

HI-FI CHOICE

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

JUNE 1990 £2.95

Best Buys Awarded

WE CHOOSE THE BEST BUYS & RECOMMENDED PRODUCTS

OVER

950 Test Summaries

IN THE CHOICE BUYER'S GUIDE

MERIDIAN Compact

CD Players

16-BIT VERSUS BITSTREAM:
22 NEW MODELS UNDER REVIEW

Competition


YOU CAN WIN ORTOFON'S
MC3000/II CARTRIDGE!

FREE Supplement

CABLES, TABLES
& SPEAKER STANDS

ISSN 0955-1115

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HOW WE PERFECTED THE AWARD WINNING CD65IISE.

So how did we perfect our award winning CD65IISE?

A lot of people thought there was no way in which it could be improved.

Even the experts were genuinely impressed with the CD65IISE.

("...a sonic performance which significantly outstrips the competition up to twice its price and beyond" raved an impressed What Hi-Fi magazine).

It received awards by the sackful. (including What Hi-Fi's prestigious Best CD player under £300).

The critics were running out of superlatives. The hi-fi magazines were running out of awards. And we were running out of CD65IISEs.

However, we weren't content to sit back and let the competition catch up.

Instead, our engineers and designers sat down and took a long, hard look at the CD65IISE. They tested. They probed. They scratched their heads.

How could they make a near-perfect CD player perfect?

Finally, they hit upon the idea of re-designing the chassis in a rigid honeycomb configuration.

This makes the CD50SE even more immune to vibration than its predecessor.

They upgraded the error correction decoder and improved the analogue circuitry.

So you get even more of the music and detail you've come to expect from Marantz.

They also managed to add more features while making it easier to use.

And, dare we say it, our design team surpassed themselves in making the CD50SE more handsome than ever.

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So why don't you ask your Marantz dealer for a demonstration of the CD50SE?



THE NEW CD50SE.
marantz®

THE WORLD'S No.1 GUIDE TO BUYING HI-FI
HI-FI CHOICE
ISSUE NUMBER 83: JUNE 1990

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ABC (July-Dec 1989 - 23,847)



Menu

A common complaint from consumers dipping their toes for the first time into hi-fi waters has been that products bought today are often out of date tomorrow. In the worst instances of 'consumer paranoia' some people simply refrain from buying anything, thinking "By next year they'll have invented something better." Frankly, I've never fully understood such rationale. Surely if a hi-fi system sounds pretty good today, it doesn't suddenly deteriorate overnight and become less enjoyable to listen to simply because another manufacturer has just produced a superior system?

Anyway, if you do worry about the in-built 'obsolescence factor' of modern hi-fi components then the rate of advancement in CD player technology must be your worst nightmare. I won't labour on about the various forms of digital-to-analogue converters currently available - you can read all about that in Martin Colloms' round-up of the CD player market on page 92 - but as an illustration of how fast the market is moving I must tell you this: as we went to press we learned that Philips' much-heralded '1-bit' CD840 player, to which we have awarded a *Choice* Best Buy on page 79, has already been deleted! If you like the sound of the CD840 and fancy buying one, you'd best be quick off the mark because by the time dealers' stock rooms have emptied (probably by August) Philips will have launched a new model, the CD850, using similar components but based on a more expensive metal chassis with aluminium fascia - at a £50 premium. Or, then again, you could wait a year or so until someone launches an even better player for less than £200 . . .

With so much discussion in today's hi-fi magazines concentrating on evolving CD player technology, you could be forgiven for thinking that in hi-fi circles the 'old fashioned' vinyl LP is now a thing of the past. While it's true to say that the humble record player no longer appears to be a particularly cost effective source component for a hi-fi system, in esoteric systems - where fidelity of sound matters above all other criteria such as convenience, ease of use or availability of new software - a record player is still the audiophile's prize possession. Consequently we're delighted that this month's competition offers *Choice* readers the opportunity to win one of five Ortofon moving coil cartridges. First prize is Ortofon's flagship cartridge, the fabulous MC3000/II which usually comes with an equally fabulous £850 price tag. This is one of the finest pickup cartridges in the world - and it could be yours!

