Every *Choice* issue contains a Back Issues page for this purpose.

The Directory is constantly updated with the latest reviews and price changes as well as having discontinued products removed. If a listed product is updated to a 'mark two' form and the alterations are purely cosmetic or not too extensive we sometimes leave the product in with its current model number and an asterisk to denote that it has changed since our original review was published.

## 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 as strong as ever, and certainly represents the route taken by those who place sound quality first.

Yet those who choose the separates route still have lingering doubts – usually completely unjustified – over the compatibility of components from different manufacturers. Gross incompatibilities are very rare nowadays, only likely to rear their heads amongst the most exotic components. Here the delicate art of 'supercompatibility' really takes over the major role and might be regarded as the key to 'real' hi-fi.

There are now three different pre-recorded music media competing for the attention of the hi-fi user, and to go for all three will either cost a lot of money or involve substantial compromises in the sound quality of each. For this reason many separates purchasers may start with just one source, adding others or a tuner when funds permit.

There will always be controversy over the relative qualities of LP, CD and cassette. LP is still the choice for ultimate sound quality – particularly for those prepared to spend a substantial sum on a good quality turntable system.

Cassette has never really challenged vinyl's superior quality, but it is a multiple role format, offering 'go anywhere' flexibility, a uniquely useful recording capability, plus a broad catalogue of pre-

recorded music cassette material. As a hi-fi medium cassette suffers from pre-recorded 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 replays best on that machine, which may cause aggravation when upgrading a few years hence.

CD is the latest challenger to these two established media, using a digital instead of analogue storage format. The sound quality remains controversial, hailed as near perfect by its fans but derided by vinyl freaks, so it is probably fairest to say that CD is fine for most listeners, but may not suit everyone; certainly the lack of background noise, defects and deterioration over time are major strengths.

While there will always be arguments about the different music storage and transmission formats available to the hi-fi listener, there is also controversy over the relative importance of the different components which make up the system chain – by which is meant the source, the amplification, and the loudspeakers (and for the pedantic the room itself, though there's often little that can be done here).

For many years the 'weakest link' theory proposed that the loudspeakers needed the most attention, that amplifiers merely had to have sufficient power, and that turntables were pretty well perfect. However, this perspective has become steadily discredited by an alternative 'theory of precedence', which stresses that no subsequent component can make up for the inadequacies of its

predecessors – all it can do is supply its own additional degradations. In such a context it is not uncommon to find more than half the system budget allocated to the record player, with scrimping and saving made on amplifiers and loudspeakers.

Choosing the components of a system is only part of the task of getting the system as a whole working as well as possible. Good turntables and loudspeakers both benefit to a surprising degree from proper support – from stands that enable them to give their best performance, whether floor-standing or wall mounted.

Siting of components within a room can play a significant role, as can the room itself. Some people may prefer an acoustically more 'live' room than others, but most will agree that the larger it is the better, because this tends to provide smoother and better extended bass reproduction. All rooms create reflections and standing waves, and the effects of these are more severe if all opposing walls are parallel, similar distances apart, and with hard reflective surfaces. Provided that the loudspeakers can be placed fairly symmetrically, slight asymmetry elsewhere in the room is usually helpful.

The loudspeakers are most critical of placement, because it is their job to create the stereo image, and it will be impossible to do this if the sound from each is not roughly similar at the listening position. Each loudspeaker should operate in a similar immediate acoustic environment, unencumbered by other furnishings and structure, and a similar distance from listener, nearby walls, and

corners. Some loudspeakers are designed to operate close to a rear wall, others a metre or so out into the room, but all loudspeakers benefit from being closely mechanically coupled via proper stands to the floor.

Mixing and matching the components of a record player to get optimum results can be something of a black art, over and beyond the fairly simple business of choosing a cartridge of roughly the right compliance to suit the arm effective mass. Certainly the combining of turntables and tonearms is not a simple matter, and this is where a good specialist dealer will come into his own, both in terms of recommending good combinations from the models he holds in stock, and then in correctly carrying out the sometimes tricky set up procedures which are often required to get the best results.

The key to getting the best results from a separates system lies in finding an experienced and skilled dealer in the first place, one who takes the trouble to find out what you really want and then demonstrate some likely alternatives.

The Directory has been compiled so that it can be used by *Choice* readers as a buying guide. A guide in the sense that you should use the information in it to make a shortlist of equipment suited to your needs and budget, and then audition it at a dealers before taking the plunge. Because tastes inevitably differ it would be unwise to buy purely on the basis of our recommendation and dealers are the most experienced people around when it comes to making systems work as a whole.

# THE DIRECTORY

## TURNTABLES & TONEARMS

The schizophrenic split between consumer electronics and 'real hi-fi' is most obvious amongst turntables. The former are supplied simply as a means of playing vinyl in a system context. Cheaply manufactured in the Far East, these are complete players with a variety of automatic facilities, sometimes tied into system remote control. But engineering compromises severely limit sound quality, cartridge choice may be P-mount restricted, and such machines are rarely stocked by specialist hi-fi dealers these days.

Specialist turntables offer big sound quality

improvements, but lack so-called convenience features (that practised users often find irksome). Such turntables at the cheaper end of the market (sub-£350) tend to be supplied with matching tonearm, and often include a 'starter' cartridge. Still better quality is found at higher prices amongst the separate motor units and tonearms. Careful partnering and set-up is essential for these individual components, but 'naturally sympathetic' combinations do exist, and the good dealer can help.

Listed separately as integrated players and as turntable motor units and tonearms, our **sound**

**quality** rating is based on results achieved using a high quality system – but in point of fact the turntable is usually the limiting factor soundwise in any system. **Lab performance** summarises the speed stability, vibration generation and environmental isolation of turntables, along with the friction, alignment and adjustment of tonearms. The tonearm's physical characteristics also define a range of mechanically compatible cartridges (see cartridge listings)

### INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research EB101 £230	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Alphason Solo/Xenon MCS £420/£300	Average+ Good	The deck is warm and euphonious with high levels of clarity. Wow artefacts occasionally just audible.	3 point suspended motor unit, optional quartz PSU/speed change 13g		67
Alphason Sonata/HR-100S MCS/atlas £720/£480/£340	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 Q-Deck £165	Good Average+	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid	BB*	67
Ariston Icon £215	Good Good	A thoughtful and efficient design that offers good sound, excellent value and semi-automatic operation too! Good vibration isolation eases siting	Belt drive, suspended, semi-automatic, 10g	BB	79
Ariston Forte £350	Average— Average	Heavy on engineering, short of soul? The Forte almost makes it, losing out only because of some residual pitch variations and a lack of bass power. The arm is modestly good	Manual 2-speed belt drive player and detachable arm, 10g		67
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 CS505-3 £160	Very Good Good	Continuous steady improvements have kept this model at the forefront of the budget market. Practicality is excellent and the deck has excellent timing bass/mid and stereo imaging	Semi-auto belt drive, 8g	BB	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
Goldmund ST4 £4,589	Very Good Excellent	The Studio turntable takes on a cheaper tonearm than the T3F, yet provides a similar reference standard objective and subjective performance at £2,000 less, in a neatly integrated though bulky package.	Solid subchassis, direct drive, parallel arm, detachable headshell	R	60
Heybrook TT2 turntable & arm £424/£269	Average Good+	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, belt drive, 14g	R	67
JVC AL-FQ555 £170	Below 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
Kenwood DP-990 £400	Average Average	Smart, slick and massive player suitable for low compliance cartridges only. A good but not inspired performer.	Semi-auto 2 speed direct drive, 16g		67
Kuzma Stabi/Stogi £699/£399	Average+ Stabi: Good; Stogi: Excellent	Stabi is powerful, spacious but not sufficiently subtle. Stogi is an excellent all rounder with even spread of abilities.	Manual, belt drive, subchassis, 12.5g	Stogi: R	60
Linn Axis/Akito £399	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 Sondek/Ittok/Troika* £549/£483/£669	Excellent Very Good	Superb sound – the best LP12 combination yet. The Troika gives the system real solidity and strength, stretching the deck and arm qualities to the full. Arm has since been upgraded	Manual subchassis player, belt drive, 14g	R	60
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

# THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

# THE DIRECTORY

## INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
Omega Point Silver/Black £895/£295	Good Good+	An avowedly stripped down turntable that lacks even an on/off switch, the Omega Point Silver offers fine midrange clarity and good stereo, but some HF compression and a lack of 'wellie'	Manual, solid, belt drive, unipivot, 11g		55
Opus 3 Continuo/Decca London International (Revised)* £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
Rega Planar 2 £155	Average+ Good	A remarkable product at the price, surprisingly articulate and confident	Manual, 11.5g	BB	48
Rega Planar 3 £207	Good Good	A long time leader in its price category, the '3 (with its excellent RB300 arm) sounded nicely 'musical' in a balanced and coherent manner	Manual, 11.5g	BB	48
Revolver Rebel £169	Average— Average—	Fat, assured and forward presentation, but ragged and subjective speed stability problems. With a little further development, it will be a winner	Manual, 2-speed belt drive inc cartridge, 13g		67
Revox B291* £892	Average— Average—	Sound quality ranks as below average. Subjective bandwidth is narrow and the music lacks grace and energy. Ease of use however is unrivalled	Automatic, remote controllable, direct drive parallel arm, prefitted cartridge		55
Roksan Xerxes/Artemiz/Shiraz £695, £595, £655	n/a Very Good	Imaginatively designed, sophisticated front-end system, a little drier than some perhaps, with superior stereo, resolution and presence	2-speed manual, MC cartridge, 9g	R	72
Rotel RP-855 £189	Good Good	Great sound for the money – detailed and clear with good bass and no irritating nasties	Belt drive, solid, speed adjust, 9g	BB	79
Systemdek IIX £248	Good Average+	Poised, clean sounding deck, forward and explicit in character. A good value deck under £250, and a relatively cheap and satisfactory suspended model	2 speed belt drive manual turntable and arm, 11g	R	67
Technics SLBD-22 £90	Average— Average—	Not bad for the price and a great improvement on the L20, it performs reasonably when not stretched	Semi automatic, solid plinth, electronic, 6g P-mount	R	48
Technics SL-DD33 £110	Average Average	As with the QD33 though better value	Automatic, direct drive, solid plinth, 7.5g, P-mount	BB	48
Technics SL-L20 £115	Poor Average—	A rather lightweight parallel tracker achieving a poor overall rating, with little to recommend it unless you dig facilities	Electronic, solid plinth, 5g, P-mount		48
Technics SL-QD33 £140	Average Average	The quartz speed controlled version of the DD is short on sound quality but not features. But it did have fair focus and some depth	Automatic, Quartz, direct drive, solid plinth, 7.5g, P-mount	R	48
Thorens TD 280 Mk II £180	Good— Good—	Legendary Thorens build quality on the cheap – slightly unsubtle sound but eminently liveable-with and very good value	Belt drive, solid, electronic PSU, 12g	BB	79
Thorens TD 166 Mk V £200	Good Good	Classic suspended-subchassis deck with clear, stable sound of no particular character. Unlikely to make enemies	Belt drive, suspended, 12g	BB	79
Thorens TD 316 Mk II £220	Good Good—	Very solid deck with neat split-chassis construction. Sound is a bit insecure in the bass, but it could suit classical music lovers well	Belt drive, suspended, electronic PSU, 12g	R	79
Thorens TD320 Mk II £350	Good Good	Good, consistent sounding deck with much improved (but not ideal) arm. A little expensive for performance offered	Semi-auto two speed belt drive, 14g		67
Townshend Rock Reference/Excalibur £1,800/£650	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
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

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ariston Superior £598	Good+ Good	Good but slightly damped sound quality, with powerful and stable bass. The pro quo is a certain lack of pace, energy and resolution	Belt drive, subchassis, electronic		55
CEC ST930 £599	Good 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 £80	Good— Good	After-market kit to convert Rega 2 or 3 to semi-suspended subchassis style. Looks good and sounds tidier than original. Feedback is much reduced	Conversion kit, all work reversible	R	79
Michell Syncro £265	Good Good	A particularly happy blend of qualities endows the Syncro 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
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
NVA Senior £450	Good— Average	Very high sensitivity to low-frequency vibration, especially on NVA stand, gives strange subjective bass response and confused sound. Looks are unusual but pleasing	Belt drive, electronic PSU, two-part plinth		79
Oracle Alexandria Mk III £995 – £1095	Very Good Very Good	One of the most beautifully presented players made, and fully supported by superb separation, dynamics and a euphonious style of delivery.	Manual 2-speed belt drive	R	67
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, 33 $\frac{1}{3}$ rpm only, solid plinth/subchassis		79
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, 33 $\frac{1}{3}$ rpm only, suspended subchassis		79
Oxford Acoustics Crystal Reference £2395	Very Good Excellent	This big, open and powerful sounding turntable works beautifully with Airtangent arm to give superb 3-D imagery	Manual, belt drive, subchassis, stand	R*	60
Pink Triangle Little Pink Thing £345	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
Pink Triangle PT T00 £650	Very Good Excellent	Uniquely clear sound, uncoloured, free from ringing and with good bass. Very close to master tape, given a good arm and cartridge	Belt drive, external PSU, suspended subchassis	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
Roksan Xerxes £695	Excellent Very Good	This unique design cuts a swathe through the conventions of turntable design, providing superb resolution and stereo. Power supply has since been upgraded – see issue 78 for our latest report	Manual, belt drive, solid/decoupled	R	67
Systemdek IIXE £248	Good Very Good	Fine, honestly specified and well built player which easily betters its closest stablemate, the IIX. Frankly, at the price it's a sonic bargain	Manual 2-speed, external PSU	R	67

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 ARISTON

# THE DIRECTORY

## MOTOR UNITS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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
VPI HW-19 £1,317	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
Voyd Valdi £680	Good— Good+	Slight 'one-note bass' effect and lack of pitch stability compromise the performance of this well-made deck	Belt drive, suspended subchassis, electronic PSU		79
Voyd "The Voyd Plus" £2,777	n/a Excellent	Based on the standard 3-motor Voyd but with upgrade options (better bearing, platter, etc) which take it half way to a Voyd Reference, so we've dubbed it The Voyd Plus. Superb build and finish; colourful, dramatic performance. A thoroughbred	Belt drive, 3 motors, subchassis, outboard PSU	R	72

## TONEARMS

NAME PRICE	LAB SOUND	COMMENTS	ARM EFF. MAS	VALUE	BACK ISSUE FULL REVIEW
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	This
Alphason Opal £130	Good Average	This is a straightforward adequate sounding low cost arm, priced just above where it rightly belongs	10g		55
Alphason Delta £190	Good Average+	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason Xenon £240	Good Good+	A trimmed down HR100S, the Xenon has inferior bearings and a simpler finish, but sounds crisp and coherent. Fits any Linn cutout	12.75g	R	55
Alphason HR100S £420	Good+ + Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	48/Coll
Ariston Enigma £99	Average Average+	Good but not the best in its class: mid-band sounds a little uneven; treble a trifle "brash"	11.5g		48
Audio Technica AT1130 £186	Good Good	Well suited to most cartridges including high compliance ones, the AT is smooth and tonally neutral, if slightly lacking in "balls"	8.5g	R	67
Decca London International £49	Average+ Average+	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48Summary
Eminent Technology £1000	Good+ Good+ +	One of the best sounding tonearms around, the linear tracking Eminent delivers impressive stereo imagery, focus and transparent sound	9g (vertical)	R	48/Coll
Goldmund T3F arm £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 2
Helius Orion 2 £490	Very Good Very Good	Excellently engineered with rigid bearings, free from slack. It remains expensive but the level of performance deserves Recommendation	12g	R	48
Kuzma Stogi Reference £699	Very Good Very Good	A large, solid and well-made arm that holds the cartridge firmly, giving exceptionally clear sound with just a hint of brightness	12g	R	79
Linn Ekos £895	Very Good Very Good	Superb, state of the art design which builds significantly on Ittok's strengths	9g	R	67
Mission Mechanic £900	Good Good+	Nearly right, but inconsistency with level and vague imagery spoil what is otherwise a firm, powerful advocate for black vinyl!	11g		55
Moth Arm £78	Good Good+	The ultimate budget arm? Refined, detailed, sweet and natural – performance improves in line with the rest of the system	12g	BB	60
Rega RB300 £115	Good+ + Good+ +	Despite its modest price this sets exceptional performance standards and could be used on a number of high-quality turntables	10-11g	BB	60
Roksan Artemiz £595	Average Good	Interesting design which works a treat on the Xerxes deck. Fits Rega cut-out. See issue 72 for up to date assessment	8g		67
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 3009 Series III £253	Good Average+	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009R £335	Average+ + Average+	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME 309 £495	Very Good Very Good	Beautifully made, finished and presented, this arm is fully and easily adjustable and a highly neutral performer	10g	R	79
SME Series IV £810	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	60
SME Series V £1247	Excellent Very Good	Excellent in terms of design engineering and sound quality, this arm arguably sets a new reference standard regardless of price	10.5g	R	60

\* rating refers to original tested model

## CARTRIDGES

Very much the 'slave' of turntable and tonearm and to some extent undermined by the supply of free 'starter' cartridges on many turntable systems, the cartridge is still worth taking seriously. The quality of both the stylus itself and the cartridge's tracking performance are important in preserving that most important part of the hi-fi system – the record collection – and the cartridge also plays a significant role in determining the overall balance of a system

Cartridges fall into two groups: high output models, capable of working directly into any amplifier, and more expensive low output models. Stereotypically, low output cartridges use the moving coil principle of operation, have better mechanical integrity and tighter tolerances, and give better performance but at much higher cost. Most under-£150 amplifiers and many valve designs need either an extra head amp or transformer to cope with the low output. **Cartridge/amplifier**

interfacing can be very subtle, but even basic high output moving magnet designs benefit in overall balance from optimised amplifier capacitance loading. Still more important, the mechanical cartridge characteristic of cantilever compliance ('springiness') needs to be considered in the light of the effective mass of the tonearm which will be used (see Turntable & Tonearm entries)

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/type	VALUE	BACK ISSUE FULL REVIEW
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

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## THE DIRECTORY

## CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/type	VALUE	BACK ISSUE FULL REVIEW
Arcam E77Mg £50	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laid back sound, with good 'scale'	3-8g 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 + Good + +	Not the very clearest in complex high-frequency sounds, but lively and exciting, good transients.	5-11g Low, MC	R	85
Audionote I02VDH £895	Good Very Good	One of the best, giving 'an extraordinarily relaxing midrange clarity', needs a transformer	8-18g Very low, MC	R	43
Audioquest MC5 £220	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal, MC		54
Audioquest AQ 404i-L £400	Good + + Good +	Slight harshness detracted from the performance of this otherwise clear-sounding and detailed cartridge	8-16g Low, MC		84
Audio Technica AT95E £18	Average - Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48
Audio Technica AT-420E OCC £31.50	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-430E OCC £44.50	Average + Average	A rising high frequency response yields something of a treble sting, not a good all-rounder	3-7g Normal, MM		67
Audio Technica AT-F3/OCC LE £74	Average + Good	Though the 'limited edition' badge is a trifle tongue-in-cheek the 'F3 still offers excellent value	8-15g Low, MC	BB	67
Audio Technica AT-F5/OCC LE £106	Average Good +	This latest sample demonstrated some technical weaknesses but its spacious, fluid sound quality still represents a benchmark at this price	4-10g Low, MC	BB	67
Audio Technica ATOC7 £265	Good + Good +	The OC9 is better if you can afford the extra. But OC7 is at least a taste of the high-end at a sensible price	6-13g Low, MC	R	54
Audio Technica ATOC9 £400	Average + Very Good	Tonal colours are reproduced faithfully and it rarely puts a foot wrong. Slightly less transparent than more costly MCs but it has got real wellie. Good value (really!)	6-14g Low, MC	R	60
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
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 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 DL 103 £99	Average Good	This classic spherical stylus model gives a lively sound with powerful bass, and is popular in broadcast studios	6-16g Low, MC	R	48
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		48
Dynavector DV10X IV £125	Average Average +	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g 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	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	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 800 Mk II £33	Good Average	This very high output MM appears to be based on the classic Ortofon VMS series. A trifle uninspiring overall	7-17g Normal, MM		67
Empire MC-5M £110	Average + Good	A very low compliance renders this MC best suited to heavy tonearms while its sweet, non-aggressive sound quality earns it a recommendation	13-20g Low, MC	R	67
Empire Benz Micro MC-2 £600	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 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	Systems
Glanz MFG310-LX £50	Good + Good + +	Detail and treble outstanding for sub-£100 cartridge, Slight coloration may be due to body resonance.	6-10g Normal, MF	BB	85
Glanz MFG610-LX £90	Good + Good +	Similar to cheaper '310 but slightly clearer transients and bass. Benefits from lowish impedance loading	3-10g Normal, MF	R	85
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 GMC20E £129	Average Average	You could try haggling but we thought the makers of this number were demanding too much lucre for their product	3-6g Low, MC		48
Goldmund Clearaudio £1500	Average + Very Good	Something of a mixed bag overall, its sonic character bears a strong resemblance to the Pradikat though it shares some of the hallmarks of the more expensive Accurate	5-12g Low, MC		60
Goldring 1012 £40	Good + Good	Slightly harsh sound but plenty of life and quite good detail. Some very high frequency coloration apparent.	6-12g Normal, MM	R	85
Goldring 1022 £60	Good + Good	As with 1012, a touch harsh: detail and transient purity improved, though, and it goes well with electric guitar!	5-11g Normal, MM	R	85
Goldring Elan £16	Average + Average	A lightweight and frisky-sounding MM that appears to be based upon the same body as the Nagaoka mm4	7-15g Normal, MM	R	67
Goldring Epic II £26	Average Average +	An excellent budget choice though the limitations of the stylus are rather obvious at higher frequencies	5-12g Normal, MM	R	67
Goldring Eroica £100	Good Good -	More confused and coloured than its low-output sibling - high output less of an issue in these days of cheap MC-compatible amplifiers	8-15g Normal, MC		84
Goldring Eroica LX £115	Good + Good	Not the most subtle cartridge in the world: can sound edgy at times, but lively and informative	8-14g Low, MC	R	84
Goldring Excel £500	Average + Good	Goldring's most expensive cartridge to date errs on the warm and heavy side of neutral. Strong bass lines are its forte though its ability to resolve subtle treble details is weaker	6-13g Low, MC		72
Grado 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