John Bamford



Cover photograph
of the Meridian
208 (see page 75)
by Chris
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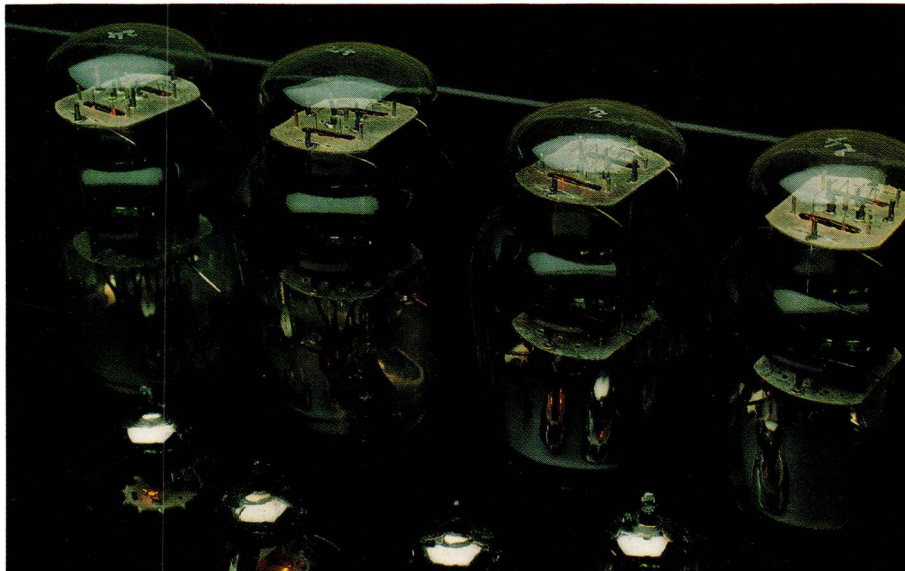
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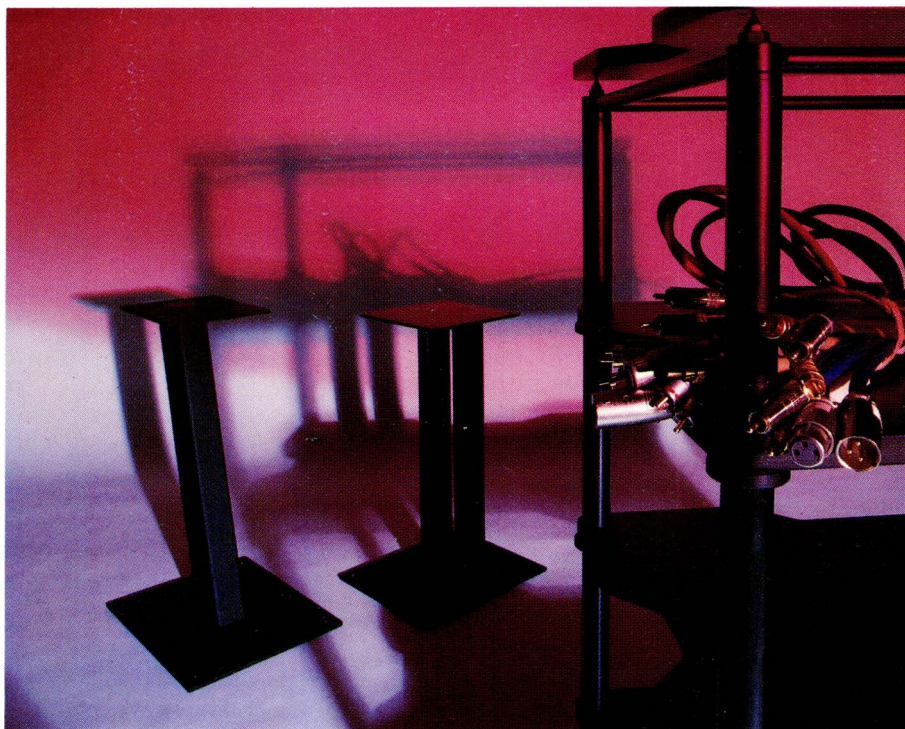
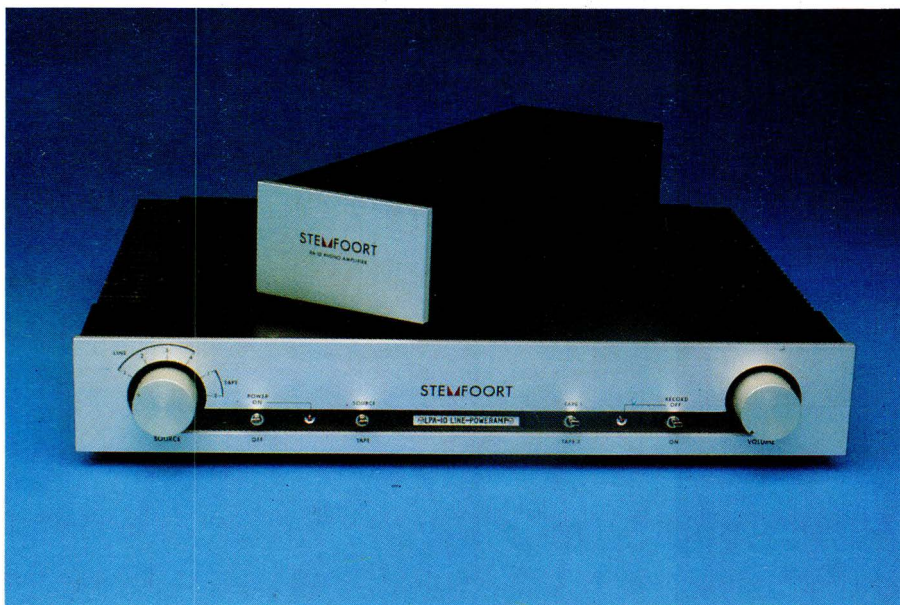
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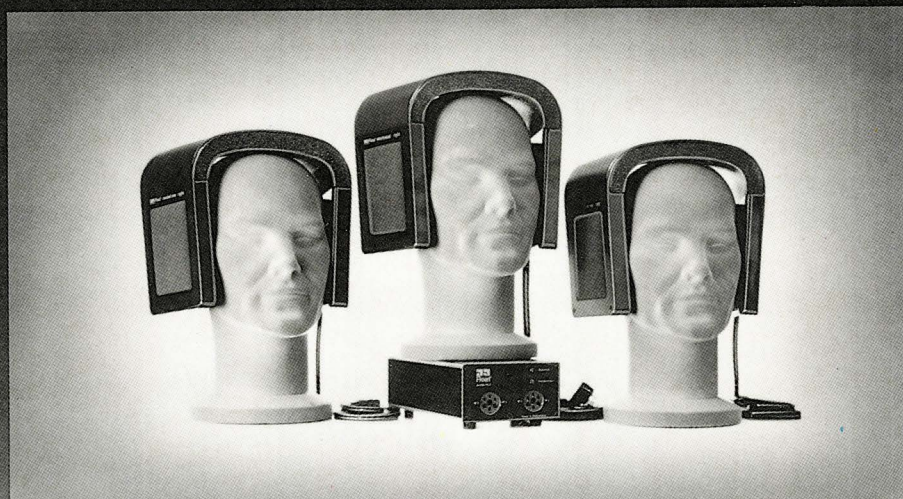
QUANTUM CABLES

Link up with the best: *Choice* offers a range of superb YFERE and Furukawa cables at discount prices.