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NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/type	VALUE	BACK ISSUE FULL REVIEW
Grado ZF3E+ £47.50	Average— Average	Downtilting balance disguises the brightness of this cartridge; bit of a mixed bag at this price	9-20g (damping) Normal, MM		54
Kiseki Blue Goldspot £450	Good+ + Good+	Good bass and imaging, but hints of spit and coloration let the side down slightly	8-15g Low, MC		84
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		Collection
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 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
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 K5 £32.50	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 £81	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	48/Coll
Linn Asaka £299	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	48/Coll
Linn Karma £465	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	48/Coll
Linn Troika £669	N/a Very Good	Ex-Karma users have been seen with glazed expressions indicating smug self-indulgence the morning after fitting a Troika	8-18g Low, MC		Coll
London Maroon £149	Average Average+	Now manufactured under the London brandname this Decca cartridge is as iconoclastic as ever	9-20g (damp) Normal, MM		67
London Super Gold £300	Poor Average—	Immediate and (in the midrange at least) detailed, but very coloured, very nonlinear and questionable effect on records. Devotees swear by it	9-15g, damp Normal, fixed stylus MM		84
Milltek Aurora £249	Good+ + Good+	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	48/Coll
Milltek Olympia £349	Average+ Good+	Warm and detailed sound – packs the punch of the best MCs with high output as a bonus	12-20g (damping) Normal, MC	R	54
Nagaoka MM4 £9	Average— Average—	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal, MM	R	54
Nagaoka MP10 £18	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal, MM	R	48
Nagaoka MP11 Boron £40	Average Average+	Responding well overall in PM's equipment and listening room, this model was mildly criticised for low level and dynamic limitations	5-13g Normal, MM	BB	48
Nagaoka MP11 Gold £47	Average— Average+	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal, MM	R	48
Nagaoka Stilton TS10 £50	Good— Good	Stilton-designed solid body (with three-point mounting) certainly gives remarkably resonance-free sound, but tip and generator are less good – a little rough at times.	5-10g Normal, MM	R	85
Nagaoka Stilton TS11 £70	Good— Good	Differs from TS10 in having Vital stylus with better tracing but still some high frequency harshness.	5-10g Normal, MM		85
Ortofon OM5E £15	Average— Average—	The OM10 is a hi-fi cartridge – the OM5E is not	5-16g Normal, MM		43
Ortofon OM10 £20	Average Average	One of the leading "cheapies", this gives a fine level of sound quality for the price, with good matching compatibility	5-15g Normal, MM	BB	48
Ortofon OM20 £45	Average Average+	This turned out to be the listening panel's favourite among Ortofon's moving magnet models	5-16g Normal, 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 X1 £50	Average Average	The cheaper X1 scored higher marks with our listening panel than the X3, but both were a disappointment	6-15g Normal, MC		48
Ortofon MC10 Super £70	Average Good	"What a delightfully sweet-sounding cartridge this is..." we said	5-15g Low, MC	BB	48
Ortofon X3 £70	Average Average	A lack of bass power, definition and a "zitty" top end makes this competent but uninvolved	5-15g Normal, MC		48
Ortofon OM40 £90	Average Average+	Highly competent engineering, secure tracking and decent sound quality are major strengths. But it's a little cold, a little polite	3-8g Normal, MM		48
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 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	48/Coll
Ortofon MC30 Super £270	Very Good Good+	Beautifully engineered and well-balanced, it was slightly criticised as bland, though some may appreciate the lack of rough edges	5-14g Low, MC		Coll
Ortofon Quasar £300	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 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
RATA RP20 £22	Average— Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g Normal, MM	R	48
RATA RP40 £44	Average Average+	The '40 did a good job of sorting out the layers and complexity of the mix, with good focus, excellent stereo spread and fine scale	6-15g Normal, MM	R	48
RATA RP70 £77*	Average Average+	Clearer and sweeter than the '40 this also seemed heavier and less lively. For £99 you can have a van den Hul stylus	6-14g Normal, MM		43
RATA RP70vdH £99	Average+ Good	Able to retrieve bags of musical detail (thanks to the vdH stylus), RATA's top cartridge ranks as one of the most articulate MM's available	11-18g Normal, MM	R	67

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NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/type	VALUE	BACK ISSUE FULL REVIEW
<b>Rega Bias</b> £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
<b>Rega Elys</b> £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
<b>Revolver</b> £20	Average+ Average	This modified AT-95E enjoys a very lively mid and treble even if the bass is somewhat 'slower' in protection. A firm budget buy	8-16g Normal, MM	BB	67
<b>Shure M92E</b> £17	Average- Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal, MM		43
<b>Shure M99E</b> £29	Average- Average-	Sister to the 92E this is a solid but not particularly exciting cartridge	5-10g Normal, MM		38 (Summary)
<b>Shure ME75ED</b> £26.50	Average Average-	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal, MM		38
<b>Shure M104E</b> £36	Average- Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal, MM		38
<b>Shure ME97HE</b> £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
<b>Shure M105E</b> £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 (Summary)
<b>Shure M110HE</b> £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 (Summary)
<b>Shure M111HE</b> £72	Average Average	Early reviews of this cartridge complained principally of the price - which has since come down	5-10g Normal, MM		38 (Summary)
<b>Shure ML120HE</b> £95	Average+ Average+	Quite decent sound quality and a generally fine balanced performance	6-18g Normal, MM		48
<b>Shure ML140HE</b> £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
<b>Shure V15 VMR</b> £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
<b>Shure VST V</b> £158	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
<b>Shure Ultra 500</b> £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
<b>Stilton/AT-F3</b> £110	Good+ Good+	At a premium of some £40 this modified AT-F3 offers a startlingly refined performance and is strongly recommended	8-18g Low, MC	R	67
<b>van den Hul MC10</b> £499	Good Good+	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass. Gosh!	5-10g Low, MC	R	60
<b>van den Hul MC One</b> £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
<b>van den Hul MC1 Super</b> £800	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
<b>van den Hul MC Two</b> £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

\* rating refers to original tested model

## AMPLIFIERS

The amplifier sits at the heart of the system, processing the outputs from all the various music sources as necessary and then driving the loudspeakers. These two (quite separate) functions are integrated into a single box at the low-to-middle price points; separated pre- and power amplifiers become increasingly common as one moves upmarket. At the upper end of the specialist market, valve amplifiers provide a popular alternative to the transistor types amongst enthusiasts.

There is a substantial difference between specialist (sound quality oriented) amplifiers and the consumer electronics style models. The former

are bleakly simple, avoiding all unnecessary features to provide the most direct signal path in the interests of best sound quality. The latter range from models with just basic tone controls and tape recorder switching, to those with elaborate facilities such as graphic equalisers, remote control (including volume), surround sound options etc. etc.

Lab measurement provides some useful data, particularly in regard to an amplifier's ability to drive a wide range of different types of loudspeakers, but this is only obliquely related to sound quality. We also include our measured power output (RMS, 8ohm load, 1 channel driven) - but

again, paradoxically, this doesn't necessarily correspond to the loudness capability of the amplifier, which has as much to do with the elegance of the overload characteristics within a given system (valve amplifiers invariably sound more powerful than their rating would suggest). The listing of features provides some indication to the complexity of an amplifier: many users prefer to retain the option of tone controls to 'shape' the overall sound according to taste; many others have found living without tone controls surprisingly easy, with additional benefits in terms of transparency

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Acoustic Research A03</b> £160	Average+ Average	New slimmed down version of the A04 with less power and facilities but also a slightly 'fuzzy' sound	38W, MM disc, CD direct and 3 aux inputs		74
<b>Acoustic Research A07</b> £299	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
<b>Aiwa XA-005</b> £130	Good+ Average-	A technically competent amp with big, friendly but not overly engrossing sound quality	61W, MM 5 line inputs, source-direct		80
<b>Akai AM-52</b> £230	Average+ Average-	Basically equipped, this amplifier offers a comfortable but hardly over-detailed sound	95W, MM/mc disc, 5 line inputs, loudness		74
<b>Akai AM-65B</b> £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
<b>Akai AM-93</b> £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
<b>Amadeus Silver</b> £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
<b>Amadeus Gold</b> £360	Average- Good	There is some indication of instability but otherwise sounds very rich, warm and musical. High-ish IMD.	56W, MM/mc plug-in cards, 3 line inputs	R	74
<b>Aragon 4004</b> £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

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## AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Arcam Alpha II</b> £180	Good Good+	Very confident, convincingly musical and punchy sound that sets the standard for other budget amps	41W, 4 line and MM inputs	BB	68
<b>Arcam Delta 60</b> £280	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
<b>Arcam Delta 90.2</b> £400	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
<b>Ariston Amp</b> £219	Average Average+	Slightly veiled and thin sound but proved suitably attractive in the listening tests	32W, full logic control, MM and 4 line inputs	R	68
<b>Audio Innovations Series 200</b> £429	Poor Good++	Like most 'Innovations valve power amps, compatibility with other brands is unpredictable. Hardly a powerhouse, but nicely 'open', transparent and dynamic sound in small(ish) systems	12W	R	77
<b>Audio Innovations Series 300</b> £479	Poor Good++	Something of an anomaly the 300 is an integrated valve amp that looks awful in the lab but sounds remarkable in a system	10W, MM, 6 inputs	BB	63
<b>Audio Innovations Series 400</b> £625	Poor Good++	Superior styling and better build quality than the Series 300 make for a very attractive integrated valve amp. Capable of fine results in the right system, but can sound too 'thin' and lacking in welly	12W, MM and 4 line inputs	R	77
<b>Audio Innovations Series 1000/2nd Audio Amplifier</b> £1379/2579	Poor Excellent	This valve combination offered awesome dynamic range with superb transparency and power to match. Compatibility with other brands is unpredictable	15W, MM, 6 inputs, monobloks	R	63
<b>Audiolab 8000C</b> £325	Excellent Good	A well established preamp with a highly controlled sound, though it could do with more life and depth	MM/mc, 5 inputs, hdph, tone controls	R	62
<b>Audiolab 8000A</b> £350	Very Good Good+	Exceptionally detailed, tactile and transparent via CD but slightly more clouded via disc. A stalwart design	72W, MM/mc, 4 line and full record out selection	R	74
<b>Audiolab 8000P</b> £495	Excellent Good+	A dynamic powerhouse, load tolerant and sonically reliable	100W	R	62
<b>Audion CD-1</b> £399	Average+ 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
<b>Aura VA-40</b> £189	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
<b>Beard Audio CA35/P35mkII</b> £695/£895	Fair+ 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
<b>Beard 506</b> £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
<b>Beard M70</b> £1995 pair	Good Good+	A substantial British monoblok power amplifier, but not a great deal more impressive than the P35 at half the price	70W	*	50
<b>Bryston 0.5B/2B</b> £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
<b>Bryston 12B/4B</b> £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
<b>Cambridge P50</b> £200	Good Average+	A pleasant enough sound with full bass yet with a slightly mechanical quality that reduced its sense of 'naturalness'	56W, 4 line inputs + MM/MC + tone		85
<b>Cello Audio Suite</b> £1200	Excellent V Good/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
<b>Chord SPM-900</b> £1725	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
<b>Concordant Excelsior</b> £856	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
<b>Conrad Johnson PV10</b> £1,395	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
<b>Conrad Johnson MV50</b> £1995	Good+ Good+	Coupled with the PV5, this CJ power amp performed well on audition	50W		Collection
<b>Conrad Johnson Motif MC-8</b> £1995	Very Good Very Good	A cheaper alternative to the '7, this preamp is an undoubted success in maintaining the Motif sound but does not compare on sound quality	MM/mc	R	50
<b>Conrad-Johnson Premier Seven</b> £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. Absolutely gorgeous!	MM, 4 line inputs, sep. Rec Out, versatile cartridge matching	R	72
<b>Creek CAS 4040 S2</b> £179	Good Good	More neutral than its predecessor tonally, substantial improvements in transparency were also noted, while the lively punchy, character is retained	30W, MM, 4 inputs, tone controls	BB	62
<b>Creek CAS 4140S2</b> £219	Average Good	Disc headroom still poor but the open and detailed, if slightly bright, sound wins through	40W, MM/mc, 3 line inputs, mono and mute	R	80
<b>Creek CAS-5050</b> £399	Average Good	Strong RF IMD compromises the sound of the CD input which contrasts with the delightful performance via MM-mc	72W, MM/mc, aux CD and video + pre/power mode	R	74
<b>Croft Super Micro A</b> £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	4 inputs, MM, straight line	R	57
<b>Croft Series IV(S)</b> £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
<b>Croft Series IVSA</b> £1000	Good Very Good	Featuring tuned components chosen for their sound quality, the 'A' variant is an impressive example of Croft's technique in valve design	60W special supply regulation	R	57
<b>Cyclone Catalyst</b> £1995	Good+ Very Good	Exceptionally load tolerant and very refined in delivery. Extra options available in future	74W, external MM or MC stages, 3 line inputs	R	80
<b>Deltec DSP-50S DPA-50S Pre/Power</b> £725/£925	Excellent Very Good+	Remarkable pre/power combo based around the highly linear DH-0A32 hybrid op-amp. Unmatched detail resolution, control and transparency	63W, external feedback wiring 3 line, MM/mc no tone controls	R	68
<b>Deltec DPA 100S</b> £2200	Very Good Very Good	A top-quality transistor power amp, sounding fast, articulate and well controlled, though maybe a touch clinical for some tastes	80W	R	50
<b>Denon PMA-250II</b> £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
<b>Denon DAP-2500 POA-4400A Pre/Power</b> £549/£599 pr.	Very Good Good	Denon's fully-fledged preamp also incorporates D/A converters that did not improve the sound of our £299 CD player. The power amps are brilliant!	172W, monobloks Opt/Coax dig + 2 tape, 4 line and MM/mc inputs		68
<b>Denon POA-6600</b> £1,000/pair	Excellent Very Good	Delivers abundant high quality sound, solid engineering expertise and content clearly compensating for any compromising of purist audiophile principles	250W monoblok, remote power	R	60
<b>DNM 3A</b> From £1000	Good+ Very Good	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art preamp	5 inputs MM/mc twin vol controls	R*	44

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## AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>E.A.R. 802/509mkII</b> £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
<b>E.A.R. 549</b> £3,628/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
<b>Exposure VII/VIII</b> £430/£470	Very Good Good	Supplied as a combination without the separate preamp power supply, this pre power combination performed satisfactorily especially on the moving coil input	50W, MM/mc, 3 inputs, straight line		62
<b>Exposure VI/VII*/VIII Pre/Power</b> £320/£500	Good Very Good	An established company like Exposure could do more to improve the 'look' of these amps which, nevertheless, sounded confident, dry and musical. Dual version no longer available	63W, Super mod. 4 line and 2 disc inputs with full rec-out switching	R*	68
<b>Exposure XI/XII/VIII Super</b> £1600	Good Very Good	New preamp and improved power amp led to a smooth and refined sound, MM/mc less transparent than CD	61W, MM/mc, 5 line inputs	R	80
<b>Grant G60AMS</b> £948 pr.	Good Very Good	This neat and compact 60W valve monoblok gave good sound on the 8ohm tap, better still on 4ohms. The midrange was particularly natural	60W monoblocks 8ohms	R	57
<b>Hafler DH120 kit form</b> £295	n/a Fair	We didn't build one: see below	60W		44
<b>Hafler XL-600</b> £1,145	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
<b>Hafler DH120 assembled</b> £360	Very Good Fair	Sound quality results were decent enough, but this power amp won't set the world on fire at this price	60W		44
<b>Harman Kardon HK6100</b> £159	Good Good	Re-packaged version of the popular PM635. Still offers very up-beat and exciting sound	47W, MM, 5 line inputs, tone controls	R	80
<b>Harman Kardon HK6800</b> £600	Good+ Good	Smoother and more evenly paced than previous H/K superamps, this model sounded both confident and nimble. A fine result	115W, 4 line + 2 tape i/p's + MM/MC	R	85
<b>Harman Kardon Citation 25/22</b> £649/£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
<b>Heybrook C3/P3</b> £400/£500	Average+ Average-	There's a chance our power amp was a dud for the combo sounded very disappointing on the whole — glassy and uncouth	138W with plenty of current. Passive line inputs		85
<b>Jadis JP30/JA30</b> £4,145/£4,200	Fair Excellent	Two-box preamp plus monoblok power amps, classic valve design gives stereotype valve sound Beautiful build, nostalgic styling and delightful sounding midrange transcend limitations at frequency extremes, in lab, and re cartridge matching	30W 2-box pre-, monoblok power, MM-only, 4 line inputs	R*	60
<b>Jeff Rowland Coherence One/Model 7</b> £3950/£9900	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 variable loading options, Balanced topology	R	72
<b>Kelvin Labs Absolute Zero/M30</b> £395 + £295/£595pr.	Good+ Average+	Latest versions of the M30 offers a true 30W Class A and a slightly muddled but very comfortable sound. MC preamp is a very linear design	33W monoblok MC only + 4 line inputs. Separate L/r balance	R	74
<b>Kelvin Digital Integrated</b> £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
<b>Kelvin Integrated</b> £395	Good+ Very Good	A true 20W Class A amp with lush, detailed and very musical sound to match. Watch out for re-style	18W, MM/mc, 4 line inputs	R	80
<b>Kenwood KA-550D</b> £130	Very Good Fair	Having dropped its moving coil input, this latest version has British style dynamics and rhythm but is not first grade yet	35W, MM, 4 inputs, hdph, tone controls	R	62
<b>Kenwood KA-4010</b> £170	Good Average+	A flexible design at moderate cost. Smooth and cultured sound if slightly lean in balance	81W, MM/mc, 4 line inputs, source-direct	R	80
<b>Kenwood KA-5010</b> £210	Good Good	Offers a slightly bass-light but very smooth, fresh and alive sound. Well built and sensibly equipped	101W, MM/mc, cd 3 tape, tuner, aux + direct	R	74
<b>Kenwood KA-7010</b> £300	Average+ Average+	More powerful version of the 5010 but less successful in the listening tests. RF IMD is the likely cause.	123W, as above plus — 20dB mute facility		74
<b>Klyne SK5a</b> £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
<b>Lectron JH50</b> £2,300	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
<b>Linn LK1/LK280 Pre/Power</b> £545/£695	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
<b>Linx Nebula</b> £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
<b>Magnum MP150/MF150</b> £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
<b>Marantz PM-50</b> £230	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
<b>Marantz PM-75</b> £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
<b>Marantz PM80</b> £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
<b>Marantz PM94</b> £1,200	Very Good Good	At 23kg the PM94 is no lightweight in either physical or sonic respects. A very powerful and comprehensively equipped amplifier	140W MM/mc tone controls (switchable)		60
<b>Marantz PM-95</b> £1,800	Very Good Average+	Beautifully constructed, this amp was less convincing via its digital i/p than via line. Class A option best suited to sensitive speakers. Costly	151W with 30W available in Class A. Opt + coax inputs		74
<b>Meridian 201/205</b> £599/£425 each	Very Good Good+	A fine preamp with additional luxury option of full system remote, plus competent and attractive monoblok power amplifiers with generally good performance	100W MM/mc 6 line inputs remote capable straight line	R/—	62
<b>Mission Cyrus One II</b> £200	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
<b>Mission Cyrus PSX</b> £230	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
<b>Mission Cyrus Two</b> £330	Very Good Very Good	Also a top performer in its group with fine moving coil and compact disc sound. Since our review Mission has omitted the headphone socket on the Cyrus Two	50W, MM/mc, 5 inputs, straight line	R*	62

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GUIDE TO BUYING HI-FI

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## AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Musical Fidelity B1</b> £200	Average + Good +	The subject of much controversy, this 50W wonder offers a very deep, solid and powerful sound	50W, MM/mc, 5 line inputs, tape monitor	R	80
<b>Musical Fidelity A1</b> £269	Average + Average +	Just scraping a recommendation, this current A1 sounded lush but sleepy — lacking the bite and sparkle of old	26W with 9W of Class A. 4 line + MM/MC inputs	R	85
<b>Musical Fidelity B200*</b> £349	Very Good Good +	Running cooler than other MFs, the B200 delivered fine musical and dynamic sounds with plenty of power	80W MM/mc 4 line inputs straight line	BB	62
<b>Musical Fidelity A100</b> £459	Good + Very Good	This is another one recommended for fine sound with which you could keep your Chinese carry-outs warm	50W MM/mc 5 inputs straight line	R	62
<b>Musical Fidelity MA-50</b> £875 pair	Good Excellent	An audiophile bargain. One of the best sounding power amplifiers made	50W, monoblok	R	62
<b>Musical Fidelity P270</b> £1,399	Very Good Very Good	If the hot-box aspect is not a deterrent, this is something of a bargain. A big amplifier scale of sound which is just a little rough-edged	135W	R*	50
<b>Musical Fidelity MVX/A370</b> £2399/£2399	n/a Excellent	In its latest guise, the A370 confirms its status alongside the MVX as amongst the best indigenous components for both sound and presentation	MVX – mm/mc/4 line/phase invert. A370 – 150W	R*	72
<b>NAD 3020i</b> £140	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	R	85
<b>NAD 3225PE</b> £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
<b>Naim NAIT 2</b> £339	Average + Fair	Well built with good load tolerance the NAIT delivered a fully competitive sound in spite of its modest measured power output. Recent modifications as yet unchecked	15W pc MM 3 inputs	R*	50
<b>Naim Separates</b> £560-c£8,000	Very Good Good	A consistent and coherent series of 'building blocks' for conventional passive or active operation. Sound quality ignores conventional audiophile standards of presentation, but achieves fine musical communication	40-70W, MM/mc etc	R*	60
<b>Nikko Beta 400/Alpha 800</b> £225/£800	Very Good Good	Big, bold and gutsy these are indestructible amps with a sound quality to satisfy all but the most demanding users	358W(!) with every feature necessary	R	85
<b>NVA P70MC/a60</b> £830	Fair 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
<b>Oakley S</b> £499	Good Very Good	Much improved version of the original Image preamp from Yugoslavia. This one won't disgrace itself even in top-notch systems. Image Six model (£150 more) is really fabulous	MM plus 3 line inputs	R	78
<b>Onkyo A-8000</b> £140	Good + Good +	A rare combination of style, features and very acceptable sound quality. Free of compression and 'grain' — undemanding	64W, 5 line + MM disc i/p's + full tone cont.	R	85
<b>Orell SA-040</b> £359	Good Good +	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/mc, 4 line inputs, straight line	R	56
<b>Orell SA-040SE</b> £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 compts.		71
<b>Philips FA-880</b> £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
<b>Philips FA960 MkII</b> £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
<b>Philips DFA-888</b> £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
<b>Pink Triangle PIP</b> £2670	Excellent Excellent	This state-of-the-art preamp is one of the few truly high end products to come out of this country this year. It will most certainly worry the competition	MM/mc, 4 inputs, battery supply	R	62
<b>Proton 520</b> £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
<b>Proton AP-1000/AA-1150</b> £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
<b>QED A240 CD II</b> £199	Good + Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	62
<b>QED A240 SA II</b> £259	Good + + Good +	Redesigned 240SA represents a significant allround improvement over its predecessor, and provides a good moving-coil disc input in a competitive price	45W MM/mc 5 line inputs straight line	BB	62
<b>QED A270</b> £299	Good – Good +	Building on the strengths of the '240, the '270 sounds weighty, fast and dynamic. A bit 'lumpy' via MC	51W, 5 line and 2 disc inputs, pre-out	R	68
<b>QED C300/P300</b> £300/£300	Good Good	A cost-effective combo, limited in its resolution but no less beguiling as a result. Disc stage is sweeter but samey	58W, 2 tape, 3 line, MM/MC + mono/biamp opt.	R	85
<b>Quad 34</b> £299	Very Good Fair	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
<b>Quad 405</b> £389	Very Good Fair	Not an impressive power amp but easy on the ear if not pushed and very reliable	100W		44
<b>Ray Lumley Model 75</b> £1,995 pr	Average Good +	Monstrous valve monobloks which represent good value. What they lack in musical subtlety they make up for in sheer muscle. And these are Lumley's small monobloks!	75W monoblok		78
<b>Revox B150</b> £1,047	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
<b>Revox B250</b> £1,467	Very Good Good	With much improved sound over its predecessors plus amazing remote control facilities, this could form the heart of a round-the-dream-house system	150W MM/mc system/house remote tone controls		56
<b>Rose RV-23</b> £395	Good Very Good	Beautifully built classy British 'hybrid' preamplifier. You can spend more to get a more transparent sound – but it's hard to criticise the Rose given the competitive price	MM plus 3 line inputs	R	77
<b>Rotel RA810A</b> £120	Very Good Fair	As a cut price RA820AII this is a very successful little amp that loses little in sound quality to its predecessor. Excellent value	20W, MM, 5 inputs, hdph, tone controls	BB	62
<b>Rotel RA-820AX</b> £150	Very Good Very Good	The spacious, detailed and very musical performance of this budget amp is almost too good!	47W, MM, 4 line inputs	BB	80
<b>Rotel RA-840BX4</b> £190	Good + Good +	Very authoritative but creamy-smooth and delightfully musical. Spatially convincing too, yet not as open as RA-820AX	39W, 4 line + MM/MC. dual-conc. volume. No tone	R	85
<b>Rotel RA870BX</b> £330	Very Good Good +	A powerful blockbuster with solid and well focused sound, good versatility and fine load tolerance	85W MM/mc 7 line inputs tone controls	R	56
<b>Rotel RB/RC850</b> £160/£140	Good + + Good +	Quality separate pre and power amplifiers at near budget integrated amplifier prices. A notable achievement	60W MM/mc 4 line inputs tone controls	BB	62
<b>Rotel RC-870BX/RB-870BX</b> Pre/Power £219/£230	Excellent Good +	Reduced price makes the 870 combo better value but, despite mods to the preamp, it is the power amp that must take the lion's share of credit	128W or 208W in bridged mode. CD direct, 4 line, 2 tape and MM mc	R	68

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SAE P102/A202 £499/£599	Average+ Average+	Microprocessor-controlled pre and power amp that sounds much better at low rather than high volume levels. Pro-oriented aesthetics	151W, MM/mc + CD tuner and 2 tape tone memory, spk switching	R	74
Sansui AU-X911 DG £480	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-F410R £170	Average+ Average+	Over-zealous protection circuitry limits continuous power but sound is still agreeably focused despite being tonally lean	84W, 2 tape, 3 line + MM i/ps. Tone + Rec-out	R	85
Sony TA-F630ESD £350	Good Average	Based on the '530 but equipped with PDM D/a convertor. Amp is competent but DAC sounds truly magnificent!	130W, as above + opt. and coax digital inputs	R	74
Sony TA-F730ES £450	Very Good Good	A very stable and coherent amp but one that lacks a crucial sense of involvement	133W, MM/mc, 3 tape, 2 line, full rec-out	R	80
Sumo Athena/Polaris £695/£695	Very Good Very Good	Very good value US pre/power combo with transparent, detailed and gutsy sound via all inputs	128W, MM/mc, 2 tape and 3 line inputs	R	80
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	R	85
Technics SU810 £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 cntrl	R	85
Technics SU-V660 £250	Good Fair	Chunky build but integrated output stage infers a weak, insubstantial and rather monophonic sound	107W, MM/mc, cd aux, tape + tuner + power amp-direct	R	74
Technics SE-M100 £350	Very Good Good+	An unusual disc-less poweramp with volume control. Standard line input sounds very open and clean. Digital input is harsher and less convincing	123W, coax and opt digital inputs, var and direct CD no MM or MC disc	R	74
Yamaha AX-330e £130	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	R	80
YBA Model 3 pre/power £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. Separate L/r volume controls	R	72
YBA 2 pre & pwr £1395/£1695	Good+ + V Good/Excellent	Superbly finished French audiophile separates, with very good space and transparency, slightly softened bass. Needs extra transformer (£300) for MC cartridges	70W MM (MC extra) straight line	R	56
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 1 power amp £2995	Good Excellent	This equally well finished power amp offers front rank stereo staging and transparency, and is capable of driving the most difficult loads	85W	R	62

\* rating refers to original, tested model

## LOUDSPEAKERS

Last item in the hi-fi chain, to some extent the loudspeaker is merely the slave of what has gone before, capable only of reproducing a signal as good as it is fed. Nevertheless the distortions (colorations and stereo effects) introduced by loudspeakers (and rooms) tend to be more immediately obvious than those anywhere else in the chain, so careful choosing according to taste is very important.

The average loudspeaker consists of a smallish enclosure, much of which may have begun life as

part of a tree, plus a couple of drive units hidden behind a removable grille. Inside the box lurks a simple electrical circuit known as a crossover, which divides the incoming (full range) signal into the right bits for the drivers to handle. Variations on the above formula are specifically identified in the entries. The designer's primary task is to balance the sensitivity of the loudspeaker (how loud it goes for a given electrical input) against the bass extension (how low does it go) for the given box size. After that such subtleties as coloration and

dispersion come into the equation.

Careful placement of the loudspeakers within the room is as important as the initial choice of model. For good stereo they need to be more or less the same distance from nearby walls, and preferably on similar rigid stands. The listener should be about the same distance from and listening angle to each loudspeaker. The ideal placement depends on the way a particular model has been balanced (not to mention a number of other factors), and our recommendation is given in the entries.

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Acoustic Energy AE1 £696	Good Very Good	To the author's knowledge, the most awesomely dynamic and articulate miniature ever made	29.5 x 18 x 25cm semi-open space	88dB/w 60Hz	R	59
Acoustic Energy AE2 £1138	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 in free space	88.5dB/w 45Hz	R	66
Acoustic Energy AE3 £1650	Very Good Very Good	Solid, authoritative and impressively accurate – if a shade ponderous and slow – AE's latest 'big one' is a much better bet than the earlier '4, combining traditional monitoring virtues with the latest metal diaphragm technology.	63 x 26.5 x 37cm low stands in free space	85dB/w 23Hz (in room)	R	86
Acoustic Energy AE4 £1800 (stands £552)	Good Good	Magnificent but also seriously flawed, the AE4 possesses tremendous dynamic realism but a very mid-dominant balance. Large rooms and wallets only need apply.	54 x 32.5 x 44cm own stands in free space	90dB/w 40Hz	R	71
Acoustic Research Red Box £100	Average Average	Lively and balanced if a bit crude and uneven, this under-£100 econobox succeeds partly because of its simplicity, and works well with some rear wall assistance.	32 x 19.5 x 17cm close to rear wall	87dB/w 85Hz	R	74
Acoustic Research AR112 £125	Average Average—	Nicely presented and engineered, but sounds a bit small and boxy without true coherence.	36 x 19 x 18.5cm stands near rear wall	87dB/w 75Hz	R	66
Acoustic Research AR122 £150	Average Average	Despite a promising enough list of ingredients, the 122 failed to excite real enthusiasm amongst the listening panel	38.5 x 19 x 22cm stands near rear wall	87dB/w 68Hz	R	68
Acoustic Research AR132 £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 wall	87dB/w 50Hz	R	66
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 mar good detail and clarity, and price is a little high	40.5 x 12 x 15cm ALS stands near wall	82dB/w 50Hz (in room)	R	78
Alexander SE11 £299 (stands £69)	Good Good	Clearly better than its cheaper stablemates, the metal jacket delivers a different – and in some respects superior – sound than the wood-based competition	52 x 14 x 17.5cm stands close to wall	86dB/w 25Hz (in room)	R	82
Allison AL105 £150	Average Average—	Pretty enough in appearance, sonically the AL105 doesn't really make the grade at the £150 asking price	37 x 24 x 21cm high stands against wall	87dB/w 45Hz (in room)	R	78
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 wall	88dB/w 45Hz	R	71
Alphason Amphion £680	Good Good	This fine-sounding, nicely finished compact wall-mount is just a little too expensive for formal Recommendation, but is a good performer for all that	44 x 23 x 27.5cm high stands against wall	88dB/w 47Hz (in room)	R	78
Alphason Orpheus £1000	Good Good+	Large hi-tech two-way features unusual, sweet-sounding isodynamic tweeter: well engineered and balanced if a shade odd in appearance	65.5 x 28 x 34cm stands near rear wall	87dB/w 43Hz	R	71
Apogee Caliper Signature £3350	Good+ Very Good	Pretty but power hungry full range panels have remarkable transparency and delicacy, though loudness and bass 'grunt' both a bit lacking: need very costly amplification	122 x 59-70 x 6.5-28cm floor, free space	81dB/w 30Hz (in room)	R	81

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
<b>Arcam Three +*</b> £150	Average + Average—	Arcam's baby speaker did not delight our listeners, but it might do better in less expensive systems	34 x 18 x 23cm close to wall at head height	88.5dB/w 95Hz		53
<b>Arcam Alpha</b> £199	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 for money as well	46 x 26.5 x 26cm stands close to wall	89dB/w 30Hz (in room)	BB	82
<b>Arcam Two +*</b> £280	Good Average	Most things to most men this compact is unlikely to disappoint with its lively "ballsy" character though lacking weight... a bit	38 x 23 x 28cm near wall shelf or 40cm stands	88dB/w 55Hz		59
<b>Arcam One +</b> £380	Good Average	Provides a solid, weighty and rich sound, but is a little raw in the treble and indefinite in the midband	22.3 x 28.1 x 37.8cm open space, on stands	88.5dB/w 60Hz		59
<b>Ariston Image</b> £180	Average— Average—	Despite a sweet treble character, the Image fails to impress with a 'lumpy' over-rich balance that has room integration problems	42 x 22 x 27.5cm stands in free space	89dB/w 28Hz (in room)		82
<b>Ariston Q</b> £395	Average + Average	The prettily shaped Q delivers a good impression of scale from a small box, but the rather laid back, ponderous and over-rich overall sound engendered little enthusiasm amongst the listening panel.	35 x 16.5-25 x 20-27cm high stands in free space	85dB/w 30Hz (in room)		86
<b>ATC SCM20</b> £1320	Very Good Good +	Massively built to no-compromise Pro monitoring standards, the SCM20 is invariably informative but the rather forward presentation is a mite uncomfortable too. Needs a big amplifier and sadly lacks a bi-amp option.	44 x 24 x 31cm stands close to rear wall	82dB/w 28Hz (in room)		86
<b>Audio Electronics TC10 II</b> £599	Good— Good +	Oddball appearance is rescued by a respectable technical performance, interesting and impressive engineering and fine sound quality at a realistic price	70 x 33.5 x 33.5cm low stands in free space	87.5dB/w 40Hz	R	68
<b>Audioplan Kontrapunkt</b> £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 matching stands in free space	83dB/w 48Hz (in room)	R	86
<b>B&amp;W Vision DS1</b> £99	Average Average—	Although significantly hampered by upper bass cabinet coloration, the DS1 cleverly combines high sensitivity with a rich and generous soundstage	36 x 21 x 19cm stands quite close to wall	91dB/w 40Hz (in room)	R	82
<b>B&amp;W Vision DS2</b> £150	Average Average—	Although the box is generous for the price, the DS2 is a rather uneven performer, both on measurement and listening. Careful stand selection and placement is needed to control the enthusiastic mid bass.	50 x 24 x 25cm stands in free space	89dB/w 43Hz (in room)		86
<b>B&amp;W DM550</b> £149	Good + Average—	Beautifully presented, well engineered near-miniature with precise sound but a distinct lack of 'wellie'. Ideal for considerate flat dwellers	35 x 20.5 x 22.5cm stands in free space	86dB/w 70Hz		71
<b>B&amp;W DM560</b> £200	Average + Average—	Fine cosmetic presentation and good engineering for the price; overload protection may be handy but listening panel was underwhelmed	49 x 23.5 x 30cm stands in free space	88dB/w 55Hz		66
<b>B&amp;W CM1</b> £345	Good Average	Cleverly thought out luxury design package is also fundamentally well engineered, if a shade pricey on 'sound for pound' basis	24.5 x 16 x 22cm close to rear wall	84dB/w 90Hz		74
<b>B&amp;W Matrix 801</b> £2500	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 stereo imaging	77/99 x 56 x 43cm floor or stands, free space	86dB/w below 20Hz (in room)	R	81
<b>Bose Interaudio 3000XL</b> £150	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/w 45Hz		71
<b>Bose 305</b> £350	Average Good—	A bit of an oddball, fine dynamic liveliness and a good room match more than make up for the strange stereo imaging and treble	28 x 45 x 23cm high stands near wall	88dB/w 40Hz (in room)	R	78
<b>Bose 901 MK6</b> £1600	Good Average	Still controversial after all these years, the pre-equalised multi-driver 901 is cleverly engineered to deliver exceptional loudness with a modest amplifier, but mid bass tends to dominate the sound and transparency is notably lacking.	33 x 54 x 32cm rigid stands in free space	(92dB/w midband) 28Hz (in room)		86
<b>Boston A120</b> £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 genuine bass extension and a few rough edges	62.5 x 31.5 x 25cm stands in free space	89dB/w 48Hz (in room)	R	86
<b>Boston A4011</b> £120	Average Average—	Competent performance for size and price but below average relative to the UK competition	34 x 21 x 20cm on stands near wall	88.5dB/w 63Hz		41
<b>Boston Acoustics T830</b> £399	Good Good	A lot of speaker for the money, the T830 is a smooth and accomplished performer with a big and easy – or alternatively a lazy and laid back – sound	82.5 x 25.5 x 24cm floor, away from walls	91dB/w 28Hz (in room)	R	82
<b>Castle Clyde</b> £159	Average + Average	A tidy little performer packing punch, but beginning to show its age in the light of new competition	37 x 21.5 x 22cm open space on stands	89.5dB/w 64Hz	R	46
<b>Castle Warwick</b> £179	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 wall	88dB/w 50Hz		66
<b>Castle Durham</b> £209	Average + Average	Listening results were encouraging, well engineered and finished, but lean on treble and a bit weak on bass; still recommended	41 x 21.5 x 25cm near rear wall	89dB/w 67Hz		46
<b>Castle Pembroke</b> £229	Good Average +	Comfortably recommended, a sweet smooth sound with good overall balance of engineering-based performance	55 x 37.5 x 30.5cm open space on stands	88dB/w 46Hz	R	31
<b>Celef Cirrus</b> £180	Average Good	It's nice to see Celef back in the UK, with this decent sounding small reflex box that seems unusually tolerant of siting	39 x 20.5 x 23cm stands in free space	84dB/w 60Hz	R	66
<b>Celef CF2 Nimbus</b> £230	Good— Good—	Nicely balanced overall but a little uneven with it, this lively and dynamic large bookshelf model came close to Recommendation	46 x 25.2 x 24cm stands in free space	88dB/w 55Hz		71
<b>Celestion 3</b> £109	Average + Average	This attractive little wall-mount gives good balance and stereo imagery, with a character which leans more towards inoffensiveness than excitement	31 x 18.5 x 21cm high stands against wall	86dB/w 55Hz (in room)	R	78
<b>Celestion DL6 Series Two</b> £159	Good Average	Good tonal colouring and plenty of bass for the enclosure size; the metal dome tweeter is excellent, but bass and mid lack clarity and 'bite'	45.4 x 24.5 x 26.2cm near wall, on stands	87dB/w 65Hz		59
<b>Celestion DL8 Series Two</b> £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open, stands	87.5dB/w 60Hz	R	59
<b>Celestion SL12Si</b> £579	Average Average	Careful setting up does reveal elements of fine sound quality, but this 'grown up' SL6 variation has a lumpy response alongside its improved power handling	53 x 20 x 27cm matching stands clear of walls	85dB/w 50Hz		66
<b>Celestion SL600Si</b> £799	Good + Good	This Aerolam high tech miniature has certain remarkable qualities that some will find irresistible, but needs careful system and room matching.	27 x 20 x 23cm matching stands in free space	82dB/w 52Hz		68
<b>Celestion SL700</b> £1349 inc stands	Good Good	Very sophisticated, mostly smooth and accurate transducer, with fast but not very deep bass and a rather bright treble	37.5 x 20 x 23.5cm free air on tall stands	83dB/w 45Hz		60
<b>Celestion 6000</b> £1470	Very Good Very Good	A genuine fullrange audiophile quality speaker system – with Star Wars styling to suit a high tech environment	Complex, on floor in free space	82.5dB/w	R	60
<b>Cyrus 781</b> £250	Average + Good	Properly run in, the pretty little 781 delivers a fast, dynamic and informative sound which more than justifies its price. Take care to adjust placement to suit room and system.	43 x 22.5 x 28cm matching stands 1ft from wall	88dB/w 28Hz (in room)	R	86
<b>Doxa 5 - 2</b> £900	Average Good	The high sensitivity and seductive midband makes an obvious partner for valve amplifiers, though obtaining a good room match may prove a little tricky	98 x 21 x 28cm floor well away from walls	91dB/w 30Hz (in room)	R	82
<b>Duntech PCL500 Marquis</b> £3998	n/a Very Good	Better value for money than the Crown Prince – and arguably more dynamic, with real bass 'slam' – but a little less refined in the higher registers	147.5 x 27 x 40 free standing away from walls	92dB/w 48Hz	R	65

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## LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
<b>Duntech PCL1000 Crown Prince</b> £6120	n/a Very Good +	Immensely 'listenable', refined sounding speaker capable of creating lifesize musical images. Not overly transparent to source, but very civilised nonetheless	180 x 30.5 x 43.5 free standing away from walls	90dB/w 42Hz	R	72
<b>Goodmans Maxim Two</b> £90	Average + Average	More wham-bam-thankyou-mam sound that imitates much bigger speakers when you let these babies yell. (A well-controlled yell)	26 x 17 x 19cm near wall on shelf or stand	86dB/w 85Hz	BB	59
<b>Goodmans B-Max/Maxim Two</b> £90 + £90	Poor Average -	Stick with the Maxims on their own until you can afford some real grown up loudspeakers	60 x 21 x 26 + see above, suck and see	89dB/w 55Hz (in room)		78
<b>Goodmans M100</b> £79	Average + Average -	Effectively a Maxim on the cheap, the M100 measures more smoothly but sounds somehow less involving than its more famous stablemate.	20 x 17 x 26cm close to rear wall	85dB/w 50Hz (in room)	R	86
<b>Goodmans M300</b> £99	Average Average -	Conveying much of the charm and life which has made the Maxim 2 so popular, the M300 is sensitive, but also significantly hampered by upper bass cabinet coloration	38.5 x 21.5 x 17cm stands close to rear wall	89dB/w 50Hz (in room)	R	82
<b>Harbeth LS3/5A</b> £343	Good Average	Still a classic miniature, though not to every taste, and none the better for the recent update under our listening conditions. Limited dynamic range	30.5 x 19 x 16cm stands in free space	81dB/w 60Hz		66
<b>Harbeth HL Compact</b> From £539	Very Good Average	The clean and neutral sound lacks resolution and gives rather unobtrusive though well differentiated stereo. Can be bi-wired to advantage	52 x 27.2 x 28.1cm open space, on high stands	87.5dB/w 65Hz		59
<b>Heco Interior 90S</b> £159	Good Average -	Neatly finished and engineered miniature, but the disappointingly 'lifeless' sound left the listening panel decidedly underwhelmed	27 x 18 x 16cm on high stands	87.5dB/w 90Hz		74
<b>Heco Interior 120</b> £169	Good Average	Drab appearance belies a lively enough character, though the balance is altogether a bit bright for UK tastes	32 x 23 x 23cm high stands against wall	88dB/w 50Hz (in room)		78
<b>Heco Interior 430s</b> £429	Good Good -	This tall floorstanding enclosure delivers an impressively even sound balance with good bass extension, if not the lively dynamics to satisfy enthusiasts	85 x 24 x 27.5cm free space	88dB/w 43Hz	R	71
<b>Heco Superior 740</b> £599	Good Good -	A similar sonic package to the cheaper Interior 530, these Superior clothes are very pretty indeed, though spikes are still awaited	84.5 x 22 x 25cm on floor in free space	88dB/w 30Hz (in room)		78
<b>Heco Superior 940</b> £1000	Good Good	This large and beautifully finished floorstander has an impressively smooth and attractively transparent midband. Bass is well extended but follows rather than drives the music along.	110 x 26 x 31.5cm free space	88dB/w 20Hz		86
<b>Heybrook Point 5</b> £139	Average Average	"Uncouth yet still satisfying", the Point 5 gives good dynamics and bass for a compact wall-mount, but is burdened by a somewhat unhappy treble	37.5 x 23 x 24cm high stands against wall	85dB/w 32Hz (in room)		78
<b>Heybrook Point 7</b> £185	Average Average	Physically an attractive package, but not entirely convincing in lab or listening panel test; interesting for all that	40.5 x 23 x 23cm stands against rear wall	85dB/w 60Hz		68
<b>Heybrook HB1</b> £199	Good Average +	No longer an over-bright character, a strikingly clear sound and fine transient performance now merits recommendation	47 x 29 x 23cm on stands near wall	88dB/w 61Hz	R	46
<b>Heybrook HB100</b> £255	Average + Good	Well matched for wall sitting, the HB100 is a lively and informative performer in the tradition of the popular HB1	47 x 26 x 28cm stands near rear wall	86dB/w 50Hz	BB	66
<b>Heybrook HB150</b> £319	Average Good	Convincingly communicative but a bit colored and congested, this lively compact wall-mount is nicely finished but a little costly for the content	40.5 x 23 x 22cm stands close to rear wall	89dB/w 42Hz (in room)		82
<b>Heybrook HB200</b> £399	Average Average	This luxury successor to the HB2 is lively and informative, but sounded insufficiently balanced to convince our listening panel	46 x 23 x 26cm stands against rear wall	87dB/w 55Hz		66
<b>Infinity RS2001</b> £180	Average Average +	A little coloured and unruly in the treble, the 2001 nevertheless retains the lively dynamic bounce of its predecessor; pity the price has gone up	36.5 x 22.5 x 20cm lightweight stands	87dB/w 50Hz (in room)	R	78
<b>Infinity Kappa 6</b> £795	Good Good	Interestingly styled US loudspeaker has unusual high tech drivers and good neutrality, but the sound seriously lacks excitement	63 x 38 x 24cm stands, free space	85dB/w 35Hz		66
<b>Infinity Kappa 8</b> £1850	n/a 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 space	89dB/w 33Hz		72
<b>Infinity Modulus</b> £695	Good Average +	Luxury high-tech miniature is carefully conceived and beautifully executed. Undeniably attractive in the midrange and treble, the Modulus failed to handle the bass end of the spectrum as successfully.	30 x 18 x 26cm high stands 1ft from wall	84dB/w 45Hz (in room)		86
<b>Jamo Concert 2</b> £230	Good Average -	A thoroughly respectable 'bookshelf' performer that needs free space sitting but includes attractive cabinetwork and a neat grille	41 x 24 x 25cm stands in free space	85dB/w 48Hz		66
<b>JBL TLX12</b> £149	Good - Average	This smart near-miniature has a 'boppy', lively bottom end, but beware of the fizz in its top	37 x 23 x 23cm stands 0.5m from rear wall	87dB/w 55Hz	R	71
<b>JBL LX33</b> £259	Average + Good	A bit of a cheat, but a lot of speaker for the money, which manages a better room balance than many 'large bookshelf' rivals, and delivers a fine acoustic performance	80 x 25 x 21cm floor, 1ft from wall	89dB/w 48Hz	R	82
<b>JBL LX44</b> £340	Good - Average	This generously built model offers good power handling, bass extension and dynamic range, but suffers from the 'three-way syndrome', with middle muddle	58.5 x 30 x 29cm stands in free space	89dB/w 40Hz		71
<b>JBL XPL 90</b> £699	Good Average +	Though undoubtedly pretty and very expensively engineered, this elaborate near-miniature didn't really convince our listeners that it could deliver a sound quality to match its elevated price.	39.5 x 24 x 24cm stands in free space	85dB/w 45Hz (in room)		86
<b>JPW Minim</b> £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/w 28Hz (in room)	R	82
<b>JPW Sonata</b> £99	Good Average +	Well balanced and integrated, this near-miniature offers fine sound if limited bass and dynamic range, plus real tree wood at a nearly silly price	32 x 23 x 20cm stands near rear wall	86dB/w 55Hz	BB	71
<b>JPW P1</b> £139	Good Average +	Honest and basically articulate if not very sophisticated, resolution is good but it can sound a little wearing in bright systems or with rough sounding material	44 x 25.9 x 26.1cm free space on stands	89dB/w 60Hz	R	59
<b>JPW AP2</b> £165	Good Good	Few grounds for criticism but purchasers should check out the treble qualities to avoid hammering the ear anvils	46 x 26 x 25cm 40cm from wall on 45cm stands	89dB/w 65Hz	R	53
<b>JPW AP3</b> £219	Good Average +	Pretty good stereo and well balanced overall it had its own character which is well suited to vinyl replay	52 x 25 x 29.5cm near wall on stands	90dB/w 57Hz	R	46
<b>JRT AD1</b> £500 (stands £100)	Average + Good +	A most auspicious Choice debut for relative newcomers JRT. A fair share of cosmetic deficiencies do little to spoil the impressive coherence and timing that makes this beautifully finished and generously proportioned model so enjoyable.	59.5 x 28 x 36cm own stands close to rear wall	86dB/w 28Hz (in room)	R	86
<b>KEF C15</b> £99	Good Average	One of the tiniest around delivers a surprisingly 'big' and well balanced sound, with excellent stereo from free space sitting	26.5 x 18 x 14cm stands in free space	85dB/w 60Hz	R	71
<b>KEF C25</b> £139	Average + Average -	Very safe and competent, but rather short on inspiration, the '25 lacks the brio and flair of its smaller C15 brother	34 x 20.5 x 17cm high stands near wall	87dB/w 60Hz (in room)		78
<b>KEF C45</b> £199	Good Average -	Conventional and competitively priced, C45 delivers an impressively consistent and competent sound. As one listener commented: "Offensively inoffensive... whether it be love or loathing, give me some emotion"	47.5 x 28 x 24cm uncritical	87dB/w 30Hz (in room)		86
<b>KEF C55</b> £219	Good Average +	Similar to but less good value than C75, the '55 provides Uni-Q stereo stability but not real wood veneer or good low frequency room match	48 x 24.5 x 25cm stands, free space	91dB/w 30Hz (in room)		82