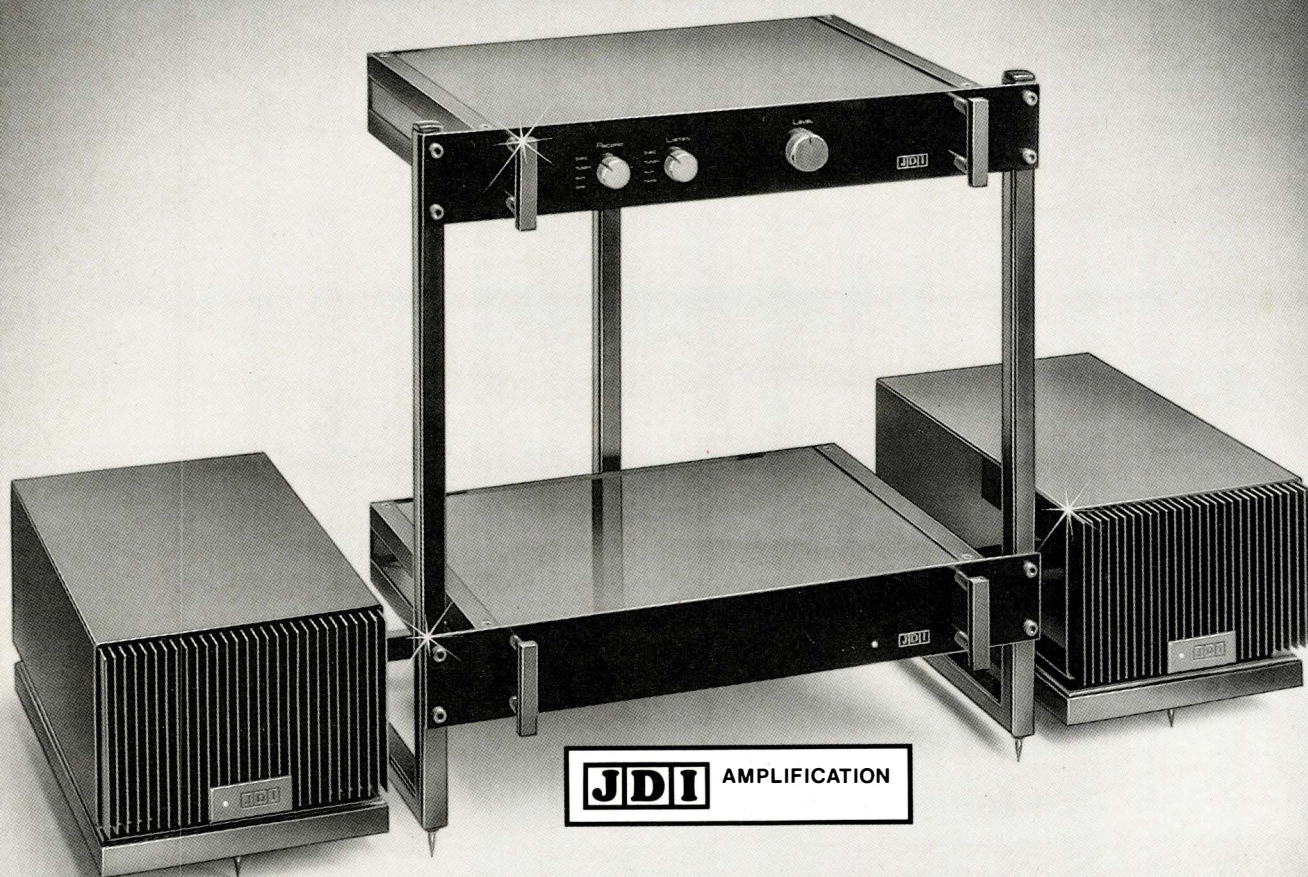
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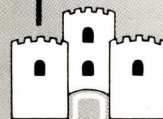


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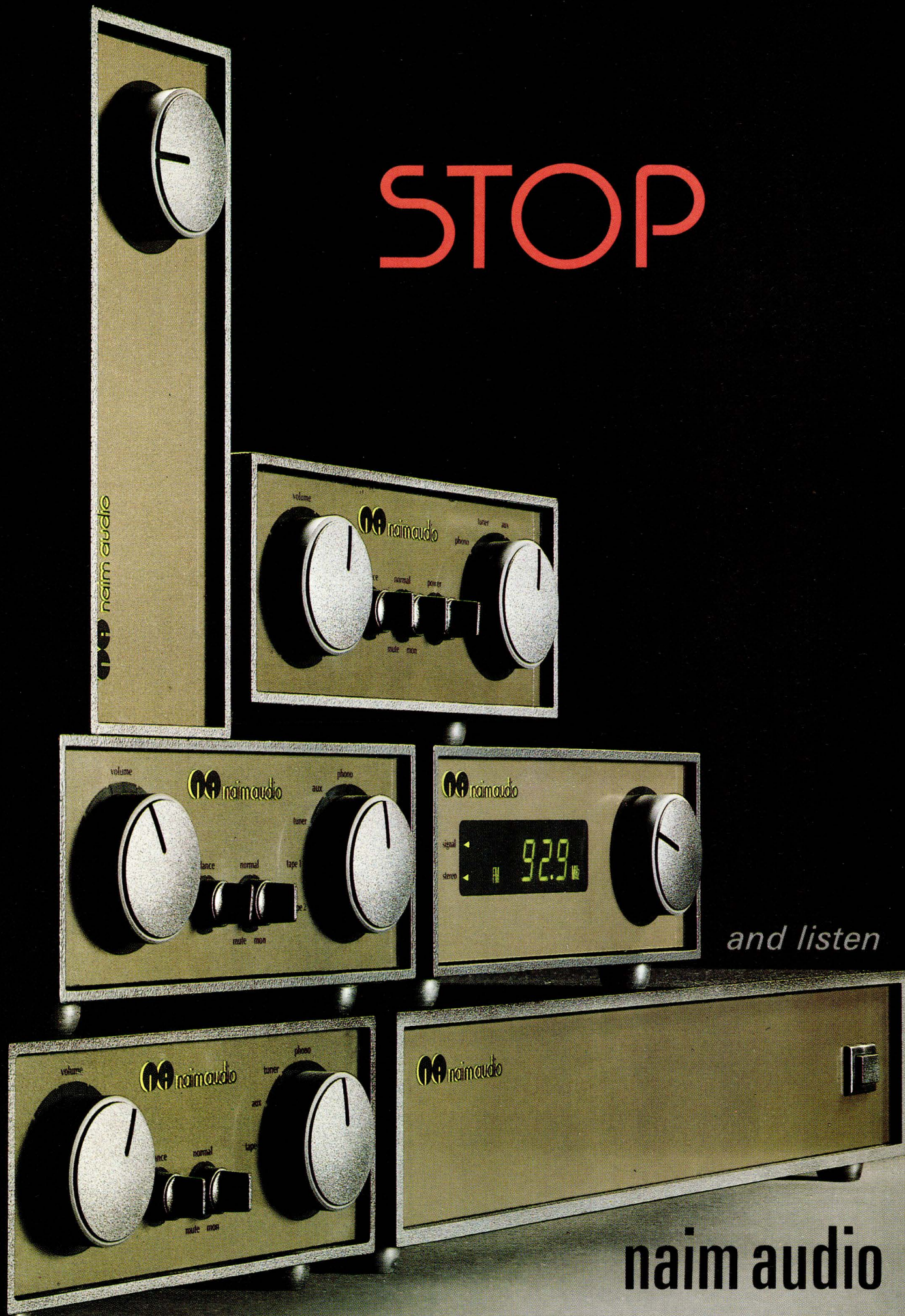


JDI AMPLIFICATION

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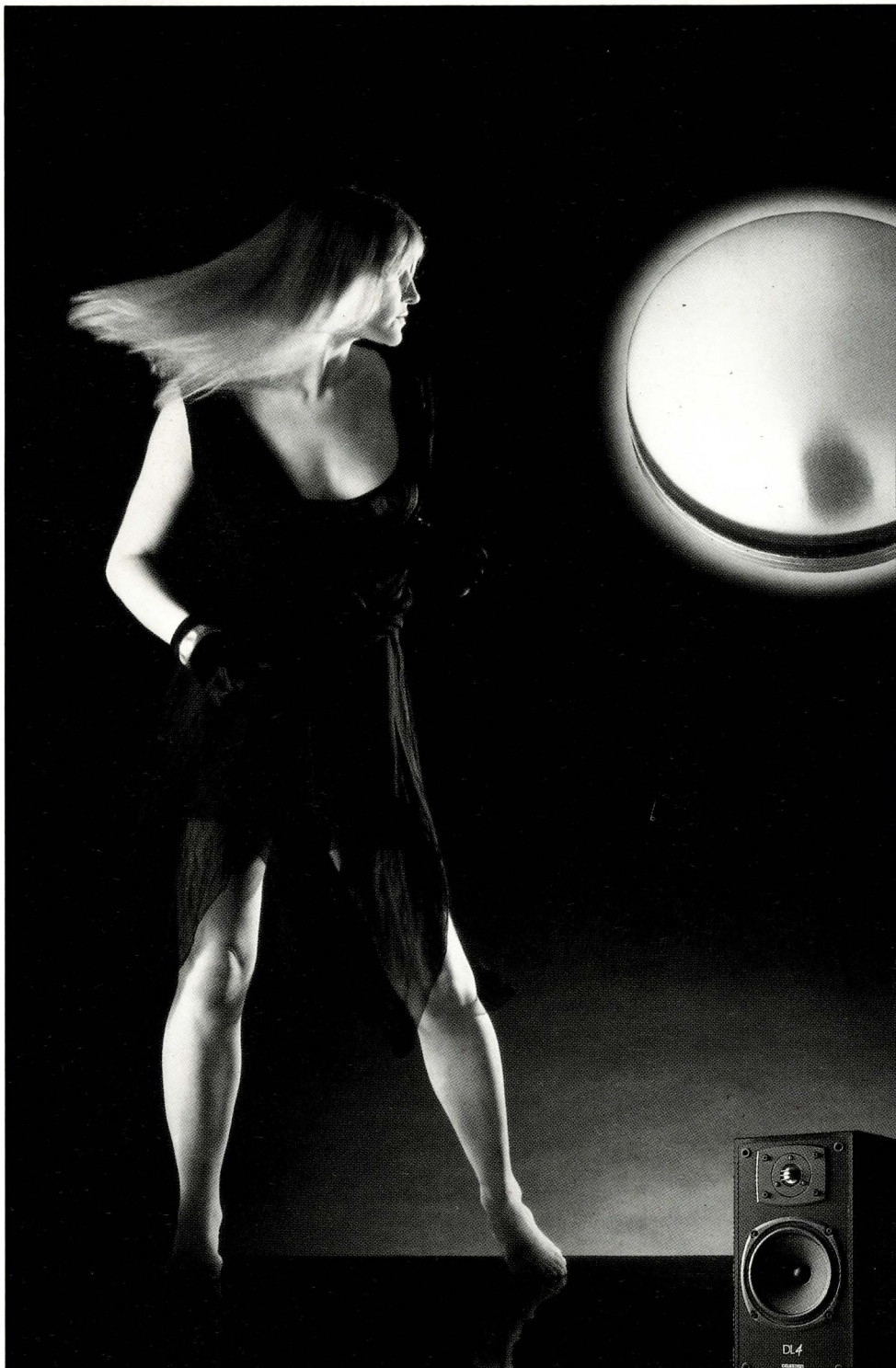
STOP



and listen

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The result of years of research and development. The very evocation of sound perfection.



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Update

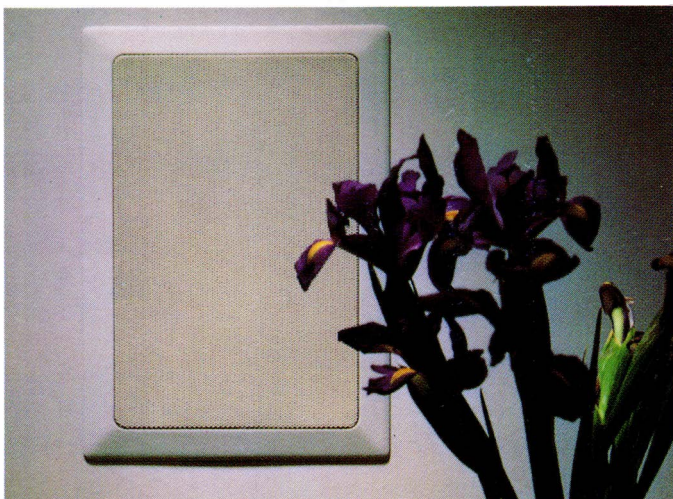


PRODUCTS

The sound of Infinity

"You can hear the future," says Infinity of its new *Modulus* loudspeaker. The two-way, 200watt, 12-inch high speaker promises a huge sound for its size but has been designed with an optional add-on £1,495 sub-woofer unit for those who cannot live without through-the-floor bass. *Modulus* uses Infinity's EMIT tweeter which sits proud of the main baffle on a sort of arched dome above the five inch IMG long throw woofer. The tweeter thus measures the same, according to Infinity, as if it were suspended in mid air. Finish is in high-gloss black or white and the *Modulus* costs £695 on its own. The *Modulus* pedestal stand, which can be sand filled, costs an extra £200 or you can wall-mount on a very nattily designed proprietary £110 bracket.