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<b>KEF C75</b> £349	Good Good	Compact floorstanding model's Uni-Q driver provides fine crossover integration, giving stable stereo and fine dynamic range within a slightly 'rich' balance	72 x 24.5 x 25.5cm floor in free space	90dB/w 45Hz	R	71
<b>KEF R102</b> £365	Very Good Very Good	High class near-miniature with expressive, articulate midband and clean, accurate bass and top. The sound quality of the Kube circuitry, however, is suspect	33 x 20.7 x 26.3cm near wall or open on stands	89.5dB/w 60Hz	R	59
<b>KEF C95</b> £599	Good Good	Rich and lazy, but nonetheless very endearing in a cosy sort of a way, the '95 is a lot of speaker for the money, and delivers a big sound with grace and subtlety	88.5 x 24.5 x 31cm floor in free space	90dB/w 28Hz (in room)	R	78
<b>KEF 103/3</b> £680 inc. stand	Good + Good	Technically impressive, excellent bass/power handling for size, but not for the audiophile system. Better among cheaper components, and good in a large room	56 x 27 x 30cm supplied stands free space	90-95dB/w 35Hz		53
<b>KEF 104/2 (inc KUBE equaliser)</b> £895 (£994)	Very Good Good + +	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound levels	90 x 28 x 41.5cm floor standing in free space	92dB/w 50Hz	R	60
<b>KEF 107</b> £2025	Very Good Good +	A welcome sense of ease and lack of strain at most normal levels. Minor criticisms included a dulling in the extreme treble. Excellent bass extension	116.5 x 33 x 45cm on floor in free space	87.5dB/w 20Hz	R	60
<b>Linn Helix</b> £279	Average + Good	Attractive presentation is coupled with an attractively lively sound which is more neutral if less committed than earlier Linn loudspeakers	51 x 25.5 x 28cm stands 1ft from rear wall	88dB/w 53Hz	R	66
<b>Linn Kan 2</b> £339	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 wall	82dB/w 35Hz (in room)		78
<b>Linn Nexus</b> £379	Good Average	Good features include a solid, meaty bass plus good imagery and tonal balance. The catch is that Nexus lacks resolution and timing	49 x 23.5 x 30.4cm near rear wall supplied stands	89dB/w 60Hz		59
<b>Linn Kaber</b> £899	Average Good +	Discreet wall-mount package trades sensitivity for fine bass extension and midbass performance; can be a little relentless but has prodigious dynamic capabilities	93 x 19 x 28cm floor against rear wall	86dB/w 82Hz (in room)	R	82
<b>Magneplanar SMGa</b> £675	Average - Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB/w 56Hz		46
<b>Magneplanar MG1.4</b> £1190	Good + Good +	Replaces the stalwart MGic 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
<b>Magneplanar MG2.5R</b> £1998	Good Good	Offers the low coloration and profound musical insight of better electrostatic loudspeakers but without loss of low frequency extension	183 x 56 x 4.5cm Open space	83-85dB/w 35Hz	R	60
<b>Magneplanar MG11a</b> £2700	Good Very Good	Another excellent true-audiophile loudspeaker this American panel speaker helps to convey much of the original character of the music	180 x 62 x 38cm well clear of walls	84-86dB/w 35Hz	R	46
<b>Marantz LD20 DMS</b> £170	Average Average	Recommended more for CD users than vinyl keepers, soundly engineered and built but should be heard before bought	36 x 23 x 24cm free space on 45cm stands	86.5dB/w 55Hz		53
<b>Marantz LD50DMS</b> £200	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	42.5 x 27 x 28cm stands in free space	87dB/w 50Hz	R	71
<b>Martin Logan CLS II</b> £3998	n/a Very Good	Much improved high resolution design, fussy about system set-up and demanding of ancillaries and software alike. It rewards the efforts though	60 x 28 x 7.5cm open space	86dB/w 45Hz	R	72
<b>MB Quart 220</b> £270	Average - Average	The elaborate and pretty enclosure in a wide range of finishes works better than the drivers and crossover, which impose a lumpy balance	30 x 22.5 x 21cm stands in free space	87.5dB/w 80Hz		74
<b>MB Quart 280</b> £340	Average - Average	Despite redoubtable build quality and good dynamics, the 280 has a rather 'obvious' mid bass and a balance that adds rather too much of its own character	44 x 27 x 29cm uncritical	88dB/w 40Hz (in room)		78
<b>MB Quart 390</b> £469	Below Average Poor	An aggressive, messy sounding design whose uncouthness undermines the positive level of detail	52 x 31 x 30.5cm open space, on stands	89.5dB/w 60Hz		59
<b>Meridian M30</b> £775	Average + Average	Priced but easy on the ears and worth considering especially where space is at a premium	38.5 x 18 x 32cm free space on stands	Active 40Hz		46
<b>Mission 761</b> £130	Average Good	One helluva speaker for the price, if a shade small and short of subtlety and refinement - should prove a worthy successor to the 70 and 700	38 x 21 x 21cm stands near rear wall	87dB/w 60Hz	BB	66
<b>Mission 762</b> £200	Average Average -	Mission's 'bookshelf middleweight' offers high sensitivity and loudness capability, but at the expense of a somewhat untidy and rather 'heavy' sound	50 x 25 x 27cm stand, experiment advised	91dB/w 55Hz		66
<b>Mission Cyrus 781</b> £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 own stands 1ft from wall	88dB/w 30Hz (in room)	R	86
<b>Mission 763</b> £300	Average + Average +	A very artful combination of generous volume and good bass extension at a modest price. Works well in the listening room despite a few rough edges	77 x 25 x 32cm near rear wall	86dB 40Hz	BB	68
<b>Mission Cyrus 782</b> £350 (stands £80)	Good - Good -	Lively, articulate and beautifully finished, this compact wall-mount model with twin main drivers has good integration but a rather rich, 'Loudness' balance	50 x 25 x 32.5cm Cyrus stands near wall	90dB/w 50Hz		71
<b>Mission 764</b> £450	Good Good -	Large floorstander has fine bass extension but limited dynamic range, and sounds 'lazier' than Best Buy 763	86 x 25 x 32cm 0.5+ m from rear wall	86dB/w 43Hz		71
<b>Mission 767</b> from £2500	Very Good Very Good	Magnificent and massive part-active monoliths have fine acoustic subtlety and impressive loudness capability, ultimately limited by partnering (Cyrus) electronics	138 x 29 x 43cm floor, flexible	91dB/w below 20Hz (in room)	R	81
<b>Monitor Audio Monitor 7</b> £150	Average - Average	This lively and punchy near-miniature looks pretty enough and is good value but is let down by an unruly and indifferently integrated tweeter	34 x 16.5 x 17cm stands 1ft from wall	84dB/w 70Hz		74
<b>Monitor Audio Monitor 9</b> £190	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	84dB/w 40Hz (in room)		78
<b>Monitor Audio R300/MD</b> £250	Average Average -	An attractive 'large bookshelf' model that's handicapped by poor crossover and integration between paper cone bass and metal dome tweeter	47.5 x 25 x 30.5cm stands in free space	88dB/w 50Hz		71
<b>Monitor Audio R352/MD</b> £299	Average + Good	A good value large box that sounds more engaging than subtle, providing a good compromise between bandwidth and sensitivity	64 x 25 x 32cm stands in free space	89dB/w 45Hz	R	66
<b>Monitor Audio MA700/Gold</b> £349	Good Average +	Lacks bass authority and timing, but could suit the smaller room, at the end of a CD-based system used primarily for classical music at modest levels	35 x 21.5 x 25cm stands, free space	87dB/w 48Hz (in room)		82
<b>Monitor Audio R852/Gold MD</b> £449	Good Good	Luxury build and 'high tech' tweeter or not, this compact model offers good refinement and detail on an open soundstage	45 x 25 x 26cm stands in free space	86dB/w 50Hz	R	66
<b>Monitor Audio 1200 Gold MD</b> £799	Average Average +	This smooth and civilised slimline floorstanding loudspeaker is well built and nicely presented. But it is also expensive	94 x 20 x 26cm in free space	85dB/w 48Hz		68
<b>Monitor Audio MA1800 Gold</b> £1299	Good Average +	Attractive and beautifully finished, even when ballasted with lead shot the 1800 inclines towards upper bass richness and lacks genuine extension	106 x 22 x 32cm floor, free space	88dB/w 30Hz (in room)		81
<b>Mordaunt-Short 3.10</b> £100	Average Average +	Probably the liveliest and most communicative miniature around, this beautifully presented design is probably better suited to budget 'real hi-fi' than the blandness of the midi system	28.5 x 17.5 x 20cm high stands near wall	84dB/w 50Hz (in room)	BB	78
<b>Mordaunt-Short MS 3.20</b> £130	Average Average +	All the charm of its BB-rated £99 baby 3.10 brother, plus a smidgeon more bass for those in a suggestible frame of mind	35.5 x 18 x 20cm open stands against wall	85dB/w 50Hz (in room)	R	82

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## THE DIRECTORY

## LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
<b>Mordaunt-Short 3.30</b> £180	Average Average+	A little too mid-forward for neutrality or formal recommendation, this attractive, good-sized model nevertheless has more than enough appealing qualities to merit serious consideration	46 x 23.5 x 27cm high stands 1-2ft from wall	87dB/w 38Hz (in room)		78
<b>Mordaunt-Short MS3.40</b> £230	Average+ Average	It looks pretty and sounds civilised, but the 3.40 failed to ignite any degree of enthusiasm amongst our listeners. Low frequency stand and room matching is a bit tricky.	57 x 23.5 x 27.5cm stands in free space	87dB/w 30Hz (in room)		86
<b>Mordaunt-Short 442</b> £1150	Good+ Good++	A resounding success with the listening panels. Make sure your room can accommodate the bass	95 x 26 x 38cm floor standing in free space	87.5dB/w 40Hz	R*	60
<b>Musical Fidelity Reference 2</b> £199	Good- Good-	This compact wall-mount design with advanced drivers has good dynamics, balance and stereo, plus flashy styling and some midband 'boxy' coloration	38 x 25 x 20cm stands near rear wall	88dB/w 50Hz		71
<b>Musical Fidelity MC-2</b> £299	Very Good Good++	This exceptionally clean and clear design offers real subtlety and finesse. Bass quality is light but exceptionally clear; the treble is smooth if slightly shallow	48.5 x 25.5 x 16.5cm open space and stands	87.5dB/w 65Hz	BB*	66
<b>Musical Fidelity MC-4</b> £499	Very Good+ Good++	Achieving a very high standard, the MC-4 sounds detailed and coherent like the MC-2, but with more bass depth and solidity, and large image scale	56.5 x 26.9 x 29cm open space on stands	87.5dB/w 60Hz	R*	59
<b>NAD 8225</b> £150	Good Average+	Notwithstanding lacklustre styling and an unprepossessing appearance, this NAD miniature has a smooth and even midband plus an appealing overall jauntiness. The whole turns out to be worth more than the sum of its parts.	34 x 20 x 18cm stands close to wall	87dB/w 45Hz (in room)	R	86
<b>NVA Cube 2</b> £380	Average Good	A rude but exciting miniature, with unusually accomplished bass capabilities for its size	28.5 x 27 x 28.5cm NVA stands against wall	85dB/w 48Hz (in room)	R	82
<b>NVA Cube 1</b> £600 (stands £200)	Good- Good+	Attractive, cube-shaped semi-omni is very sturdily built, and gives an idiosyncratic but unusually open, spacious and informative sound	33 x 32 x 32cm own stands c0.5m from wall	85dB/w 52Hz	R	71
<b>NVA Cubix</b> £1,100	Average Good	Too idiosyncratic for formal recommendation, the Cubix possesses remarkable bass extension for its size, but is tricky to optimise and has some aggressive tendencies	60 x 32.5 x 32.5cm low stands against wall	88dB/w 20Hz (in room)		78
<b>Opus 3 Credo</b> £399	Average Average	Credo's odd-shaped silicate-based cabinet confers good box and bass performance, but the sound could be more neutral for the price	32 x 28 x 32cm stands in free space	88dB/w 65Hz		74
<b>Opus 3 Capella</b> £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 bookcase	86.5dB/w 45Hz		66
<b>Pearl &amp; Oakley Victoria 200</b> £1099	Average- Average-	Extraordinary – and to many very attractive – 'ginger jar' presentation in Staffordshire ceramics, but let down by need for further acoustic and mechanical development	93 x 33 x 33cm on floor in free space	87dB/w 30Hz (in room)		78
<b>Philips FB815</b> £230	Average Average	An impressive – indeed imposing – physical package for the price, clever engineering gives a very competent if slightly hard and brittle sound quality that somehow lacks genuine authority.	63 x 27 x 27cm low stands in free space	85dB/w 30Hz		86
<b>QLN Model One</b> £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 stands, free space	85dB/w 28Hz (in room)		82
<b>QLN Signature</b> £1,100	Good Good	Beautiful but expensive luxury compact has a rather laid back and 'heavy' sound, but coloration is low and stereo imaging very good	37 x 18 x 36cm heavy stands in free space	83dB/w 30Hz (in room)		78
<b>Quad ESL-63</b> £1690	Good+ Good++	With its unusual but subtle characteristics this classic electrostatic may not be punchy in the bass, but has strengths that some cannot live without	92 x 66 x 27cm open stand well clear of wall	84dB/w 34Hz	R	60
<b>Richard Allan CD5</b> £184	Average- Average-	This neatly presented small reflex design can sound engagingly communicative, but is flawed sonically and technically and quite expensive too	38 x 19 x 23cm on rigid stands	88dB/w 80Hz		68
<b>Rogers LS2a</b> £180	Average Average	Provides very good engineering and stereo performance for the price, alongside some 'boxiness' and certain dynamic constraints	36 x 23 x 21cm low stands 1ft from wall	88dB/w 50Hz (in room)		82
<b>Rogers LS4A</b> £219	Good Good-	This artfully voiced and well balanced compact gives a fair flavour of the classical 'BBC sound' at a very reasonable price	43 x 25.5 x 24.5cm stands 1ft+ from wall	87dB/w 32Hz (in room)	R	78
<b>Rogers LS6A</b> £285	Good Good	Stereotypically a Rogers model with impressively even balance, prospective purchasers will have to weigh the fine midband naturalness against slightly lazy dynamics and timing.	51 x 27.5 x 28cm stands in free space	86dB/w 25Hz (in room)	R	86
<b>Rogers LS7t</b> £399	Good+ Good+	A fine combination of classic qualities at reasonable price produces the "R" tag, but try to get a pair home on approval to check for bass 'heaviness'	56 x 27 x 28cm free space on 40cm stands	88.5dB/w 48Hz	R	59
<b>Rogers Studio 1a</b> £579	Very Good Good-	The classic BBC monitor style sound sensitively updated – transparent and natural with fine stereo, but a touch 'heavy' in balance	63.5 x 30.5 x 30.5cm stands in free space	87dB/w 36Hz	R	66
<b>Roksan Darius</b> £1395 (+£345 integral stand)	Good Very Good	Now totally realigned, the current Darius provides an exceptionally impressive combination of transparency and delicacy with fine information retrieval and speed. The problem is affording the amplification to do it justice.	47 x 27 x 40cm own stands angled in space	82dB/w 20Hz (in room)	R	86
<b>Rotel RL850 II</b> £140	Average+ Average+	Strongly recommended. Well-balanced, clear, with decent focus and fine stereo, but tendency to 'heaviness' needs decent stands and space	44 x 25 x 24cm free space on 40cm stands	86.5dB/w 50Hz	BB	59
<b>Royd A7 Series 11</b> £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 wall	86dB/w 75Hz	R	53
<b>Royd Eden</b> £235	Average Average+	Delightful mid/treble speed and transparency but determinedly bass light. this oddball miniature threatens cult status but could use a sweeter tweeter	31 x 20.5 x 18.5cm stands close to rear wall	87dB/w 85Hz	R	66
<b>Royd Apex</b> £485	Average+ Good	Not the smoothest sound around, it more than compensates with an impressively communicative and informative musical presentation	85.5 x 20 x 30cm on floor close to wall	87dB/w 33Hz (in room)	R	78
<b>Ruark Swordsman</b> £219	Good Average	Very attractively styled and finished, the Swordsman is a well built 'small bookshelf' model that delivered better test than listening results	38.5 x 20 x 27.5cm stands 0.5m from wall	84dB/w 50Hz		71
<b>SD Acoustics OBS</b> £695	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 walls	92dB/w 30Hz (in room)	R	82
<b>SD Acoustics SO1</b> £1150	Average Very Good	A large scale, airy and unusually detailed system with excellent dynamics. Current model has more civilised top-end and warmer balance than original model	123.5 x 38.2 x 31.9cm free space	90dB/w 50Hz	R	60
<b>SO Acoustics SD3</b> £500	Average Good	Neither cheap nor perfect, this near miniature (using OBS' mid driver down into the bass) sounds unusually lively and dynamic within inevitable physical constraints, and is ultimately both engaging and entertaining.	38 x 19 x 29cm stands 10cm from wall	83dB/w 30Hz (in room)	R	86
<b>SO Acoustics Ribbon</b> £2000	Average Good+	Entertaining but a little underdeveloped and rather amplifier sensitive, the Ribbon is a lively and loud hybrid marred by some colorations: some like it, others don't	152 x 30 x (15-30)cm floor, angled, away from walls	91dB/w 30Hz (in room)		81
<b>Seventh Veil System IV</b> £1290 (+£340 integral stand)	Average Good+	Lacks welly and loudness but delivers astonishing results with female vocals in particular. Antithesis of the 'good allrounder', this oddball design has considerable charm that the committed enthusiast might find irresistible.	72 x 44 x 21 x 29cm own stands close to wall	84dB/w 28Hz (in room)	R	86