Infinity has also launched its *Environmental Reference Standard* (ERS) in-wall loudspeakers for people who want hi-fi sound but non-evident equipment through their homes. Three models in the ERS range are available ranging in price from £200 to £425. Add around £40 each for a wall-fitting kit. ERS speakers are flush fitting and the grilles can be painted to match room decor.



Flush for the plush . . . another in-wall option.

One way to NICAM

Following in the great tradition established first by hi-fi and then home computers, camcorders and home video movie making is the latest electronic hobby to capture the public imagination.

The Video Show, promoted by specialist magazine *What Video?* was a roaring success as would-be Spielbergs jostled to play with editors, effects and enhancers. Rather on the sidelines, but particularly interesting for hi-fi people, two companies were showing brand new standalone decoder units for NICAM stereo TV sound.

NICAM is the new digital stereo TV sound system which is already used for a small but worthwhile proportion of programmes and from a number of major transmitters, as the service is phased in. Depending on local NICAM availability, all you need to start receiving this major television improvement is some form of NICAM decoder.

One way is to buy a new and upmarket videocassette recorder or colour television, prices from £500 upwards. A cheaper alternative, usually better adapted to the task of integrating TV and hi-fi, is the standalone decoder.

The Arcam brand needs little or no introduction, though in this case the



Infinity: going upon trial with its new *Modulus* loudspeaker.

company has worked alongside electronics consultants Eldon Technology, which includes a number of ex-Ferguson television engineers, to come up with the *Delta 150* NICAM stereo TV tuner whose discreet full-width black styling matches Arcam's other hi-fi components.

Reflecting the £350 price tag, it's very much a full feature unit, remote controllable for volume and selection from eight preset TV channels, while the back bristles with inputs and outputs for the flexible integration of best quality hi-fi and TV/video signals. And even on the show stand, the sound quality was obviously superior to the run of the NICAM mill as built into normal TVs and VCRs.

Sachs Nicam is a brand new company, formed in order to manufacture and market its *AD9000* NICAM decoder unit. In complete contrast to the Arcam, this 'hair shirt' model simply takes its signal from an extra aerial spur feed and delivers a stereo audio output. Tuning is manual, with eight preset pushbuttons, but the best news is the very competitive £200 price tag.

Choice has already

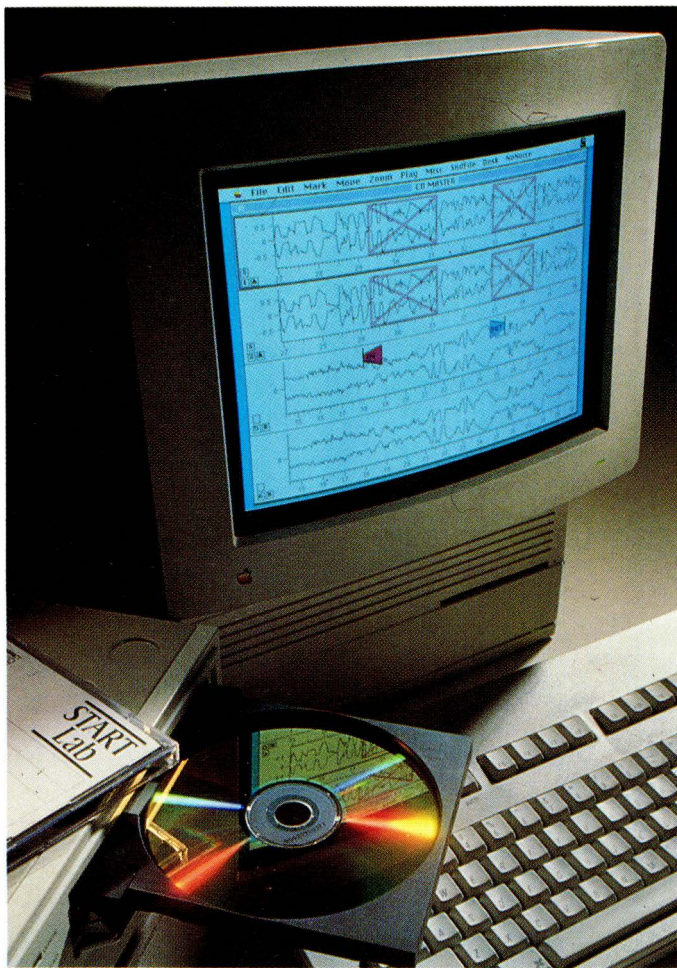
requested samples of both models, for review coverage in a September issue *A/V* supplement.

TECHNOLOGY

Pressing issue

Following *Choice's* recent article on recordable CD for the public – at Tape One Studios – another famous London recording house, Abbey Road has installed a similar system. (All Abbey Road staff are avid readers of *Choice* of course!) The system uses Sony write once/read many (WORM) discs made by Taiyo Yuden and up to 32 daisy-chained *CD Makers* developed by Sony. Digital editing, mixing and master preparation are performed on Macintosh computers using a programme developed by Sonic Solutions of San Francisco.

At £29 the blank discs cost a trifle more than the original 'fiver' estimate but this is of little importance to readers anyway – the Abbey Road system initially will only be used for limited runs of reference copies for 'industry professionals'. CD recorders – which use a laser to 'write' on a disc – are being kept well out of pirates' and bootleggers'



Recordable CD . . . is really expensive.

reach at £10,000 each. So the technology for CD-R is here, but Taiyo Yuden's hopes that machines would cost 'about £180 more than a conventional CD player' and would be available to the general public have been dashed by a record industry obsessed by copyright. This technological advance, which offers serious music lovers the most logical and sensible home recording alternative since the development of the compact cassette, is once again being kept at the bottom of lawyers' In Trays.

PRODUCTS

Roll up for a bargain

Hayden Labs, the distributor for Denon, Dual and Sennheiser, is introducing the Sherwood brand to the UK. Sherwood is the export brand name of Inkel of Korea, one of the largest producers of hi-fi outside Japan. Perhaps best known for having made the world's first FM stereo tuners in 1961, Sherwood has a solid reputation for 'good value' product and is one of the

fastest growing brands in America.

"Sherwood is an ideal addition to our range of hi-fi," says Peter Ratchford, General Manager for Sales & Marketing at Hayden Labs. "The product is incredible value and will complement Denon and Dual."

The line-up includes a full range of separates, midis and in-car components – at prices which can only be described as predatory. With a typical example being a £99.95 cassette deck called DS1135C offering soft touch controls, timer function, Dolby B/C and HX Pro, Hayden Labs has its competitors quaking in their

boots. Other components include the DD1032 twin tape deck with hi-speed dubbing (£89.95), DS7000R 3-head cassette deck with HX Pro and variable bias (£229.95) and a host of low-cost CD players and amplifiers too numerous to list here.

Ratchford again: "I am confident you will be surprised at the quality that Sherwood offers for the price."

Wot, no crossover?

Featuring four full-range drivers and no crossover, 7th Veil's *System IV* boasts unmatched performance capabilities. *System IV* is the first product of the new company. The loudspeaker uses four Bandor drive units designed by Doreen Jordan (ex Wharfedale), who, to continue with a favourite number, spent four years developing the Bandor. The driver comprises a 50mm light alloy cone which is gold anodised and weighs just two grams.

"The speed and transient response in the bass and mid frequencies are unmatched by any other moving coil loudspeaker", claims 7th Veil. Frequency response apparently extends to 24kHz which explains why the drivers are called 'full range'. No crossover or electronic equalisation is used, thereby cutting out any phase problems and minimising links in the signal path which might ultimately affect sound quality.

Cabinet construction has been designed to reduce panel resonance and internal standing waves and

reflections. A glass fibre mould has been sandwiched inside a MDF (medium density fibreboard) box with foam and sand used as damping material between the two. A matching tuned tubular steel stand designed to improve bass quality is also available.

The *System IV* is finished in black lacquer and should ideally be used near walls in a 'small to medium-sized room'. Price? £1,290 a pair plus £240 for the stands. Seventh Veil Ltd, Wellington, Shropshire. Tel: (0952) 222107.



System IV

The art of Xen

A new company based in Warwickshire has launched its first product – a surround sound processor. The Xen Audio ASP-60 promises full surround sound (using two pairs of loudspeakers to recreate a live atmosphere) from sources offering stereo sound as well as binaural, ambisonics and NICAM (TV) stereo. It can recreate the acoustics of the concert hall or the recording studio by



Sherwood players: taking rich ideas to poor pockets.

'restoring the ambient and reverberated sounds from the stereo signal and replaying them through the rear loudspeakers'. At a cost of £399 it is as yet only available through a couple of dealers. Xen Audio, PO Box 37, Warwick CV34 6QE. Tel: (0926) 493092.

Grand excellence

The famous GX6 line of cassette decks from Akai continues to evolve with the introduction of the GX65. The 3-head £299 pro-style deck lists high quality features such as the Super GX head, Dolby C, HX Pro and a dual capstan tape drive to maintain correct tape tension. There is an automatic tape type selection, and a variable bias control allows user 'tuning' to almost every type of tape on the market, Akai claims. It has an optional remote control.

A tuner to match

Musical Fidelity has a new audiophile tuner, the FM-only T1, which visually matches the B1 amplifier. Fully digital, the £249 T1 features eight station presets with the likes of auto seek and mono/stereo inter-station muting and a signal strength indicator, but refreshingly



B1 buddy: Musical Fidelity's new digital tuner.

few gimmicks. It is finished in matt black with grey and blue graphics to match the blue LCD.

Musical Fidelity also has two new loudspeakers, an upgraded version of the MC4 at £499 and the MC5 – a new design at £799. The MC5 uses a woofer and tweeter on top with two more bass units and another tweeter on the front baffle. A reflex port underneath helps the speakers deliver 'gut thumping bass' when they are mounted against a rear wall.

High tech damping

Sigma is a new British based company that has, with the aid of some substantial backing, taken a scientific approach to the damping and support of audio components. The company has developed a new plastic

specifically for isolating both individual pieces of hi-fi equipment such as turntables, CD players and amplifiers and the various components within them – ie PCBs.

The material called *V-damp* is available in little cartwheel-like feet for component support, and comes in different sizes to suit equipment according to its weight. The unusual shapes have been selected because of their isolating and damping properties, and we're told even the bright blue colour is related to its performance. The price for a set of four feet is £24.95.

The company will be releasing a range of hi-fi components in the near future which will incorporate *V-damp* and should be competitively priced. Watch this space. Sigma H-Fi Europe Ltd, 108 New Bond Street, London W1Y 9AA. Tel: (071) 499 9192.

Naim of an amp

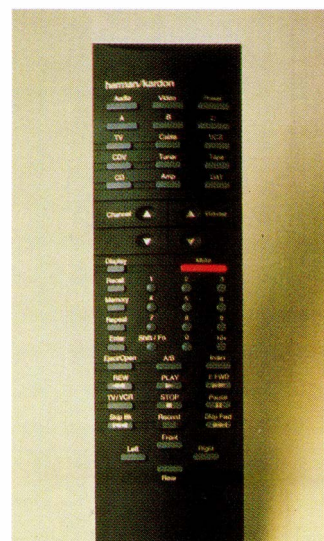
Naim has a new remote control preamplifier – the £4,249 NAC52 – which is remote control. What? Remote control? Naim promises the 'audio path is completely free from digital noise'. Read about it in *Statements* on page 32.

No passes

If you're the sort of person who finds remote control units crunching underfoot every time you leave the comfort of your armchair, then a new Harman/Kardon development could help you to a better life. The £100 *Mastermind* universal remote control unit is programmed to be compatible with any audio or video system

including video, TV, cable, VCR, CDV, tuners, tape machines, CD players and amplifiers as well as receivers, DAT machines and surround sound systems.