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# THE DIRECTORY

## LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
<b>Shan Shima</b> £280 (stands £75)	Average + Good—	Pretty little miniature in cast mineral/plastics has limited dynamic range and could sound smoother, but integration is good and box effects slight	31 x 16 x 17cm stands near rear wall	84dB/w 65Hz	R	71
<b>Snell Type C</b> £2350	n/a Very Good	Pricey, yes, but an extremely capable loudspeaker. Musical and transparent; excellent bass extension	112 x 38 x 33 free standing away from walls	90dB 35Hz	R	65
<b>Sony APM-101ES</b> £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 23.5 stands in open space	86dB/w 52Hz	R	71
<b>Sony APM-141ES</b> £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 large room, free space	88dB/w 30Hz (in room)	R	78
<b>Sony APM-181ES</b> £300	Very Good Average	Big and beefy but also somewhat fat and bass heavy, this well engineered three-way has notable strengths but lacks transparency and sounds better at lower levels	57.5 x 29 x 36cm stands in open space	87dB/w 40Hz		71
<b>Sony APM 66ES</b> £700	Average + Average +	Powerful heavyweight sound with a brilliant midband – clear articulate and transparent. But the bass is on the boomy side and the treble can sound grainy	66 x 38 x 36.5cm open space, low stands	89dB/w 60Hz		59
<b>Sony 121ES</b> £150	Average Average—	Good perceived high tech value, but the balance has an artificial 'loudness' character, too rich in the bass, making room matching difficult, and too strong in the treble as well.	43 x 25 x 28cm stands in free space	86dB/w 25Hz (in room)		86
<b>Spendor SP2/2*</b> £500	Very Good Good +	Conceding little to the SP1, this 30 litre model displayed good tonal balance with a highly articulate midrange, only slightly marred at frequency extremes	50 x 25 x 30cm free space, stands	87dB/w 45Hz	R*	59
<b>Spendor SP1</b> £800	Very Good Good	A very subtle and musical performer that works particularly well with digital material. An exceptional allrounder	63.5 x 29.5 x 30.5cm stands in open space	87dB/w 41Hz	R	60
<b>Spica TC50</b> £599	Good— Good	This triangular-profile 'grown up' miniature is a shade boxy and laid back but has good rhythmic and musical integrity	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
<b>Spica TC50SE</b> £799	Good— Good	A heavily UK-modified TC50, the SE sounds less boxy and more spacious, but lacks some of the urgency of the standard model	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
<b>Spica Angelus</b> £1295	Good Average	A little bass shy and soft in the bass and lower mid, the free standing Angelus is otherwise tidy, extremely lively and fluid, if uneven overall	116.8 x 53.3 x 26cm away from walls	86.5dB/w 50Hz		60
<b>Studio Power DMS100</b> £249	Average + Average +	Close to a BB rating, and in many respects remarkable value for money. Delivers an impressively smooth and large sound, but sheer ugliness will limit its appeal	51 x 26 x 32cm open stands 1ft from wall	86dB/w 25Hz (in room)	R	82
<b>Sugden CL</b> £275	Average + Good—	A thoroughly impressive and likeable near-miniature, the CL is prettily and properly built, and needs a good driving amplifier	35.5 x 18 x 26.5cm high stands in free space	86dB/w 35Hz	R	78
<b>Tannoy E11</b> £129	Average Average—	Fundamentally turgid and slow, thanks to leaden upper bass and 'shut in' treble, though stereo images are convincing, as are the reasonably uncoloured vocals	39 x 21 x 22cm stands, free space	87dB/w 45Hz (in room)		82
<b>Tannoy M15</b> £170	Good Average +	Somehow lacking the magic of its predecessors, the M15 remains a fine value compact that needs careful set-up to give optimum results	50 x 25 x 21cm Blu-tack to stands 1-2ft from wall	88dB/w 40Hz (in room)	R	78
<b>Tannoy DC1000</b> £200	Average Average—	The smaller of two DC models with dual concentric drivers, the '1000 is much less well balanced than the larger, floorstanding '2000	50 x 24 x 25cm	91dB/w 53Hz		71
<b>Tannoy DC2000</b> £300	Good Good	Remarkably high sensitivity from unique dual concentric driver that has an involving but characteristic sound. Bass could be better	68.5 x 26 x 27cm floor in free space	93dB/w 55Hz	R	66
<b>Tannoy DC3000</b> £600	Good Good	Giving new meaning to terms like dynamic range and headroom, the magnificent '3000 is a must for those who enjoy high-level monitoring. But spare a thought for the neighbours	94 x 26 x 31cm floor 1ft+ from wall	94dB/w 30Hz (in room)	R	78
<b>Tannoy M20</b> £250	Good Good	Alongside fine build and presentation, the M20 provides an unusually clever combination of the 'traditional' virtues of transparency and low coloration with more trendy strengths of speed and pace.	50 x 25 x 22cm stands in free space	87dB/w 25Hz (in room)	R	86
<b>Tannoy Westminster</b> £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 corners	96dB/w (manuf.)	R	Coll
<b>TDL Studio 1</b> £549	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 low stands in free space	84dB/w 25Hz (in room)	R	78
<b>TDL Monitor</b> £1799	Very Good Very Good	Fine solidity and good accuracy, with enough bass extension to satisfy even organ freaks. Needs a big room and can sound a bit lazy and a shade tinkly	118.5 x 30 x 47cm 0.5m from walls	85dB/w 28Hz	R	66
<b>Technics SBC 250</b> £140	Average + Average—	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character	36.5 x 23.5 x 20.5cm free space, stands	86dB/w 60Hz		46
<b>Technics SB-CS5</b> £70	Average Average	Clearly fine material value for money, the CS5 nevertheless betrays its midi system heritage, the quest for size for its own sake compromising the performance of both enclosure and main driver	42.5 x 25 x 24cm stands in free space	86dB/w 48Hz (in room)	R	86
<b>Technics SB-RX50</b> £500	Very Good Average +	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass	48 x 30 x 26cm free space on 40cm stands	86dB/w 40Hz	R	46
<b>Toshiba SS33-M</b> £100	Average Average	Providing a benchmark for budget loudspeakers, this Toshiba-inspired but UK designed and manufactured model is a lot of loudspeaker for the money, if a shade on the cheap	40 x 26 x 21.5cm stands in free space	86dB/w 55Hz	BB	68
<b>Townshend Glastonbury IIS*</b> £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. Super soundstaging	91.5 x 28 x 46 free standing in room corners	88dB 27Hz	R*	65
<b>Vandersteen Model One</b> £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 in view of the additional mid forwardness and bass imprecision	100 x 30.7 x 25.6cm floor clear of walls	87dB/w 23Hz (in room)		86
<b>Videotone Minimax 2</b> £80	Poor Average—	Cheap in build and QC as well as price, but cheerful (if coarse) with it – if a little too cheerful after extended listening...	27.5 x 17 x 20cm near rear wall	84dB/w 90Hz	R	74
<b>Visonik David 6001</b> £173	Average— Poor	Sharp styling a classy looking miniature makes, but the complex grillework worsens a sound which starts off with too much top and not enough bottom	20 x 12 x 13cm against rear wall	87dB/w 130Hz		74
<b>Wharfedale Delta 30</b> £80	Good Average	Very clear and surprisingly neutral for the price, with good dynamics and stereo within limited volume ceiling	37.9 x 20 x 16.9cm near wall on high stands	88.5dB/w 80Hz	BB	59
<b>Wharfedale Delta 50</b> £100	Average + Average—	"There's nothing obviously wrong, but it seems a bit mundane." is what we said when the Delta 50 was £129. But since then the price has dropped by 30 per cent, making it great value	48 x 27 x 19cm near wall on 40cm stands	88dB/w 55Hz		53
<b>Wharfedale Diamond III</b> £100	Below Average Average—	This latest version of the long running Diamond sports a better tweeter, but bass, though deep, is soft, and the midband is indistinct and uneven	24 x 18.5 x 20.5cm near wall, stands	86.5dB/w 75Hz		59
<b>Wharfedale Super Diamond</b> £140	Average Average—	Although there are improvements on the basic "legendary" model, listening panelists did not get airborne about this upgrade	24 x 19 x 19cm close to wall at head height	88dB/w 57Hz		53
<b>Wharfedale 504/2</b> £150	Average Average	Not strictly accurate, this musically involving miniature sounds unusually coherent and well integrated, if a shade dull in balance	29 x 18.5 x 19cm stands against rear wall	84dB/w 60Hz	R	68

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Wharfedale 505/2 £180	Average Good	This lively Wharfedale provides plenty of speaker with unusual refinement for the money, and should be fairly tolerant of room siting	44 x 25.5 x 24cm stands 1ft from wall	86dB/w 55Hz	BB	66
Wharfedale 507 £220	Average + Average -	Generous in size but uningratiating sonically, the 507 doesn't seem to gel in the way the smaller 505.2 does, finding a good in-room balance difficult to achieve	49 x 25.5 x 29.5cm high stands 1ft+ from wall	86dB/w 35Hz (in room)		78
Wharfedale Coleridge £499	Average Good	Compact, beautifully finished and extravagantly engineered box sacrifices bass extension in the cause of high midband sensitivity: communicative, but can be a little unforgiving	48 x 26 x 26.5cm stands 1ft from wall	91dB/w 48Hz (in room)	R	82
Yamaha NS 1000M £900	Good Good +	Living up to its monitor label, and tonally well suited to digital material, the NS 1000M is superbly crafted and capable of high levels	67.5 x 37.5 x 32.5cm 30cm from wall, stands	90dB/w 40Hz	R	46

\* rating refers to original, tested model.

## CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal – at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes.)

There is no problem in connecting a cassette deck to any normal amplifier, but some care needs

to be taken in choosing the best tapes for a specific machine. (Trial and error is one effective technique, but many decks have manual bias adjustment and some match up to the tape automatically.) Lab performance and sound quality often go hand in hand, and are frequently somewhat 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

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research RD-06 £280	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-F270 £90	Average Average +	An excellent budget machine, adequately equipped and satisfactorily built. Sound quality is in severe danger of transcending the price category	Dolby B/C, fine bias adjust	BB	75
Aiwa AD-F370 £130	Average Average	Adequate but uninspiring recorder with detail shortcomings but good control layout and successful sounding with recorded musicassettes	Dolby B, C, HX Pro, bias adjust		63
Aiwa AD-R470 £150	Average Good	For once, an auto-reverse deck with the performance of a decent unidirectional one at a similar price. The Aiwa is modern in concept and execution, and has good, transparent electronics	Dolby B/C/HX Pro, auto reverse, cue & review, bias adjust	BB	69
Aiwa AD-WX777 £179	Very Good Very Good	Excellent, middle price dual deck with quick side change and a living, breathing sound – though prerecorded tapes sound bright	Twin auto-reverse, one records. Dolby B/C, fine bias	BB	75
Aiwa AD-F700 £199	Good Average -	Somewhat less than the sum of the (most fine) individual parts, this deck has an artificial quality which spoiled the efforts of a fine transport	Dolby B/C/HX Pro, fine bias, CD Direct input		75
Aiwa AD-F800 £249	Good Very Good	Close to first class performance – and superb value. The Aiwa is purposeful and finely engineered. It provides a near irresistible blend of good mechanics and electronics	3 head, dual capstan, Dolby B/C/HX Pro, tape calibration	BB	75
Aiwa AD-WX888 £249	Good Good	Inaccurate set-up spoils metal tape operation, but with other tapes the deck works well. This deck offers fine engineering, facilities and sound	Dual auto-reverse twin deck, Dolby B, C and HX Pro	R	75
Aiwa XK-007 Excelia £400	Good Good	Downmarket version of XK-009 with simplified bias/equalisation adjustment section and more forgiving but less informative sound. Still good, but less exciting than XK-009	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment		63
Aiwa AD-WX909 £400	Good Good	Convenience meets sound quality, and both win. An essentially clean, positive recorder which works alongside an auto-reverse player of lower standard – a sensible compromise	Dual deck, auto-reverse, track search, Dolby B/C/HX Pro, bias adjust, 3 Head	R	57
Aiwa XK-009 Excelia £550	Very Good Very Good	Excellent detail, stable articulate midband and slightly obvious treble. The most interesting Aiwa for yonks	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment, CD direct	R	63
Akai GX-32 £170	Average Poor	Constrained and smeared sum this deck well. It has poor bass and treble definition alike, though it proved well aligned for prerecorded cassettes	Dolby B/C, variable bias, headphone out, track search		69
Akai GX-52 £250	Very Good Very Good	Well finished and a pleasure to use this well specified deck sounds clean and defined with all tape groups, with or without Dolby	Dolby B, C, HX Pro, track locate features	BB	57
Akai GX-65 £300	Average Average +	Fine ungimmicky middle ranking deck with simple, purposeful controls, works best with metal tapes. Performance standards fair to good	3-head, dual capstan, Dolby C/HX Pro		87
Akai GX-95 £400	Good Very Good	Well designed and finished cassette deck with features well judged to please the audiophile – especially switchable Dolby HX Pro and switchable panel display. 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
Denon DRM-400 £140	Poor Poor	Messy, confused sound terminally lacking in detail and space under all conditions of use due to high mechanical flutter levels.	Dolby B/C, memory stop, track search		81
Denon DRM-500 £180	Good Very Good	Powerful, refined and detailed sound, and an excellent transport are keys to the success of this cleanly styled addition to the range – but why no timer standby?	Dolby B/C/HX Pro, variable bias	BB	75
Denon DRW-750 £250	Good Good	Polished and articulate, the only significant shortcoming is poor performance with prerecorded material	Dolby B/C/HX Pro, twin unidirectional, one records	R	69
Denon DRM-700 £250	Good Very Good	Stoppily executed (though attractive) user interface contrasts with a high standard of music making belying its modest price	3 head, Dolby B/C/HX Pro, record return	R	81
Denon DRM-800 £330	Good Very Good	There are some niggling faults and limitations (no timer standby is particularly annoying), but as a means of recording music it sets a very high standard	Dolby B/C/HX Pro, off tape monitoring, dual capstan	R	75
Dual 5850RC £269	Poor + Average -	Average-to-middling deck which does most things well and skates over the more subtle things. Control system is uninspired but easy to master. Overpriced	Dolby C/HX Pro, bias adjust		87
Goodmans GSW-5200 £90	Poor Poor	Musically unimpressive but at least it's cheap!	Dolby B, twin, one records		69

# THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

# THE DIRECTORY

## CASSETTE DECKS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Grundig Fine Arts CCT-903 n/a (system component)	Good Good—	[Competent part of complete Grundig system]. Solid and well engineered deck with small but significant problems preventing it scoring highly. Basic design generally – and transport specifically – are excellent	Dolby B/C, twin auto reverse, one records		69
Harman Kardon CD491 £695	Good Good+	Excellent audio engineering and tremendous flexibility make this an audiophile cassette deck 'par excellence'	Real-time counter, auto reverse, track search, Dolby B, C, HX Pro, bias adjust	R	52
Kenwood KX-440HX £130	Average+ Poor	Uneven, unstable sounding player with limited resolving power, but good control layout and finish	Dolby B, C, HX Pro, intro scan		63
Kenwood KX-3010 £170	Average+ Average	Minor ergonomic shortcomings notwithstanding, this is a workmanlike deck that only misses recommendation due to an azimuth problem leading to very dull sound with prerecorded tapes	Dolby B, C, HX Pro, auto bias		75
Kenwood KX-4520 £260	Good+ Very Good	Some high frequency Dolby misalignment and obscure minor functions aside, this is a vital and engaging performer	Dolby B/C/HX Pro, 3 heads, various search functions	R	81
Kenwood KX-5010 £270	Very Good Excellent	This important new middle price deck is a well thought through and thoroughly developed design which eschews gimmicks for the sake of musical excellence	Dolby B/C/HX Pro, auto tape calibration, track/intro search	BB	69
Kenwood KX-9010 £400	Very Good Average+	Clean, detailed but flat and overtly hi-fi-ish sound quality makes the 9010 a little less than the sum of its parts	3-head, auto tape calibration, Dolby B/C/HX Pro, remote control		75
Marantz SD-40 £170	Average Average—	Transistory sounding electronics mar a basically good recording machine. Prerecorded material suffers from effects of Dolby pumping	Dolby B/C/HX Pro, bias adjust		81
Marantz SD-50 £220	Good Very Good	Fine, exacting all-rounder offering good stereo, precision and focus. Good with prerecorded tapes too.	Dolby B/C/HX Pro, track & intro search, variable bias etc	R	81
Marantz CP230 £300	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52
Marantz SD585 £300	Average Average—	Sound quality is a little sat upon, and control ergonomics are somewhat opaque, though the twin auto-reverse/recording capability makes this a powerful machine	Dolby B/C, twin auto-reverse & record, parallel recording etc		69
Marantz SD-60 £350	Good Very Good	A first rate, highly capable deck offering energetic yet refined sound largely due to good electronic design	3-head, Dolby B/C/HX Pro, variable bias & sensitivity	R	81
Marantz CP430 £399	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, ever-ready case and charger/adaptor	R	87
Memorex SCT-5 £150	Bad 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
Memorex SCT-84 £200	Average+ Average+	The playback only transport is a little disappointing, but the record one is a quality item and the deck works well. Ergonomics are good, but styling and control feel are decidedly tacky.	Dolby B/C, fine bias, twin with auto-reverse record, unidirectional play	R	69
NAD 6300 £550	Very Good Very Good	Solid and homogeneous sound quality and very good replay compatibility thanks to 'play trim'. Distinctive, musical – and costly	Dolby B, C, HX Pro, 3 Head, bias adjust	R	63
Nakamichi CR-1E £345	Very Good Good	Modestly equipped by any standards, the CR-1E stands or falls by its build quality, which is high, and sound which is highly competent	Dolby B & C		57
Nakamichi CR-2E £395	Very Good Good+	Ordinary to look at, in some respects rather awkward to use (tape switching especially), the CR-2E sounds very slightly better than the CR-1E, and therefore ranks well. But it doesn't come cheap	Dolby B & C, bias adjust, remote control	R	57
Nakamichi RX-202E £545	Good Very Good+	Fine, clear and articulate sounding player. Excellent with prerecorded material, but idiosyncratic and sometimes obstructive control system	Auto reverse, Dolby B, C, 2 Head	R	63
Nakamichi RX-505E £895	Very Good+ Very Good+	First class recorder with near state of the art performance. Auto reverse tape system raises a few smiles, but provides auto-reverse without the usual compromises	Unidirectional auto-reverse, 3 heads, dual capstans	R	87
Nakamichi CR-3E £595	Very Good Very Good	The user interface is a little clumsy, though conceptually straightforward. Sound quality approaches the CR-4E, and is amongst the best at the price.	Dolby B & C, bias adjust, remote control	R	57
Nakamichi CR-4E £745	Very Good+ Very Good+	High class deck with a reasonably full range of features and superb sound at a slightly unlikely price	Dolby B & C, bias adjust, remote control, 3 Head	R	57
Nakamichi CR-5E £995	Excellent Excellent	A slightly simplified version of the all-conquering CR-7, the CR-5 has a very similar standard of audio performance – the best	Dolby B/C, fine bias, 3-head	R	69
Nakamichi CR-7E £1500	Excellent Excellent	Remarkably this deck is not only ergonomically but also sonically superior to the Dragon, particularly on record/replay	Real-time counter, track search, Dolby B & C, tape alignment adjust, bias adjust, remote control, 3 Head	R	60
Nakamichi Dragon £1750	Excellent Excellent	Previous to the birth of the CR-7E, this machine stood head and shoulders above the rest. It is still the ultimate for musicassette replay	Auto reverse, Dolby B & C, tape alignment adjust, bias adjust, remote		60
Onkyo TA-2120 £130	Average+ Good	Clear, vivid sound with good timing and resolution when using Type II tapes without Dolby. The controls are less inspiring – the meters in particular are plainly inadequate	Dolby B/C, auto tape sensing, block/side repeat	R	63
Onkyo TA-2200 £190	Poor Poor+	Mediocre, dynamically rather squashed sound quality, partly due to iffy transport. Messily equipped too	Dolby C/HX Pro, variable bias		87
Philips FC566 £179	Average+ Average+	Mostly well equipped, though some tape search facilities fail to exploit the auto-reverse capability. Sounds clean and stable – with prerecorded tapes too	Auto reverse, track search, Dolby B & C		57
Philips 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
Philips FC567 £279	Average Poor	Well equipped but ergonomically substandard; sound quality is messy and lacking in clarity and dynamics	Dual deck, auto reverse, track search, Dolby B & C		57
Pioneer CT-337 £130	Average Average+	Simple but well made machine with a slightly soft but consistent standard of reproduction	Dolby C/HX Pro, CD synchro, mic inputs	R	87
Pioneer CT-447 £170	Good Good	An excellent and affordable package, decidedly OTT in the display area but capable of genuinely fine musical reproduction	Dolby C/HX Pro, auto tape alignment, track search	BB	87
Pioneer CT-656 £250	Good Good	Well conceived and executed low cost 3-head recorder. It benefits from and makes good use of metal tapes, but is never less than couth and stable sounding – even with ferric tapes	3 heads, off tape monitoring, fine bias, Dolby B/C/HX Pro	R	75
Pioneer CT-737 Mk II £350	Good Average+	Easy to use and sensibly equipped, the CT-737 is much improved, but sound quality is still a tad lacklustre	3-head, Dolby B/C/HX Pro, manual record bias/sensitivity		75
Pioneer CT-959 £450	Very Good Very Good	Near state of the art for £450. Engineering is of a high order which reflects in an open window sound quality, but playback response is very bright (being corrected by manufacturer)	3-head, var bias & eq, multi-mode meters. Dolby HX Pro	R	87
Pioneer CT-91a £500	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
Revox B215 £1,727	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 £1,826	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
Rotel RD-845 £130	Below Average Good/Poor*	Extremely fine transport and clean sounding electronics for the price. Bass lacks weight, but deck works remarkably effectively with chrome tapes. *See text	Dolby B/C, manual tape selector	R	81

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## THE DIRECTORY

## CASSETTE DECKS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Rotel RD-855</b> £180	Average Good	The transport is OK and the various frequency responses are erratic, but good basic electronics help the Rotel deliver. Coherent, enjoyable and informative	Dolby C memory stop & repeat, track search	R	87
<b>Rotel RD-865</b> £200	Good Very Good	Fine, architecturally solid sound quality in a package with a low gimmick count and strong audiophile appeal	Dolby B/C/HX Pro, fine bias	BB	75
<b>SAE C102</b> £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
<b>Sansui D-X3011</b> £180	Average+ Good	Lively, informative and well equipped basic deck, if rather obscure operationally	Dolby B/C/HX Pro, variable bias, track search	R	69
<b>Sansui D-X501</b> £230	Poor Poor	Unhappy mixture of good looks, excellent ergonomics and mediocre, sometimes poor sound	Dolby B/c, random track search		81
<b>Sansui D-X701</b> £340	Average Average	A little flat and smeared under some conditions, this design is at its best with metal and prerecorded tapes	Dolby B/C, 3-head, variable bias & output, track search		81
<b>Sherwood DS-1135C</b> £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
<b>Sherwood DS-7000R</b> £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
<b>Sony TC-RX110B</b> £90	Poor+ Poor+	Woolly bass and scrappy treble combine to make a meal of many music types, despite accurate response shapes with most types of tape. Prerecorded material sounds dull	Dolby B/C		75
<b>Sony TC-TX55</b> £150	Average Average+	The sound quality ranking is a good one for an auto reverse machine at this price level. Clean, sharp sound, only slightly let down in the deep bass.	Auto reverse, Dolby B, C & HX Pro	R	75
<b>Sony TC-K520</b> £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
<b>Sony (WMD6C) ProWalkman</b> £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
<b>Sony TC-K850ES</b> £400	Very Good Very Good+	Near state of the art recorder with excellent recording quality, and even better playback performance. Sounds — and looks — best with the display turned off	3-head, Dolby HX Pro, bias/level adjust, dual capstans	R	87
<b>Sony TC-K730ES</b> £500	Very Good Very Good+	First rate cassette deck that scarcely betrays it is a cassette deck on audition. Features and control wise, it feels a little dated	Dolby B, C, bias and equalisation adjust	R	81
<b>Teac V-270C</b> £89	Average- Average-	Not quite cheap enough to compete solely on price, the V-270C is a rather messy and unstable sounding deck	Dolby B & C, bias adjust		63
<b>Teac V-480</b> £129	Average Average+	A rather utilitarian model, the V-480 just makes it on to our recommended list by virtue of a clean, open sound that to an extent transcends the measurements	Dolby B/C/HX Pro, fine bias	R	75
<b>Teac W-470</b> £129	Average- Average	A low grade transport is allied to respectable electronics to give sound quality ranging between acceptable and good. Prerecorded tapes sound bright	Twin deck, one records, Dolby B/C, intro-search		75
<b>Teac V-870</b> £349	Good+ Good	Cut-down V-970X for the proletariat. Expensive and carefully engineered with mostly very good but slightly cold sound quality	Dolby B, C, HX Pro, 3 Head, manual tape calibration	R	63
<b>Teac V-970X</b> £449	Very Good Very Good	An excellent sounding deck with useful features (tape calibration etc) that fully justifies the price	Real-time counter, track search, Dolby B/C/dbx & Dolby HX Pro, bias adjust, remote control, 3 Head	R	57
<b>Teac W-990RX</b> £445	Good Good	A mess with dbx, but taut and articulate otherwise. The 990, though expensive, has a powerful range of features, making it one of the few really ambitious decks to successfully straddle both sets of requirements	Dolby B/C 9 dbx, dual auto-reverse/record, parallel & sequential recording, remote	R	69
<b>Teac R-919X</b> £489	Very Good Average	Superbly equipped, yet usable — and well built too. But sound quality is something of a disappointment at this price level, being appropriate for a model about half the price	3-head auto-reverse, tape calibration, Dolby B/C/HX Pro/dbx		75
<b>Technics RS-B555</b> £160	Good+ Good+	Very good value. Resolution, stability and quality of set-up are strong points, a slightly strained, synthetic quality is sometimes apparent	Dolby B/C/HX Pro, bias adjust, track search	BB	81
<b>Technics RS-B665</b> £199	Average- Poor	Disappointing deck, below par by Technics standards. Lacks detail and neutrality due to electronics and transport limitations	Dolby C/HX Pro, track search, fine bias, mic inputs		87
<b>Technics RS-TR255</b> £160	Average Average	Neat, sensibly designed middle of the road dual transport recorder, suitable where the ability to dub tapes is a particular priority	Twin transports, one records and auto-reverse, Dolby B/C	R	75
<b>Technics RS-TR265</b> £170	Average+ Average-	Flexibility and build quality are strong suits, and the control system is a gem, but performance is unduly compromised by the range of features and sharp pricing	Dual auto-reverse, one records, Dolby HX Pro		87
<b>Technics RS-B655</b> £200	Good Very Good	Excellent middle price deck, well equipped with a not over-refined but highly articulate and crisply defined style of musical presentation	Dolby B/C/HX Pro, bias adjust, track search	BB	81
<b>Technics RS-TR355</b> £200	Average Average	Serviceable middle market dual deck without serious fault but with some annoying inadequacies, notably an inability to play side A and B and then stop	Twin auto-reverse, one records, Dolby B/C/HX Pro		75
<b>Technics RS-TR555</b> £300	Average+ Average	Sound quality varies with mode of use, but is rarely less than competent, and is often highly enjoyable. dbx is best avoided	Dual auto-reverse/dual record/Dolby B/C/HX Pro & dbx	R	81
<b>Technics RS-B905</b> £350	Good Good	Good, well set up cassette deck with a clean, accurate sound but some compression dbx circuit sounds poor	Dolby B, C, HX Pro, dbx, bias adjust, 3 Head		57
<b>Yamaha KX-230</b> £140	Average+ Average+	A strong near-budget performer, the strengths include good overall sound, excellent search aids. Weaknesses: ergonomics, soggy bass with prerecorded material	Dolby B/C/HX Pro, variable bias	R	75
<b>Yamaha KX-330</b> £170	Average Good	Cramped control panel but a strong, dynamic and comparatively stable performance distinguish this strong middle-price deck	Dolby C/HX Pro, optional remote control	R	87
<b>Yamaha KX-530</b> £230	Good Good	Excellent all-rounder that does most things at least competently and many things well. One of the best middle price decks	Dolby C/HX Pro, 3 motors, optional remote control	BB	87
<b>Yamaha KX-630</b> £300	Good Very Good	Well equipped and immaculately presented, offers fine, articulate music making with a bias towards high bias tapes, especially metals	3 head, Dolby B/C/HX Pro, optional remote	R	81
<b>Yamaha KX-800</b> £330	Good Average	The present Yamaha range seems oddly inconsistent. This sophisticated model sounds fine (almost) but came a clear second best to the KX-500	Real-time counter, track search, Dolby B, C, HX Pro with play trim, bias adjust, 3 Head		57
<b>Yamaha KX-930</b> £400	Good Average	Worthy but ultimately slightly disappointing mixture of fussy ergonomics and tidy but cluttered sonics	3 heads, dual capstans, Dolby C/HX Pro, remote control		87
<b>Yamaha KX-1200</b> £500	Excellent Average+	A veritable rats' nest of buttons and dials, albeit well laid-out. This is nearly a great recorder, but lacks simplicity of sound	Real-time counter, track search, Dolby B, C, dbx, HX Pro, bias adjust, remote control		52