The *Mastermind* features a back-up battery to guard against memory loss. Its 53 keys give access to a staggering 4,000 options and the unit lists up to 100 IR cod formats. But H/K says it is logical and not difficult to use. *Mastermind* is slightly larger than other remote control units at 22.5cm long by 6cm wide.



"I-will-only-baffle-you-at-first" appeal from H/K.

Vinyl magistry

Such care has been taken with the design of the new Manticore *Magister* record deck that even the hardwood for the plinth is certified to be from unendangered forests. The £3,500 deck is the company's statement on vinyl reproduction on the high end; only 150 will be made and production will be spread over a three year period. The *Magister* comes with its own arm – an upgraded *Magician* wired with van den Hul cable. It delivers an equalised line level output and can therefore be connected directly through a passive volume control to power amplifiers – or active loudspeakers, say. The preamplifier and RIAA equalisation is built into the plinth and run by four separate external power



Surround sound . . . down to four knobs.



Tweak-it appeal from Akai.

supplies. The motor is also externally powered with a speed control button atop.

Natty points include an owner's video – individually produced as a handbook. Manticore says orders are already booked through to the autumn.

Devonshire Cream

Studio Acoustics, importer of Vandersteen loudspeakers to the UK, has just begun distributing the Music Reference range of valve amplifiers here. There are three Music Reference amps: the £800 RM4 headamp, £1,375 RM5 preamplifier, and £2,836 power amplifier. The range was expected during May. SA also expects a new Vandersteen loudspeaker – the Model 3 which retails for £2,300 – to arrive in June. Studio Acoustics, Newton Abbot, Devon. Tel: (0626) 67060.

Getting longer

TDK has introduced a 100 minute version of its SA-X Type II/chrome tape in response to the popularity of the new CD-friendly length. The tape costs £2.99 and TDK says no sound quality will be lost with the magnetic coating thickness being maintained – although the base has been thinned by a micrometre compared to the 90-minute version. TDK also has a new budget metal 110-minute tape on the market, the MA110 at £3.49. Both tapes are described as stronger than (the fairly elastic) 120-minute length tapes, and touted as suitable for in-car and personal use.



The longer playing... TDK.

Nene Valley upgrades

Nene Valley Audio – NVA – is increasing the prices of its upgrading service to take the new design of casework into account. Up until recently NVA was offering upgrades on the entire range of its equipment for the difference in price of the old and new equipment. Now NVA offers customers the new casework as well. For instance an old NVA A40 can be completely upgraded to a new A60 for £120. The offer does not apply to AP30 integrated amplifiers.

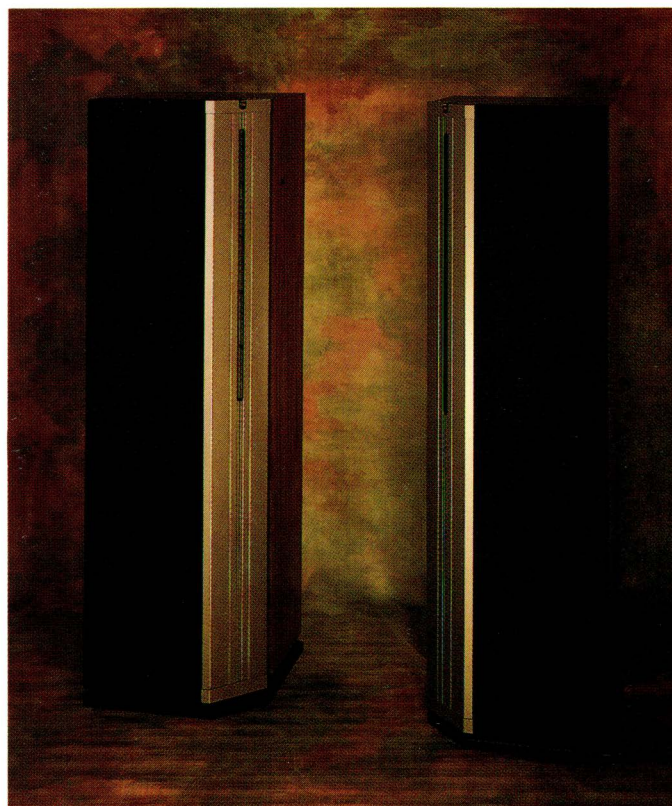
NVA, Hatley St George, Near Sandy, Bedfordshire. Tel: (0767) 50532.

TECHNOLOGY

Going Japanese

Loudspeaker manufacturer Celestion has won the Component of the Year Award for its 7000 loudspeaker from Japan's *Stereo Sound* magazine. The loudspeaker was picked from some 500 new products sold in Japan in 1989, by the magazine's editorial staff. Celestion also won the award for its *System 6000* in 1987 and the *SL700* in 1988... and won twice before as well!

Reflecting such success the company is currently increasing production capacity at its Ipswich factory with an additional 25,000 square feet of warehouse space being built. With a high percentage of Celestion speakers being sold overseas the company says it plans to



Celestion: A bit close for stereo but great for Stereo Sound.

increase production by 30 per cent, and has already increased its workforce by 50 per cent in the last 12 months.

BUSINESS

Yorkshire sweeter?

News this month that loudspeaker designer Phil Jones, founding member and director of Acoustic Energy (AE), had moved to Wharfedale plc, was followed by a press release from AE saying it had applied for a High Court injunction to prevent his going there.

As *Choice* went to press no injunction had been granted but a preliminary hearing of the case was set for Friday April 20.

Earlier, Jones, creator of all four models in AE's range, told *Choice* he already has responsibility for design of Wharfedale loudspeakers as well as Fane and McKenzie professional audio products, with the possible introduction of a new Leak amplifier range by the autumn.

And he still has a 33 per cent shareholding in Acoustic Energy but says: "I was very unhappy there and life is too short for that." However Steven Taylor, AE's managing director, described Jones' move as only 'purported employment' and

maintained the designer was still contractually tied to AE. AE was seeking an injunction to stop Jones having anything to do with Wharfedale and also against the latter to restrain the firm from employing him. The firm is making further claims for damages, accounts and payment of profits. "Morally it absolutely stinks," opined Taylor, "he's still a director here. In the near term future we'll continue regardless of him being here, but the matter is now the subject of litigation."