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# THE DIRECTORY

## CD PLAYERS

This all-digital music source is well established, despite still high disc prices and the opposition of many hi-fi enthusiasts. Compact Disc's strengths over conventional vinyl are complete freedom from surface noise with automatic and programmable play, plus track skip and fast music scan – frequently under full remote control. However, many vinyl enthusiasts find CDs sound less involving than

top quality vinyl replay

Introduced five years ago at around £500, CD players now average less than half that price, and for the main offer improved performance besides. Even cheaper players may have the latest decoding chips and the most useful play features; extra money can buy remote control, remote volume control, audio 'tweaks', plus improved build and component

quality control.

Compared with many hi-fi components, CD players give impressive lab performance, though there are differences between players nonetheless. **Sound quality** variations are even more marked, particularly in a good quality system. As it behaves very like a preamp, there are no problems connecting a player to a normal amplifier.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Aiwa XC-007</b> £499	Very Good Good	Creditable sound despite inverted output, high tech engineering with very good lab performance. A worthy contender but not cheap	Remote, keypad, timer, digital output, pseudo 20 bit, dual DAC		64
<b>Akai CD-55</b> £230	Good Average—	Budget model which fails to compare with the CD52	Remote, hdph, Good programming		83
<b>Akai CD-52</b> £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
<b>Akai CD-62</b> £330	Fair Very Good	Looks, build quality and the technical specification are right up to date. As it stands it sounds very good but if the indifferent lab performance could be improved, it would probably sound even better.	Remote, programme, hdph, comprehensive display etc	BB	70
<b>Akai CD-73</b> £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
<b>Akai CD-93</b> £700	Good Very Good	Undoubtedly a CD player of real class in build, presentation, lab performance and sound quality, but also a shade expensive for formal Recommendation – though that's not to dissuade lovers of black lacquer wood finish	Track entry remote, menu display etc.		58
<b>Arcam Delta Black Box</b> £260	n/a Very Good	This rich, powerful and articulate sounding DAC transforms the majority of medium price CD players	Needs D-out CD players	R	60
<b>Arcam Black Box II</b> £300	Very Good Very Good	An addition to the BB I, it also offers improved sound and more inputs	Optical and wired input digital decoder	BB	76
<b>Arcam Alpha</b> £375	Very Good Very Good	Arcam's new star, its best CD player yet and great value	Remote, hdph, etc, coax dig. out	BB	83
<b>Arcam Delta 70 II</b> £600	Very Good Good	Now in Mk II form a further improvement is seen in features, performance and sound quality. Solidly built and British	Now adds simple remote vol + std features: also display off	R	76
<b>Arcam Delta 170 Transport</b> £600	Very Good Very Good	While no bargain, this is a well made metal boxed transport providing clean digital data for outboard decoder/processors	Transport only, display off, usual programming	R	76
<b>Ariston CD1</b> £345	Good Good	Easy on the ear compact disc for those who like their music Radio 2 flavoured. And it looks good	digital output, remote control	R	87
<b>Cambridge Audio CD3</b> £649	Poor Good+	Unique internal configuration gives the CD3 a fluid and detailed sound falling off at the frequency extremes. The controls and displays are primitive	Optical/electrical digital out, remote control		87
<b>Carver TL 3100</b> £340	Average Average—	The sound quality did not live up to the excellent fascia. Carver's DTL did not aid the indifferent sound	DTL sound shaping, usual facilities, remote, memory		76
<b>Carver TL-3300</b> £700	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
<b>conrad johnson DFI</b> £1,995	Average— Good+	Setting a decent standard and including an FET line preamplifier, the unusual DFI is worth investigating	Line preamp built-in, simple remote facilities		76
<b>Deltec PDM-One</b> £500	Average Very Good	A no frills audiophile bitstream converter at an affordable price	Coax-in, special cable and mains filter options	R	83
<b>Denon DCD 620</b> £180	Average+ Average—	Not competitive on performance though feature pack is good	Hdph + vol, edit, remote		83
<b>Denon DCD820</b> £270	Average+ Average—	A powerful combination of features and build for the money ensures recommendation. The sound is just good enough	Well equipped, power vol, edit etc, digital out	R	76
<b>Denon DCD 920</b> £320	Good Average+	Highly featured and well presented but unexceptional performance	Everything! inc remote volume		83
<b>Denon DCD1420</b> £400	Very Good Average	Superbly equipped with a fine lab performance, this modern player needs a touch more sonic spice to get recommended	20-bit, very comprehensive, remote, power volume etc		76
<b>Denon DCD-1520</b> £550	Very Good Very Good	High tech, high profile, high gadget content, good sounding player at an almost affordable price	Programme, hdph socket, remote, track entry, optical digital output	R	70
<b>Denon DCD 3520</b> £1000	Very Good Good+	Built like a battleship this new model takes its place at the top of the Denon range with a smooth and powerful sound, quite free of graininess	Composite 20-bit DACs, full programming features	R	72

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## THE DIRECTORY

## CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ferguson CD007 £130	Good Fair	The cheapest recommendation in the test group, don't expect the earth but the value is good	Manual, digital output, headphone socket	R	64
Ferguson CD008 £150	Fair Fair	Not as strong as its relatives, sample fault perhaps? Though performance is fair enough overall	Remote, midi digital output, 2x 0/s, timeshare 16 bit		64
Grundig CD9000 £1000	Good Good	Aimed at a market which puts external styling above sound quality. Although this player is of slightly above average competence in most departments it is expensive	Remote, programme, hdp socket, calendar display etc		70
Harmon Kardon HK7300 £199	Average Average—	Budget low bit technology, does not deliver enough for a recommendation	No remote, no digital out; basic control features		83
Harmon Kardon HK7500 £299	Average+ Average	Decided improvement over 7300 in all respects. Still fairly unimpressive sound	Remote, hdp + vol, remote vol, good programming, A-B repeat etc.		83
JVC XL-Z1010 £499	Good Average—	Despite some high tech design and a good lab result this model did not deliver good sound quality	32 track prog., disp off, auto fade, 2 digital op		76
Kenwood DP-8020 £500	Excellent Very Good	Fine build and finish, a fine performer in the lab, and in sound quality	Comprehensive remote inc volume, display off, opt & coax digital output, versatile	R	83
Marantz CD50SE £330	Very Good Very Good	Souped up CD50 delivers reference performance in its class. Worthy successor to the '65SE legend	Full remote, power (7 step) volume Hdp, (fixed). FTS disc memory. Good programming	BB	83
Marantz CD60SE £380	Very Good Very Good	Luxury '50SE with superior remote volume and variable headphone socket; a fine performance all round	Optical digital output, full remote, power vol. FTS, hdp	BB	83
Marantz CD12LE £2800	Very Good Excellent	This top of the range two-box player may be very expensive but it is very well made. Technical performance is very good and the sound is the best from Marantz yet	Two box, digital processor, FTS, optical connection, hdp socket, comprehensive display, balanced output etc	R	70
Meridian 203 £495	Very Good Very Good+	Exceptionally lucid, transparent and solid sound 'bitstream' converter. Always tidy and easy on the ear, but doesn't bulldoze the craggy bits	Stand alone converter, 32-48KHz, optical/electrical i/p	BB	87
Meridian CD206 £800	Very Good Very Good	Fine build, finish and styling, very good sound, classy	Good programming, remote, coax digital output	R	83
Meridian CD208 £1490	Excellent Excellent	State of the art CD sound combined with a decent preamp and full remote control	Opt & coax dig. output, fixed and variable output. Hdp + remote level. Programming, phase invert	R	83
Micromega CDF1 Classic £1400	n/a Very Good	A very well made and stylish player from France, the CDF1 is a CD player for analogue lovers or as close as we've come across	Basic remote, digital output, suspended chassis	R	72
Micro Seiki CDM100 £3850	Very Good Good	One of the hernia inducing bricks of hi-fi, the Micro is extravagantly styled, finished and built. The good lab performance led to an 'only good' sonic display when the price demanded excellent	Balanced output, remote, display blanking		72
Mission Cyrus PCM II £400	Very Good Good+	Improvements in price and performance keep this classic remote player in the running	Remote vol, phase inv, display of, dig op. PSX option	R	83
NAD 5320 £169	Average— Average—	A low cost player devoid of features but at this low price it should still offer better sound	Budget facilities, 20 track program		76
Nakamichi OMS-1E £395	Good Good	This neat enough player doesn't really follow the Nakamichi tradition of providing exceptional sound quality while at the same time perpetuates that of selling at an above average price	Simple remote etc.		58
Nakamichi COP-2E £495	Very Good Good	It's ergonomically superior and has above average sound, but it isn't cheap. The standard of build quality and finish is first class which isn't quite matched by the sound quality	Programming, hdp, remote track entry, digital output		70
Nakamichi OMS-5EII £1500	Good+ Very Good	"... delivers near state of the art performance and build quality in a deliberately starkly functional package, but at a very high price..."	Skip and scan, simple track programming, manual control		51
Nakamichi OMS-7EII £2000	Good+ Good	The only serious criticism here is of the price. And in our not always humble opinion you can get better sound quality for less elsewhere in Nakamichi's range	10 digit track entry keypad programming, headphones		51
Onkyo DX-1500 £170	Average Fair	Ruled out on the grounds of its poor DAC filter, but it's not so bad really given the price	Manual, 2x 0/s, timeshared 16 bit		64
Onkyo DX-7500 £490	Good Very Good	This comes close to the state of the art performance in many areas. It has lots of facilities and is well made too.	Key pad remote, memory, hdp, comprehensive display, optical output etc	R	70
Philips CD610 £160	Average+ Average	Built down to the price the sound is OK while the package performance and features constitute fine value	Remote, hdp, programming etc	BB	76
Philips CD630 £250	Very Good Good	Large clear display with an international flavour. Strong Philips style, high value CD player	FTS, digital op, versatile programming, remote, remote vol (7 steps) hdp (fixed)	R	83
Philips CDC875 £300	Average+ Average—	The changer works well and this machine is very well equipped. The sound quality is below par but may not matter too much in its likely 'muzak' application	6 disc changer/dig op remote, hdp, memory, shuffle		76
Philips CD840 £350	Good+ Very Good	Philips best yet and bitstream too! Very versatile programming and easy to Recommend. Fine stereo imaging for price	FTS, hdp + vol, full remote programming	BB	83
Philips CDV185 £350	Average+ Average	Hard to value with the video singles facility but it all works well enough for a recommendation	Video singles + CD scart + digital out etc	R	76
Pioneer PD9300 £499	Excellent Average	A mid price flagship of excellent build and lab performance but only average sound - interesting though	Remote, 24 track programming, 2 digital op		76
Pioneer PD-91 £899	Excellent Very Good+	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, index search, etc.	R	64
Proton AC-120 £180	Average Average—	Fine styling, low price but barely average performance	15 track memory, simple design, remote, hdp		76
Radford DAC1 £895	Good Good	Fine but slightly dated and costly package in performance terms — but flexible, musical and well built	DAC with 2 electrical + optical i/p, tape out		87
Radford WS1 £1095	Good Good	This player fails only in subtle ways. It is not the most engaging of players, but it is strong, forceful and dynamic, and it remains one of the better Philips 16-bit clones	Programming, intro scan etc	R	87
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 remote 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, hdp, 19 track memory, digital op		76
Rotel RCD-855 £250	Good Good+	Stripped for action this well built Philips technology player delivers fine performance and sound. First rate value	Remote, 20 track prog, 1 audio op, 1 digital op	BB	76
Rotel RCD-865 £300	Average Good	Curious mixture of bold musical presentation and foreshortened imagery. Grows on you though. One to audition with care	'bitstream', remote control	R	87

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# THE DIRECTORY

## CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
SAE D102 £700	Good Good	Considering the high price of this player, most of the innards seem fairly prosaic. Sound quality and lab performance are both respectable enough, but hardly justify the price premium involved, though styling is unusual.	Remote (inc volume), skip, scan etc.		58
Sansui CD-X711 £550	Excellent Very Good	Luxury features, finish and sound from this classy Sansui; no excuses required here	Balanced and normal op, Digital; opt & coax; hdph + vol, remote full programming	R	83
Sharp DX150 £129	Fair Fair	This is a none 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	Fair Fair	It has a remote control but it's too like the 150 which is rather outclassed for technical and sonic merit by the vast majority of the competition	Remote, programmable, skip, search, repeat		70
Sonographe SD1 (by CJ) £799	Good Very Good	Distinctive with oak end-cheeks, using Philips based 14 bit x 4 oversampling, Conrad Johnson electronics make this a musically rewarding player	Full search programme and timing	R	51/Coll
Sony CDP-228ESD £400	Very Good Average +	Good value, this is Sony's best mid price design and comes superbly equipped	hdph, remote, rem vol, custom file	R	76
Sony CDP-338ESD £600	Excellent Good	Only a bit better than the 228 the 338 is a good machine, but not quite good enough for formal recommendation at the price	Custom file, remote, rem vol, hdph, shuffle etc, 2 digital op		76
Sony CDP-X7ESD £1300	Good + Average	A Sony flagship, build and finish is exemplary, styling is unusual but the sound is just average	Custom file, remote, 2 digital op, balanced audio + phonos		76
Sony CDP-R1/DAS-R1 £5000	Very Good Excellent	Sony has aimed high with the R1 and in some ways has created the reference player. Build quality is amazing and it offers a high level of facilities. One or two faults were revealed in both the lab and the listening, but it's generally excellent	Two box, dual optical connection, digital processor, FTS, remote		72
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 PD470LE £279	Average Average	With the LE upgrade the 470 has improved to a just average position	Remote, hdph, 20 track prog		76
Teac ZD880 £450	Good Fair	Decent enough in most respects with a very good build and finish. Its sound isn't competitive enough to inspire any real enthusiasm	Remote, track key access, auto space, comprehensive display, hdph socket etc		70
Technics SL-P277A £160	Very Good Average +	High value, budget priced, yet well equipped and finished, a strong example in its group	Remote, programming, hdph + level. No BB digital op.		83
Technics SL-P550 £220	Very Good Average	Superb, slick presentation, well equipped, average sound, fine build	Remote vol (6 steps) hdph + var, remote programming, edit/fade, digital optical only		83

## CD MIDI SYSTEMS

So you want a hi-fi, but you don't want to make a fuss about it. A pre-packaged system with everything matching up and no aggravation may not rank with carefully chosen separates on sound quality, but there's no denying the attractiveness or popularity of this approach – the market for pre-packaged component hi-fi systems is at least as big as that for separate items, even ignoring the vast numbers of low-cost single unit stacker systems. The arrival of compact disc led to a new fashion for shelf-standing compact systems, or 'midis' as

they are known in the trade, as a replacement for earlier floor-standing rack systems (themselves the upmarket development from music centres). Only some 330mm wide, midis can more or less match full-size (430mm) rack components for performance, and are certainly cheaper to make, ship, sell and buy.

Whereas specialist hi-fi is moving steadily towards ultra-simple 'no frills' components, midi systems tend to be sold on a feature count at a price point, usually with little opportunity for

demonstration and comparison. Our test programme includes extensive auditioning and lab testing, while making allowance for the different aspirations of designers and expectations of users. Key features valued highly by customers include system remote control, automatic switching, double 'dubbing' cassette decks, and elaborate equaliser tone controls. And the top end of the market is developing with surround sound audio/video-ready packages.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa X-D80K £550	Poor Poor	Congested and harsh sound quality, the cassette deck, amp and loudspeakers being well below par. The built-in timer adds some operational flexibility	Auto-reverse, CD synchro record, remote, timer		77
Aiwa X-D100 £1000	Average – Fair	Very fully equipped with wide ranging in and outputs but poor upgradeability. Sound quality is reasonable on the whole	Digital & optical in/outputs, dual auto reverse, disc file CD etc		77
Ferguson HFD28 £300	Poor Poor	Similar to Godmans 5000 system but with greater power and marginally superior sound	One-piece, semi-remote		77
Grundig Studio Line 1 £330	Poor Average +/ Poor	Intriguing package with warm, woolly but attractive sound let down by poor attention to detail and suspect cassette deck. Amplifier appears to be inadequately protected	CD/cassette tuner plus preset equaliser		77
Hinari DK200 Disc Deck £300	Poor – Poor –	Confused user interface is matched to inadequate electronics. Poor – and poor value	Single unit, two cassettes, CD, tuner, remote		77
JVC Midi-W900CD £1111	Good Good +	A competent allrounder, with important convenience related features, and powerful linked recording facilities. Less strident speakers would be appreciated	Separates system, equaliser, auto-reverse cassette	R	65
JVC Midi-W91CDM £1111	Good – Average	Very well equipped (viz: multi-disc player, powerful tape related features) with acceptable but rather nondescript sound	Multi-disc player, twin auto-reverse cassette, equaliser		77
Pioneer S-11 £510	Average – Average –	Fine lower middle market system, with one useful extra – the built in timer. Only the record deck is disappointing	Twin auto reverse cassette, built in timers, one piece amp/cassette		77
Pioneer S-330D £1080	Very Good Very Good	High standard of reproduction on all sources, though mistracking with Dolby C was a limitation. There are few gimmicks and plenty of fine engineering	Dolby C/hx pro, multi-disc, amp with DAC etc	R	77
Proton AI-3000 £550	Good Good	There are a host of minor problems, including no LW, but the unit is attractively packaged and can be made to sound very good despite a woolly sounding amplifier	One piece CD, cassette, tuner and amp, remote	R	65
Sanyo 39CD £260	Poor Average –	Acceptably compromised basic low end system, offers broadly respectable if unambitious music making for those on a tight budget	One piece + CD, non-remote, manual tuner		77
Sanyo 49CD £300	Poor Average –	Similar to 39CD, but with Dolby B, preset tuning, remote control and more power. Audio wise, it's more of the same, but there's greater stature when loud and cassettes are helped by Dolby B	One piece + CD, partial remote control, digital tuner	R	77
Sanyo 59CD £380	Average – Average –	Adequate performance overall, though endemic lack of pitch integrity takes edge from tape and records. Some inconsistencies in control system too	As 49CD. + full remote, auto source select, separate turntable		77
Sharp CD-X17E £500	Average Average +	Highly specified miniature with detachable speakers. AC mains power only. Good sound let down by crude upper midband and treble. Expensive for what it is	CD luggable with dual cassette & tuner, detachable speakers		77

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## CD MIDI SYSTEMS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Technics X900CD £470	Average Average—	Good build and mostly good sound is offset by mediocre amplifier and loudspeaker and some operational oddities	Main cassette/tuner/amp, separate T/t and CD		65
Technics X1 £500	Good Good	Superb value for money from a system with solid straightforward engineering at an attractively low price	Auto-reverse record transport, auto-disc/tape editing, surround sound, remote	BB	77
Technics X5D £800	Very Good Very Good	A mainstream system offering considerable flexibility and power in a traditional suit of clothes, and embodying values that place music first	Twin auto-reverse, tuner/timer, auto record deck, digital amp	R	77
Yamaha AST-C10 £530	Average+ Very Good	Brilliant if flawed luggable with weighty, powerful bass, and a rare combination of expressiveness and clarity unprecedented from such a small package. Good features.	Mains portable twin cassette/CD/radio system detachable speakers, remote	R	77

## TUNERS

The radio medium operates at a much lower profile than TV, but in areas outside pop music the BBC service is the envy of the world. Live Prom concerts can rival all other sources from a hi-fi perspective. Only the FM (VHF) bands give stereo hi-fi sound, though AM (MW & LW) are useful for receiving certain transmissions in the UK.

Something of a hi-fi afterthought, tuners are often selected merely to match a chosen amplifier

cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is well spent

Tuners come in two basic types. Analogue models tune gradually (and usually manually) across

the bands, and can have analogue or digital displays; they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories

(The Lab and Sound results for models tested in issue No. 65 refer to FM only. For AM results see under Comments.)

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Akai AT-52L £150	Very Good Very Good	Holds its own on FM against many much more expensive tuners, but AM is very poor	All bands	BB	65
Akai AT-93L £250	Good+ Good+	By AM standards presentable (good) while FM delivers the goods	All bands, aerial switch	R	65
Arcam Alpha £120	Good Average++	Attractively classic British analogue tuner with sound quality comfortably better than most	FM/am analogue	BB*	50
Arcam Delta 80 £300	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
Harman Kardon TU920 £299	Good Average	Rather weak sound quality for the price despite good lab test results	16 presets, AM/fm, digital auto scan, active tracking		55
Harman Kardon Citation 23 £559	Good Very Good	Fine performance, interesting features and ease of use are this tuner's forte, and the sound quality is top notch	FM/am seek/manual adjustment muting 16 presets remote control	R	60
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 ST35L £125	Good+ Average—	It works well enough but the sound could be better for the money	16 presets, AM/fm, digital auto scan, active tracking		55
Meridian 204 £525	Good+ Good	Pleasant sounding with a fine finish but does not make the grade at this price	FM only, auto scan, digital, remote, clock timer		55
Musical Fidelity TI £300	Good+ Very Good	Top class FM stereo sound on good signal strengths from this audiophile model. Watch out for local CB!	FM only, analogue box dial, manual tune, signal meter	R	55
Naim NAT 01 £1294	Very Good Very Good	There may be better sounding tuners in the world, but we have yet to hear one	No presets. Two box, flywheel tuning FM only, Analogue	R	50
Nakamichi ST-7E £750	Good++ Good+	Exceptionally good for weak-signal areas, and good all round	16 AM/fm presets, Schotz enhanced sensitivity, auto time digital		55
Onkyo T9090 II £590	Very Good Very Good	It has most of the facilities you could possibly want and more beside. Lab performance and sound quality are both good enough to ensure recommendation even at this price	FM only, digital, 20 presets, auto scan etc.	R	72
Pioneer F91 £350	Excellent Good++	Easy to use, this model has excellent RF performance and scored very high ratings on the listening tests	FM/am 24 presets	R	60
Proton AT-300 £199	Good Good	The AT-300 is pretty on the outside, orthodox on the inside and rather dear. AM - poor	FM/mw only	R	65
Quad FM4 £329	Very Good Good+	Fine sound, excellent ease of use, good build and finish and a more than satisfactory technical performance	7 presets, Digital	R	50
Revox B260 £1120	Excellent Very Good	Sophisticated and expensive, the B260 is ideally suited to the rest of the Revox range and should also work well in other systems	FM - virtually everything	R	60
Rotel RT-830AL £110	Good+ Good	Fine sounding budget audiophile material, no frills, no fuss	Manual dial analogue, FM, MW, LW	BB	55
Rotel RT-850AL £160	Good+ Good+	Scoring well on listening tests and one of the best sounding tuners at its price level, it was a bit let down on AM but RF performance was good	FM/am, digital	BB	50
SAE T-102 £449	Good+ Good+	Expensive for all the radio you get, but sounds interesting. AM - poor	FM/mw only	R	65

Rating refers to original, tested model

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## HEADPHONES

There are a variety of different approaches to headphone design, and examples of each turn up in this group. Amongst the more expensive esoteric models, electrostatic drivers are used in square open-backed phones such as the Jecklin and Stax models. The majority of these come with some form of transformer which takes the signal initially from the speaker terminals on the amplifier. The actual speaker cables then travel from this unit *via* a

bypass switch to the loudspeakers.

The more down to earth models feature dynamic drivers in circular open-backed designs. The advantage of open backs seems to be a correspondingly open sound and a less claustrophobic feel to the music. One can also of course hear external noises and irritate people on public transport

The third category are closed-back designs,

which are useful in situations where it is necessary to block out background noise

Another means of distinguishing different types is the way they sit on your head or ears. There are three styles: circumaural models enclose the ear and rest on the side of the head; supra-aural designs press on the outer ear (pinna); and intra-aural types rest inside the ear and are popular amongst users of personal stereos.

NAME PRICE	COMFORT SOUND	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
<b>Aiwa HP-X30</b> £30	Good Good—	A flashy personal stereo phone which alternatively could be used at home. A slight LF tonal preference slightly colours the response, but it ain't a bad can	Supra-aural, closed-back, dynamic		75
<b>Aiwa HP-V99</b> £50	Good— Average+	Horn loaded in-ear miniatures with plenty of guts but not enough transparency or bass to compete with the headbanded competition	Intra-aural, closed-back, dynamic		75
<b>Aiwa HP-X80</b> £50	Good Good	A headphone that's highly suited to non acoustic music and portable sources, nicely made and slickly finished. Sound quality doesn't quite match the price	Supra-aural, closed-back, dynamic		75
<b>Aiwa HPEX-200</b> £90	Good Good	Modern looking and well finished the Excelias, as they are dubbed, had meaty bass and sounded reasonably open for the type	Circumaural, closed-back, dynamic		63
<b>AKG K135</b> £35	Poor Fair	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
<b>AKG K145/S</b> £58	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
<b>AKG K240 Monitor</b> £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
<b>AKG K280 Parabolic</b> £110	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
<b>AKG K340</b> £136	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
<b>Audio Technica ATH 909</b> £55	Average Average	Quite impressive in the treble though a bit bass shy, the 909s worked well at highish levels	Circumaural, semi-open, dynamic		55
<b>Audio Technica ATH 910</b> £65	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
<b>Audio Technica ATH-911</b> £75	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
<b>Beyer DT 325</b> £30	Very Good Fair	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
<b>Beyer DT330 Mk II</b> £45	Good Poor	Not the most revealing 'phones encountered, the 330s were nevertheless enjoyable and rarely offended	Circumaural, semi-open, dynamic		55
<b>Beyer DT550</b> £69	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
<b>Beyer DT880</b> £90	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
<b>Beyer DT990</b> £119	Very Good Very Good	The 990s are definitely a significant pair of dynamic headphones; they have a smooth and yet revealing, neutral sound that is hard to criticise.	Circumaural, open-back, dynamic	R	55
<b>Beyer IRS690</b> £200	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
<b>Jecklin Float Model One</b> £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
<b>Jecklin Float Model Two</b> £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
<b>Jecklin Float Electrostatic</b> £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
<b>JVC HA-D990</b> £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
<b>Koss TD/60</b> £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
<b>Koss K/6X Plus</b> £30	Fair Poor	'Sixties-style' phones from the good ole US of A, their sonic style is unique and can make a system sound quite different	Supra-aural, closed-backed, dynamic		63
<b>Pioneer SE-72</b> £30	Good + Average—	Neat, nicely made personal stereo oriented phones along the lines of Sony V3s. Sound is on the veiled side, good for aggressive sources	Supra-aural, closed-back, dynamic		75
<b>Quart Phone 30</b> £40	Good Fair	Whilst not as seductive as their PMB25 predecessor the 30s are reasonably neutral and do improve on some of the competition — though not stunning	Circumaural, semi-open, dynamic		63
<b>Quart PMB 25II</b> £40	Good Good	Despite a somewhat unconventional suspension system the 25s put in a convincing and enjoyable performance with warm yet lively balance	Circumaural, open-back, dynamic	BB	55
<b>Quart Phone 70</b> £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
<b>Quart PMB 65</b> £70	Good Good	Quite revealing and neutral albeit with the usual closed back sound, this competes well with more established models	Circumaural, closed-back, dynamic	R	55
<b>Quart PMB 85</b> £90	Fair Very Good	These more expensive Quarts bear a striking resemblance to the Jecklin Float models and use two drivers per ear. Sound is a bit bass heavy but not bad overall	Circumaural, open-backed, dynamic		63
<b>Realistic Pro-X</b> £25	Poor Average—	Robust, unanimously uncomfortable and heavily veiled in sonic terms — not a great success	Supra-aural, closed-back, dynamic		75
<b>Ross RE2530 CD</b> £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
<b>Ross RE2560 CD</b> £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
<b>Ross RE-2760</b> £35	Poor Fair	Stylish white cans from the only British firm in the business. Unfortunately sound quality is not up to par in this price range	Supra-aural, closed-back, dynamic		63
<b>Sennheiser HD40</b> £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

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## HEADPHONES

NAME PRICE	COMFORT SOUND	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
<b>Sennheiser HD450</b> £35	Good Fair	Modern, simple and lightweight phones that are remarkably robust and which turned in a relaxed if weighty performance that was at worst pleasant	Supra-aural, semi-open, dynamic	R	63
<b>Sennheiser HD480</b> £45	Good Fair	Using the same shell as the 450s, the 480s were a little softened and unrevealing by comparison with their competitors	Supra-aural, semi-open, dynamic		63
<b>Sennheiser HD520</b> £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
<b>Sennheiser HD530</b> £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
<b>Sennheiser HD540 Ref Gold</b> £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
<b>Sony A21L</b> £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
<b>Sony MDR V3</b> £30	Fair Good	Portable stereo oriented phones that are very nicely made and combine clarity with a pleasant lack of distortion	Supra-aural, closed-back, dynamic	BB	63
<b>Sony MDR V7</b> £70	Very Good Very Good	Classy sounding cans that are very slick and work well with all types of music, setting the standard in their price range	Circumaural, closed-back, dynamic	R	63
<b>Sony MDR-CD999</b> £120	Good+ Very Good	A very nice headphone in all respects, the 999s are worthy of the best headphone outputs and high quality sources	Supra-aural, semi-open, dynamic	R	75
<b>Sony MDR-R10</b> £2500	Excellent Very Good+	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
<b>Stax SR34</b> £140	Fair 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
<b>Stax SR84</b> £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
<b>Stax Gamma pro/SRD-X pro</b> £296/£230	Very Good Excellent	The Gamma pros are like a stethoscope for your hi-fi, revealing subtleties that many loudspeakers fail to resolve	Circumaural, open-backed, electrostatic	R	63
<b>Stax SR Gamma</b> £299 (inc. SRD-6 Adaptor at £100)	Very Good Very Good	The next model down the Stax range from the Lambda, the Gamma is an excellent headphone with little to criticise but the price	Circumaural, open-back, electrostatic	R	55
<b>Stax SR Lambda Pro</b> £545 (inc. SRD-7SB Mk 2 Adaptor at £185)	Very Good Very Good	A bit of an industry reference the Pros are frighteningly revealing, bringing across more information than loudspeakers costing twice as much	Circumaural, open-back, electrostatic	R	55
<b>Stax SR Lambda Pro</b> £360/ <b>SRM-1 energiser</b> £635	Very Good Excellent	This combination extracts layers of information that other headphones only hint at. The SRM-1 has more edge than the SRM-T1, but it's good	Circumaural, open-back, electrostatic	R	75
<b>Stax Lambda Signature/SRM-T1</b> £470/£895	Very Good Excellent	The Signature when combined with the SRM-T1 valve driver must be the most transparent headphone available	Circumaural, open-backed, electrostatic	R	72
<b>Yamaha YHL-006</b> £30	Average Average	Unusual personal stereo oriented phones that curl up when not in use. Earphones are like golf balls and balance is well suited to Walkmans	Supra-aural, open-back, dynamic		75

## PERSONAL STEREO

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than all manner of domestic systems and as such demand some attention. Now that personal CD players have joined the ubiquitous Walkman in the market, the variety and standard of sound quality is huge, with obscurely named cassette players practically falling out of your cornflakes packet and Discmen going for £300.

Despite their diminutive size personals attempt to incorporate as many gimmicks and features as

possible, cassette players often incorporating tuners, graphic equalisers and Dolby noise reduction. CD players are still relatively expensive and don't tend to vary that much on the features front, rather the amount and quality of accessories differs. Most models come with a mains adaptor and some include 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. 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 NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Aiwa HS-PL300</b> £110	N/a Average	Good looking, simply laid out player with a sensible selection of features and reasonable sound quality for a small player of this price	Dolby NR, chrome/metal eq, remote		78
<b>Aiwa HS-PX303</b> £150	N/a Good	Chunky and macho styling combines with comprehensive features and a half decent transport to make a powerful personal	Dolby B & C, chrome/metal eq, remote	R	78
<b>Panasonic RQ-P505</b> £100	N/a Poor	Very attractive and neat little player with nicely designed controls and XBS bass boost, but sonically it's limited by distinct wow and flutter	Dolby, chrome/metal eq, remote		78
<b>Panasonic RQ-P525</b> £120	N/a Average+	Fitted with what is effectively a bass only tone control and harbouring all the necessary features the 525 also has a knack with tape replay	Dolby B & C, chrome/metal eq, remote	R	78
<b>Philips D6658</b> £30	Very Poor Poor	The low price limits sound quality, and this is not a spectacular machine, but it does a reasonable job nonetheless	Graphic EQ, AM/fm		56
<b>Saisho PS90R</b> £40	Poor Poor	A bit of a jumble of features and gadgets, the PS90R has on-board speakers, an extending aerial and even records, but sound quality is dubious	Graphic EQ, types I, II & IV, AM/fm, recorder		56
<b>Sharp JC-270E</b> £130	N/a Average—	Slightly old fashioned design combines with a basic feature count and mediocre sound quality to make an apparently uncompetitive player	Dolby, chrome/metal eq, remote		78
<b>Sony WM-BF65</b> £90	N/a Average+	Regular size radio/clock-cassette player with a bright even open balance and Sony's forward facing phones. Not as glamorous as slightly more expensive models but sonically not bad	Dolby, chrome/metal eq, radio, alarm clock	R	78
<b>Sony WM-701C</b> £200	N/a Good—	Beautiful little machine with all the necessary buttons 'n' switches and a fundamentally exceptional sound quality, marred unfortunately by wow and flutter	Dolby B & C, chrome/metal eq, remote, folding phones		78
<b>Sony Walkman Pro</b> £249	Good+ Very Good	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, it takes other personals to the cleaners (except on weight and power consumption)	Dolby B, C, types I II & IV, record, line in/out, varispeed	BB	52/56
<b>Toshiba KT-4549</b> £80	N/a Poor	Fully equipped with 10 preset radio and alarm clock the KT-4549 is a bit aggressive on the sonic side and the bass boost system lacks balls	Dolby, chrome/metal eq, radio, alarm clock		78

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## PERSONAL CDs

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Goodmans GCD-10 £120	Average— Poor	Cheap, flashy and not short on accessories the GCD-10 is a rather noisy player that left a lot to be desired on the sound quality front	13.5 x 3.7 x 18cm, 478g, mains adaptor		66
Kenwood DPC-77 £270	Good+ Very Good	Very chunky and well made, the DPC-77 is the only player to include a digital output and sounds very good through its analogue output – a suitable domestic alternative	12.8 x 3.5 x 14.5cm, 750g, digital output, mains & in-car adaptors	R	66
Philips D6800 £130	Average Average—	A competitively priced and reasonably attractive looking player whose sonic performance is somewhat marred by a rather grainy top end	13 x 4 x 17.5cm, 516g, 3" ready, twin hdph sockets		66
Sanyo CP-12 £260	Fair Good+	Sonically amongst the more enjoyable personal CD players and capable of revealing the musical aspects of a disc in an interesting and entertaining fashion	12.5 x 2 x 12.7cm, 380g, wired remote, mains adaptor	R	66

## CD PORTABLES

CD Portables or Yuppie Blasters as we classified them are basically portable stereos gone digital, ie a compact disc player is included alongside the usual AM/fm radio and single or double cassette deck. Compact disc is a novelty that seems to add a fairly hefty premium onto the price of the standard ghetto blaster, but the improved sound quality over standard cassettes may justify this for some.

In virtually every case a CD output socket is

fitted which means that it's possible to play silver discs through a domestic amplifier and loudspeakers, thus they are some sort of substitute for standalone mains machines (as are the personal CD players). One drawback with having a CD player on board is that batteries are gobbled up even quicker than usual, up to ten batteries being required in some cases. Neither are the units particularly light, the heaviest weighing eight kilos!

However they do all run off the mains too, and come with an appropriate lead for this purpose. Other useful features common to most are spare input sockets to record from an external line source such as a preamplified vinyl disc signal, and microphone sockets for recording live events (although the usual lack of record level adjustment is a nuisance)

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa CSO-XL25 £150	Poor	It's cheap, cheerful and not too low on features but sound quality from disc is frankly uninspiring	Twin headphone sockets		73
Bose Acoustic Wave £750	Very Good	Not exactly a CD portable as it doesn't play discs, but a highly versatile and stylish radio cassette player that has bass	Input sockets, Dolby NR, PA capable etc	R	73
Grundig RR9000CD £300	Average	Relatively slick machine with full CD function and volume remote control, low on features for price and unspectacular sounding	Remote, motorised volume pot, condenser mic		73
Philips AZ8394 £200	Average—	Stylish in a wasp like fashion, unfortunately the disc playing lets it down somewhat but otherwise it's OK	Twin decks, graphic eq., bass boost, condenser mic		73
Sharp QT-CD43 £280	Average	Quite a beefy box that comes complete with remote control for volume and CD functions. It even has a surround sound option which enhances imaging	Clock, speaker outputs, powered volume pot		73
Sony CFD-D73 £280	Good	The model we received was intended for the Japanese market and thus may not be entirely representative but it made reasonable sounds and has novel features	UHF bandwidth, input sockets, graphic eq., Megabass	R	73
Sony CFD-DW83 £300	Average	A macho looking beast capable of highish levels, but unimpressive sound for the price. Nice styling and good for scratching	Clock, timer, balance, input sockets, graphic eq.		73
Toshiba RT-8089 £200	Poor+	Square and long but rather drab on the sound quality front, as well equipped as most but rather tinny in many respects	Clock, twin decks		73

## STANDS AND SUPPORTS

It's becoming more and more apparent that all the components in a hi-fi system benefit from being placed on the right kind of support. It is already acknowledged that performance of electro-mechanical transducers, such as turntables and loudspeakers, can be greatly improved by using highly rigid supports. This notion has been expanded to include electronics such as amplifiers and compact disc players, and inevitably a broad range of stands and supports have been produced to cater for this requirement.

With loudspeaker stands there seems to be two

broad schools of design. The most common is the open frame type which uses square section steel tubing (usually less than an inch square) made up to form a tripod or quadropod stand usually fitted with spikes top and bottom to ensure good coupling to both floor and cabinet. However, for reasons of domestic harmony this latter option is often not pursued as eagerly as perhaps it should be. The alternative approach is to use mass. Larger section (approximately 3 inch x 2 inch) tubing is welded between square top and bottom plates and filled with sand and/or lead shot. Again, this type uses

spikes at the base but Blu-tack or the like for coupling with the speaker cabinet.

Equipment supports generally place isolation quite high on the list of priorities and usually use a lightweight steel frame to support an MDF platform. Once again spikes are used to minimise contact with the platform and ensure good coupling to the floor. Minimising weight without compromising rigidity seems to be the aim with turntable supports but those designed for electronics often employ some form of damping to kill vibration, sometimes in the form of mass.

## LOUDSPEAKER STANDS

MODEL PRICE	TYPE FINISH	COMMENTS	TOP PLATE SIZE HEIGHT	VALUE	BACK ISSUE FULL REVIEW
Appolo A820 £44	4 leg Fair	A light open-framed budget design slightly lacking in rigidity and subjectively superceded by other stands costing £10 more.	19 x 19cm 53cm		58
Appolo A10 £52.50	4 leg Fair	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
Audio Dimensions Classic 2 £110	4 leg Average	Built in the heavyweight tradition and damped with chalk. Solid, stable, tactile sound	20.3 x 20.3 x 52cm	R	83 supp
Foundation Fred £70	2 leg Average	With sand filling the Freds made speakers sound tight and coherent with a more even balance.	19 x 19cm 36/43/59cm		58
Foundation Sir Fred £80	2 leg Good	Upgraded 'Fred' with special in-fills. Sweet sound but one that also lacks bite and edge	19 x 19 x 46.5cm		83 supp
Foundation Maggi £159 to order	Pair 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 25/38/46/53cm	R	58
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 x 46cm	R	83 supp
Heybrook Point 5 £55	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
Heybrook HBS1 £99	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
Linn Kan II £79	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

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## LOUDSPEAKER STANDS

MODEL PRICE	TYPE FINISH	COMMENTS	TOP PLATE SIZE HEIGHT	VALUE	BACK ISSUE FULL REVIEW
Linn Sara £85	4 leg Very Good	The Sara exhibits some odd properties so its use other than with the Sara loudspeaker should be viewed with caution.	25 x 21cm 53cm		58
Monotrak Engineering M1 £58	1 leg Good	The M1 gave the mid and treble a commendably smooth and detailed presentation but bass sounded rather lacklustre and muddy.	19 x 18.5cm 48cm		58
Monotrak Engineering M4 £58	4 leg Very Good	Begging comparison with Heybrook's HBS1 the M4 maintained much of the openness and forthright detail of that model.	23 x 21.5cm 53cm	R	58
Monotrak Engineering M4S £58	4 leg Very Good	Its stature and stability would seem to mark it out as most suitable for smaller, lighter cabinets. The M4S possessed an open midband and clear treble.	20 x 17.5cm 53cm		58
Origin Live 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
Origin Live Advanced £145	3 leg Good	One of three related tripod-like stands. Stable sound with good sense of depth and power	22 x 20.6 x 44cm		83 supp.
Partington PP4 £60	1 leg Good	The PP4 offers a rather mixed performance, though when damped with sand infill it was less ready to embellish the overall sound and low frequencies became tauter and quicker.	18 x 16.5cm 48cm		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
Stand Design Z20 £70	1 leg Excellent	Well built and finished with optional sand in-fill. Ideally suited to Wharfedale 505.2's	16.5 x 19 x 50cm	R	83 supp.
Target T-40 £48	2 leg Very Good	Not very stable, tends to infer a slightly forward, ragged sound with diluted pitch	19 x 19 x 40cm		83 supp.
Target HS20 £60	1 leg Excellent	This monopod stand can be used either filled or unfilled and encourages different characteristics in the sound accordingly.	19 x 16.5cm 53cm		58
Target HJ15/3 £100	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

## EQUIPMENT SUPPORTS

MODEL PRICE	TYPE FINISH	COMMENTS	SIZE (H x W x D)	VALUE	BACK ISSUE FULL REVIEW
Alphason New Concept £99	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 gundrops 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		57
Foundation Stable Table £100 (with Super Board)	Table Good	Similar to Stand Design's table though less well finished and certainly less stable	64 x 46.5 x 36cm		83
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		83
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		83
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 TT1 £46	Shelf Excellent	This rigidly braced shelf offers both good sound quality and material value for money	26 x 46.5 x 35.5cm	BB	57
Target TT2 £55	Table Very Good	Standing up to the best in most areas, the TT2's only real foible concerns a slight loss of bass 'slam'.	52 x 46.5 x 35.5cm	BB	57

\* rating refers to original tested model

## 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 plugs yourself

The features column contains information on the material make-up of the different cables with the following abbreviations: OFC - oxygen free copper, OFHC - oxygen free high conductivity (Audionote define the HC as high crystal), PC-OCC - pure copper by ohno continuous casting, LC-OFC - linear crystal oxygen free copper.

## INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Audioquest Livewire Topaz £35	Good Fair	Sounding 'bigger' and faintly richer than Reference 2. Topaz was also slightly gramy at the top end.	Gold-plated plugs, OFHC copper		59
Audioquest Livewire Ruby £49	Fair Good	Smoother sounding than the Topaz, the extended crystal Ruby is less gramy and coarse, better able to resolve complex passages.	FCL copper twin axial	R	59
Audio Technica AT6115 £40	Very Good Fair	This cable sounds somewhat 'quieter' than the original LC-OFC interconnect, but is also less transparent and three dimensional.	PC-OCC copper coaxial		59

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## INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Audionote Copper ANC</b> £44	Fair 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
<b>Audionote Flexible Silver ANS</b> £99	Fair 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
<b>Audionote Silver ANV</b> £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
<b>Budget Patch Cords</b> see text	Fair Poor	As thrown in gratis with cassette decks and the like – frequency extremes were restricted and performances were veiled.	Thin coaxial		59
<b>Budget OFC</b> circa £7	Fair Fair	Subjectively, this cable did lift much of the aural fog experienced with scrawny standard hook-up leads.	OFC		59
<b>Chord Mono-t</b> £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		83 supp
<b>Deltec Slink</b> £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
<b>Deltec Black Slink</b> £152	Excellent Excellent	Inherently neutral the cable faithfully reproduced broad and deep stereo soundstages with precise focus and a sense of tactility.	8 silver plated OFC strands PTFE dielectric	R	59
<b>Deltec Gortex Black Slink</b> £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
<b>Denon LC-OFc</b> N/a separately	Very Good Fair	Supplied with Denon's dearer CD players this cable introduced a peculiar 'twangy' coloration at high frequencies, and a slightly soft bass.	LC-OFc, non-magnetic gold plated plugs		59
<b>ONM Solid-core</b> £23	Fair Good	Transparent in the midband and full of sparkling detail in the treble, low bass was slightly curtailed (unterminated price £2.30 per m.)	Single strand nickel-plated copper. Unshielded	R	59
<b>Isoda Electric HC-05-PSR</b> £54	Good Good	A pleasantly lively and fluid sounding cable though softens some subtle, midband detail	Aluminium + brass multistrand cable	R	83 supp
<b>Kimber Kable PSB</b> £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
<b>Kimber Kable KC-1</b> £65.55	Very Good Fair	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
<b>Kimber Kable KC-AG</b> £390	Good Very Good	Treble detail resolution was perceived in a slightly abrupt if wholly controlled fashion. Depth re-creation and lateral separation were excellent.	Multi-gauge silver, PTFE dielectric	R	59
<b>Monster Interlink 300</b> £24	Average+ Average	A big, larger-than-life sound but with some emphasis of midband detail and loss of bass	Screened, symmetrical cable		83 supp
<b>Monster Interlink 400</b> £34	Good Good	Bass is solid and punchy, counterpointed by a slightly overblown midband which tends to make vocalists sound larger-than-life.	Multi-gauge	R	59
<b>Origin Live Soli-Core Super</b> £60	Good Fair	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
<b>QED Incon P1-Gold</b> £15.95	Good Good	A lively open presentation that just borders on the lean side of neutral, the quick and lucid delivery affording considerable musical insight.	OFHC, gold plated Deltron plugs	BB	59
<b>QED Incon Graphite GP1 Gold</b> £18.95	Fair Fair	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
<b>Sterling</b> £250	Fair Good	Possessing a neutral if faintly rich overall balance it supplies a pleasantly open and transparent perspective. (Reviewed in pre-production form.)	2 silver strands per conductor		59
<b>Supra EFF-1</b> £60/0.75m	Average Average	A new, costly and mildly disappointing addition to the range. Edgy, smeared sound	Screened, symmetrical dir. cable		83 supp.
<b>Thorens SAC 100</b> £50	Good Fair	Performance is undermined by a slightly coarse and splashy treble, not necessarily bright. Simply rather confused – and fine detail lacks resolution.	Silver-plated OFC, coaxial		59
<b>van den Hul MC-D300II</b> £45	Poor Good	It tended to highlight some upper mid detail, but a generally open and spacious acoustic proved its saving grace. Slightly soft at LF.	Silver plated single strand VdH plugs	R	59
<b>van den Hul MCD-1021II</b> £69	Good Good	Possessing the same endearing qualities as the D300 it presented open and transparent soundstages and improved timbral resolution	Twin axial silver plated copper	R*	59
<b>van den Hul Thunderline</b> £150	Good Fair	Thunderline essentially parallels the sonic performance of the cheaper D102. HF is occasionally tainted by a 'tizzy' coarseness, bass is tight and dry.	Silver plated 'matched copper'		59
<b>van den Hul MC-Gold</b> £250	Fair 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
<b>van den Hul MC-Silver</b> £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
<b>Vecteur 8045</b> £49	Very Good Good	Sounding solid and forthright it might seem slightly cold in some systems but the treble 'edge' is mercifully clean. Very low frequencies were a little lacking in 'slam'.	LC-OFc signal & screen	R	59
<b>Yfere LC-OFc Quad</b> £85	Very Good Very Good	New cable with a very refined sound. Very transparent with good sense of focus and space	Symmetrical, star-quad with screening	R	83 supp

## LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Absolute Wire Force 4</b> £4.75 per metre	Good Fair+	By current standards there was a loss of fine, sharp detail at the frequency extremes, but it has a big and friendly sound	744 OFC strands. PVC dielectric		64
<b>Audio Innovations OR-200</b> £16 per metre	Fair+ Fair+	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
<b>Audionote AN-SP</b> £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 nonetheless	15 silver strands, polyethylene dielectric		64
<b>Audioquest Livewire Black</b> £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
<b>Audiospec Latitude L4</b> £3 per metre	Average+ Average+	Warm, ruddy but also mildly muddy sound with some slight emphasis of bass notes	Figure-of-eight multi-strand. PVC dielectric	R	83 supp
<b>Audio Technica AT6120</b> £10 per metre	Fair+ Fair	Compared to earlier LC-OFc cables this PC-OCC derivative sounded smoother and less aggressive	PC-OCC, PVC dielectric		64
<b>Bellwire</b> 12p per metre	Poor Average—	Broadly speaking it delivered a bright and tizzy sounding treble with a fairly open and detailed mid with little or no bass resolution	0.5mm single strand. PVC dielectric		64
<b>Deltec 8S</b> £144 – 5m pair	Good Good+	The unerring transparency and detail resolution of 8S throughout the midband makes it a far cleaner and more spacious sounding cable than others at the price	4 silver plated OF copper strands, PTFE	R	64

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LOUDSPEAKER CABLES INTERCONNECT CABLES

HI-FI CHOICE

## THE DIRECTORY

## LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Deltac Gortex Black 16</b> £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.
<b>DNM Solid core</b> £3 per metre	Average Fair	A good general-purpose solid-core, though too bandwidth limited for high-end applications. Sounds great in some systems	0.65mm single strand, webbed PVC dielectric	R	64
<b>Exposure</b> £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
<b>Furukawa FS-2F09</b> £6 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.
<b>Furukawa FS-2T15S</b> £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 strands	R	83 supp.
<b>Kimber 4VS</b> £7.15 per metre	Average + Average	Similar construction to 4TC but dissimilar materials infer a slightly tizzy sound	Open-weave, multi-strand with PVC ins.		83 supp.
<b>Kimber Kable 4PR</b> £54 – 5m pair	Fair Fair +	This directionally marked cable benefitted 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 dielectric		64
<b>Kimber Kable 4TC</b> £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
<b>Linn K20</b> £2.20 per metre	Good Fair	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
<b>Marantz ML-55S</b> £30 – 10m	Fair Fair	Subjectively this cable offered a loose and splashy treble which, though not overtly bright, did compromise both tonal and timbral accuracy	30 OFC strands, 3 conductors PVC dielectric		64
<b>Mission Cyrus</b> £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
<b>Monitor PC Silverline PC4</b> £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
<b>Monster SCI 16-4</b> £3 per metre	Average Average	Not as thick-sounding as early Monster cables but still slightly unbalanced. Versatile construction	4 x 16-gauge conductors, OF copper strands		83 supp
<b>Monster Original</b> £4.50 per metre	Good Fair +	Original sounded relatively congested and murky at higher frequencies but possessed weight and conviction in the bass	Multistrand		64
<b>NVA LS1</b> £6 per metre	Average + Good	A light and breezy sounding cable best suited to short lengths, NVA benefitted from a clear and transparent outlook	7 x 0.25mm silver alloy strands, PTFE	R	64
<b>Origin Live Soli-Core Ordinary</b> £1.80 per metre	Good Fair +	Subjectively it bettered the performance of the costlier Super version, affording a pleasantly detailed and spacious soundstage with firm bass but slightly coarse treble	1.8mm and 0.5mm single strands	R	64
<b>QED 79-Strand</b> £1 per metre	Good Fair	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
<b>QED Incon Graphite</b> £2 per metre	Fair + Fair +	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
<b>QED Flat 200</b> £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
<b>Rotel Supra 4</b> £2.57 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
<b>Rotel Supra 10</b> £6.91 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
<b>Solid core mains cable</b> 36p per metre	Fair + Good	It enjoys much of the smooth treble and articulate midrange usually associated with the better solid core derivatives. Lean but taut and rhythmically coherent	1.5mm square, 3 cores, PVC dielectric	BB	64
<b>Sterling</b> £99 per metre	Fair Fair	This pre-production sample possessed a strangely muddled and reserved sound quality. It suffered from a progressive instrument modulation	Pure Silver, PTFE dielectric		64
<b>Townshend Isolda</b> £400 – 5m pair	Fair + Good	Isolda possessed a truly dark background out of which rose a very solid and extended bass together with an excellent sense of transparency through the upper octaves	8 coax cables per conductor – very thick	R	64
<b>van den Hul CS-122</b> £5.95 per metre	Fair + Good –	Characterised by a driving and powerful bass, CS-122 proved to be a heavy sounding cable. Mid treble detail was refreshingly clear but there was a slightly muted air about the extreme treble	19 x 0.45mm silver plated strands, webbed rubberised dielectric	R	64
<b>van den Hul CS-352</b> £12.95 per metre	Good Fair +	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 dielectric		64
<b>van den Hul SCS-12</b> £29.95 per linear metre	Good + Good +	SCS-12 set a high standard with a tight and well focused soundstage populated with tactile stereo images. Bass wasn't as extended or resolved as some other cables	19 silver plated strands of 12 different gauges, PTFE dielectric	R	64
<b>van den Hul SCS-2</b> £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
<b>Vecteur R-CV30</b> £4.99 per metre	Fair Good	Subjectively the better of Vecteur's three-strong cable line-up offering a neutral overall perspective but with a slight loss of detail resolution at both frequency extremes	4 x 0.8mm LC-OF PTFE insulated strands	BB	64
<b>Vecteur S-CV90</b> £69 per metre	Fair + Fair +	It seemed both less transparent and integrated throughout the midband than R-CV30, though both frequency extremes were spruced up with a tighter sharper delivery	6 x 0.7mm LC-OF strands		64

# THE WORLD'S NO 1 GUIDE TO BUYING HI-FI



# THE DIRECTORY

## IN-CAR ENTERTAINMENT

In-car entertainment is an area not usually associated with the esoteric world of domestic hi-fi. However, it represents a source of musical entertainment that many of us are exposed to every day. The majority of new cars are fitted with some form of radio before they leave the showroom and in many cases this usually very basic player is taken for granted and accepted as representative of in-car audio standards.

For the price of a budget amplifier or more, there is a wide variety of in-car machines to choose from,

including cassette, CD and even DAT players. The majority of sub £300 players are integrated units featuring a cassette player, AM/fm tuner and amplifier, all in one remarkably compact standard sized box. At this price level the cassette players tend to be fairly basic affairs, although autoreverse and noise reduction systems are both fairly common. Tuners are usually of the digital variety with varying degrees of sophistication in signal tuning and presetting, with some machines featuring as many as 18 FM presets. The emphasis is on the frequency

modulated band and AM often suffers as a consequence, but fortunately for radio enthusiasts there are some exceptions.

The amplifier is usually designed to drive two pairs of speakers mounted fore and aft of the vehicle, and a fader is fitted to adjust the balance between the two. The dearer machines feature separate bass and treble controls which can be quite handy given the unusual acoustic of the car environment and the variety in balance and presentation to be had from car speakers.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Alpine 7282L</b> £250	Good Very Good	A very attractive and seductive sounding player. The matt surfaced transparent preset keys are especially sexy.	Bass/treble controls, 12 FM, 6 AM presets, chrome eq., clock, 8W	R	61
<b>Alpine 7905M/3539</b> £650/£350	Excellent Excellent	An easy to use and attractive CD/tuner, partnered with a powerful and flexible amplifier to give an effortless source of in-car entertainment.	Bass/treble controls, 12 FM, 12 AM presets, slide-out, 150W	R	68
<b>Clarion 916HP</b> £160	Good Average	With its rubbery buttons and touches of white this is a modest looking player let down by a weak cassette.	Bass/treble controls, 5 FM, 5 AM presets, 9W		61
<b>Clarion 946HP</b> £250	Very Good Very Good	A good FM side let down slightly by AM performance. This Clarion is particularly nice to use with its nifty SAM tuning system.	Bass/treble controls, 12 FM/6 AM presets, slot-in, 15.1W	R	61
<b>Clarion CDC7000/10028HA</b> £650/£250	Very Good Excellent	Despite a slightly off-beat cartridge system the Clarion combo put in a performance that had the sonic edge over other CD/tuners in its test group.	Bass/treble controls, 12 FM, 12 AM presets, security code, 80W	R	68
<b>Goodmans GCE229</b> £150	Fair Average	If knobs, switches and legends are your bag then the GCE229 is the one for you – a lot of gizmos for the price and it even sounds OK.	Bass/treble controls, 6 FM/6 AM presets, Chrome eq., clock, MSS, 10.1W	BB	61
<b>Nakamichi TD-400E/PA-300 II</b> £495/£329	Very Good Very Good	If you want your in-car entertainment to compete on sound quality grounds with your domestic system, this combo offers a very strong challenge.	Bass/treble controls, 5 FM, 10 AM presets, uni-directional, chrome eq., Dolby B, C, 75W	R	62
<b>Nakamichi TD-700E/PA-300II</b> £874/£329	Very Good Excellent	For those who appreciate the wonders of analogue there are few in-car players to really compete with this superb cassette/radio. You can even adjust azimuth.	Bass/treble controls, 6 FM, 6 AM presets, music search, Dolby, 75W	R	68
<b>Panasonic CQ-497</b> £117	Fair Poor	The CQ-497 has a traditional style analogue tuning system making it easy to use. AM reception was good but the other sources are less encouraging.	Bass/treble controls, chrome, NR, 7W		62
<b>Philips DC680</b> £180	Average Good	A colourful and musically competent player that despite a gammy volume knob is well worth checking out.	8 FM, 4 AM presets 3.5W	R	61
<b>Pioneer DEX-M300/CBX-M100/GM-3000</b> £300/£450/£280	n/a Very Good	Separate control unit and boot mounted multi play autochanger make this a bit of a hefty installation but it uses the same magazines as their domestic players and sounds fine.	Bass/treble controls, 18 FM, 6 AM presets, 80W, removable fascia		68
<b>Proton 214CD/D275</b> £300/£175	Very Good Very Good	This Proton cassette/tuner offers good power and a level of fidelity appropriate to its price. Musically it has a Decca-like charm that is very appealing, plus a sensitive radio.	Bass/treble controls, 8 FM, 8 AM presets, Dolby B/c nr, chrome eq., 85W	R	68
<b>Sharp RG-F816E</b> £200	Poor Average	Nothing if not novel the 816, with its unusual anti-theft system is custom built for the furry dice brigade, but is sonically a bit lacklustre.	Four band graphic, 8 FM, 16 AM presets, ASP, Dolby, MSS, 10.9W		62

## RECEIVERS

Purists will look down their noses at the very idea of combining two functions into one box, and indeed they always have done. But unless we're talking about the exotic elite, the creme de la creme of amplifier and tunerdom, intrinsic technical shortcomings simply aren't an issue.

One obvious reason why you should buy a receiver if you were otherwise considering an amplifier and a tuner is that there are savings, ie of

size. Generally you end up with one box in place of two similarly sized boxes, which has got to be a good idea. Receivers are also simpler to operate, in principle anyway. At the very least you save on one power switch, and typically you are presented with an integrated control system that is bound to oil the wheels of ergonomics.

But there is one important point to watch. Because receivers don't sell in vast quantities in

this country, and because this is one of the very few countries to use Long Wave for public service broadcasting, many – no, most – receivers on sale in this country cover FM and MW only. Remember that LW is the home of Radio 4, where it can be heard on the all too frequent occasions it is not on FM.

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Harman Kardon HK330Vi</b> £259	Average Average—	No LW, and FM section best suited to strong, local transmissions. The amplifier is quite powerful but favours the treble. Bass is tuneful but lacks weight.	5 inputs (inc 2 tape), FM/mw tuner		70
<b>Harman Kardon HK440Vxi</b> £299	Good Good	Clear, dynamic, slightly bright sounding design, a little grainy in extremis. Mono switching and LW missing from tuner, which otherwise performs well.	5 inputs (including 2 tape) with FM/mw tuner	R	70
<b>JVC RX-777VL</b> £500	Good Good	Sharp, lively but euphonious sound quality from line and phono source is matched to a high grade tuner. However, many half-baked facilities blunt value for money.	A/v capable with 6 inputs, equaliser, digital ambience, FM, MW/lw		70
<b>JVC RX-1001V</b> £770	Average Poor	Power output is well below spec, and sound quality is cluttered and messy on all inputs.	Digital ambience processing, Dolby Surround, 2/4 speaker, 40 FM/mw presets		70
<b>Revox B285</b> £1782	Average Average—	Sophisticated and capable tuner is married to a muddled, compressed sounding amplifier, which also has low sensitivity preventing the amplifier being driven fully in many situations.	70 watts/ch, 4 inputs (inc 2 tape), 29 FM/mw/lw presets		70
<b>Rotel RX-850AL</b> £230	Good Good	Well built and sensibly equipped receiver with outstanding sound quality for the price via the tuner, phono and line sources alike. It majors on subtlety however, and may not impress the heavy metal brigade.	4 inputs (inc 1 tape), FM/mw/lw tuner	BB	70
<b>SAE R102</b> £599	Average— Average	This is an uneven but mostly good performer. It sounds constrained but musical, but the tuner is weak on both wavebands.	4 inputs (inc 2 tape), FM/mw tuner		70

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# Personal Messages

*More table talk. This month Paul dabbles with an alternative Italian support for his gramophone.*

I suppose I ought to make some sort of apology for returning so quickly – indeed repetitively – to the topic of equipment supports and turntable tables. The reason is simply that this column provides me with the opportunity to rabbit on about the issues I see as most important in hi-fi today. And that currently happens to be the serious under-appreciation of said furniture's role in defining the sound quality of a system.

It's not a situation that's in any way surprising – indeed there's clear historic precedence in the decade or so that it took Linn Products to ram its turntable precedence theories successfully down the industry's collective throat. Enthusiast hi-fi is unswervingly conservative when confronted by the necessity to change perspectives.

Turntable tables are a recently discovered and poorly researched phenomenon. I well remember the irritation with which I forked out fifty quid for my first Sound Org, five or six years back. Pleasure was involved too, to be sure, because the sound quality improvement certainly justified the expense, but there was irritation at finding myself compelled to spend such a sum on what I then perceived as a mere accessory, rather than as the 'proper' hi-fi component it surely is.

My psyche has therefore had five or six years to prepare itself for the eventual realisation that the turntable support is probably more important than the turntable itself – and so in the context of a serious hi-fi system the £300 pricetag on the *Mana Reference* is peanuts.

However when chatting to dealers I've known and respected for years, it's abundantly clear that most people out there in hi-fi consumerland regard £300 or even £200 for a piece of support furniture an entirely

ludicrous suggestion. Which is a sad reflection of the fact that hi-fi purchase has far more to do with prejudice and preconception (on both sides of the counter) than careful comparative demonstration.

Though it appears that RATA's *Torlyte* tables are no longer with us (victims perhaps of their comparatively high price), the one upmarket support that many Linn dealers do seem to be stocking – and rabbiting on about, given half a chance – is the £130 Audiotech, so I felt it was imperative to get one in for a listen. The very fact that people are actually buying Audiotechs, which don't look as though they should cost more than twice the price of a Sound Org, does go some way towards countering my original complaint – but only part of the way I believe.

It's tersely simple in appearance and construction, the cost apparently coming in the careful execution of the fine detail, such as welding which is mitred in three planes, internal foam damping and so on. I believe its origins – or at any rate inspiration – go back to a French table that was made in very small quantities a few years back. Naim Audio managed to get hold of a few for its personal use, but attempts to obtain a regular supply were frustrated. The French table actually uses round section tubing where the Italian-made Audiotech's

tubing is square, but the physical similarity is quite close nonetheless.

Apart from the important details mentioned above, it's simply a compact 8-tube frame with spikes top and bottom, with a Linn *LP12* sized laminate top plate. Foam filled or not, it rings enthusiastically if tapped – not that such an observation is necessarily relevant.

In fact I've now heard two Audiotechs, and can happily report that the sound quality is very good indeed. Indeed my first impression on changing over from the *Mana* was that it might even be an improvement. Certainly it provides a cleaner and tidier sound on my suspended wooden floor, and that in itself is an achievement.

On the second occasion, I left the turntable on the Audiotech and spent a memorably enjoyable evening playing through lots of old favourites. It offered any new insights, but neither was I conscious of any particular deficiencies. (Not that I was particularly conscious full stop by the end of the evening I must admit.) Indeed my only reservation was that some of my very favourites didn't have quite the drama, impact and sheer magic that I had come to expect after three months in *Manaland*.

I quite deliberately stayed with the Audiotech for more than a week. It continued to deliver a first class sound that was in many ways entirely

satisfying. But a few doubts had started to creep in, and were immediately resolved when I moved the turntable back onto the glass platformed *Mana*.

Some of the untidiness and surface noise returned – but so did the stunning midrange integration and dynamics that make the *Mana* so extraordinarily special. The Audiotech is very good, and is certainly fine value for money (even at £130). But the *Mana*'s the device that makes me want to keep on going through my record collection, and that alone makes it one of the best bargains in hi-fi today – even at £300.

I've already admitted I'm puzzled as to why it works so well, and I know that esteemed columnist and writer Peter Turner (another *Mana* fan) is equally perplexed as to how it sounds so superb whilst breaking so many of the accepted (so-called) rules. The root of the controversy is the heavy glass top plate, which accepted (so-called) wisdom dismisses as too massy and hence energy storing.

However, Martin Colloms (another convert) has come up with a possible and entirely plausible explanation. Massy or not, the sheet glass top plate has very high stiffness. The vibrations that feed up through the four (or three) feet of a table are bound to vary from one to another, and Martin's hypothesis is that the ultra-stiff top plate acts as an integrator for these different vibration sets, passing the integrated vibration pattern evenly and consistently into the feet of the turntable itself. (The importance of which will probably depend on the turntable in question.)

For the next (and hopefully final) stage of this odyssey, I plan shortly to try a *Mana* wall shelf complete with top table. With a little luck this might tame the surface noise and untidiness without losing the magic: hope springs eternal. . .

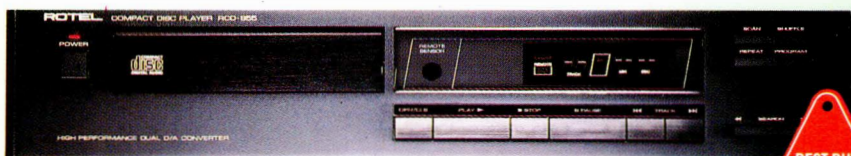


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SOUND AND STYLE



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