Coil exchange

Cartridge maker Ortofon is attracting a lot of interest in the dwindling stylus market with its innovative moving coil exchange scheme. The Danish-owned firm has for several years offered a 30 per cent discount on the cost of a new moving coil cartridge when customers traded in their existing Ortofon MC. Now owners of any moving coil can benefit from a UK-only scheme which offers them 20 per cent off the price of the entire Ortofon moving coil range. This now makes it cheaper to buy a 'cooking' moving coil cartridge and trade it in for a £200-plus discount on the cost of the MC3000/II (and several others). Lawrence Armstrong for Ortofon said the exclusive

scheme had been set up to encourage people to upgrade, and that the response had been superb.

The scheme is only open to owners of moving coil cartridges and the value of old cartridges will not be considered. "The old cartridges are just crushed; we're getting too many to test for resale," Armstrong said. Ortofon users still qualify for 30 per cent discounts. Details of dealers from Ortofon UK: Chalfont St Peter. Tel: (0753) 889949.

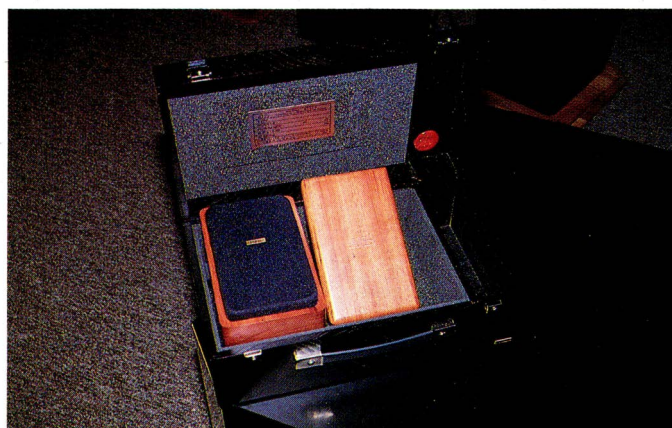
Bristol winners

The organisers of the Bristol Hi-Fi Show in February not only gave visitors a free copy of *Hi-Fi Choice*, they also offered the opportunity to win a Yamaha CDX-710 CD Player worth £230. Three CD players were won by Mark Young of Bristol, Lionel Tucker from Welwyn Garden City and Steve Giltron of Stroud. To enter for the draw show visitors merely had to pick up their free copy of *The World's Number One Guide to Buying Hi-Fi* and fill in a form with their name and address. Which wasn't bad value against the £2 entry ticket.

SHOW REPORT

And the show goes on . . .

Paris in the spring: unfortunately not the prelude to a love affair, but yet another in the world-wide round of hi-fi shows held in overheated suburban hotels.



The world's smallest hi-fi loudspeakers, perhaps . . .

As far as *Journées de la Haute Fidelité '90* was concerned, it was enlivened by the quirky inventiveness of the French high-end community.

The Paris show has grown from being the hi-fi poor cousin to the Earls Court-like 'Festival du Son', survived the collapse of the larger show, and is now growing once again to include Japanese exhibitors such as Denon and Kenwood. Next year sees the show moving to the Palais de Congrès exhibition centre – leaving the high-end where it started, in an overheated hotel.

New Far-Eastern products

Nakamichi moved into a new market area with a surprisingly downmarket-looking micro system consisting of two components, the *CPI* slot loading cassette deck/CD player plus the *CR1* mini receiver. Although neatly styled, the Taiwanese-made units are mildly disappointing for a manufacturer with Nakamichi's reputation.

Denon introduced the *NS1* remote control 'designer' system. Symptomatic of the

new Japanese interest in exporting their life-style products, the *NS1* features a slick looking 50wpc receiver, a drawer loading cassette deck and, of course, a 20-bit CD player. Although smooth looking, the styling is unadventurous in the light of competition from Yamaha and others.

Rotel, whose reputation has been built on great sounding integrated amps, showed a new passive preamp, the *RHC-100*, clearly designed for CD-based systems. Fitted with a meagre front panel count of an attenuator and record in/out switching control, it could be a strong contender if the construction, layout and componentry are up to Rotel's usual standards. The *RHC-100* and its partner, the *RHB-200* power amp were both finished in an attractive titanium finish, the current Far-Eastern attempt to wean the world off black.

Technics showed its latest *SL-PS70* MASH CD player (with a front panel legend claiming eight DACs!) while NAD released a number of additions to its *Monitor Series* including two tuner/preamps, a neglected but very sensible configuration.

The UK preference

With Paris being so close and 1992 in the air, it was disappointing to see so few UK manufacturers attending. Still, those that made the effort were rewarded with strong interest and some companies such as Roksan and Cambridge Audio were present as direct factory exhibitors, reflecting the growing European stature of the Paris show.

The rejuvenated Cambridge Audio company showed a new two-box CD

player based on existing *CD3*, the *CD3M/DAC3*. At around £1,000 the machine offers Cambridge's usual 16 x 16 configuration, in this instance using the highest Crown grade of Philips DACs plus dedicated power supplies and a passive volume control. Playing through the prototype *CAM1* speakers Cambridge was making some of the best sounds at the show (not just a patriotic comment). For introduction at the Penta Show later this year, Cambridge is preparing the *DAC One*, a full-fledged digital preamp using two Texas Instruments DSP chips, custom DACs, programmable filter software a la Wadia and volume and balance controls operating in the digital domain. Should be worth waiting for . . .

B&W showcased its *Concept 90*, an attempt to haul speaker aesthetic design into the late twentieth century. In a world of wooden boxes the designs looked inspired. The new miniature *Solids* are noteworthy for their moulded resin construction, radiused cabinet ends, built-in mounting tripods and power handling of 120W. In a short demonstration they sounded good, and in tune with requirements 'decoratif' can be ordered in four contrast colours with an interchangeable coloured woofer surround. These two new speakers plus the sensational saxophone-like *Emphasis* showed the world that British speakers don't have to be teak boxes.

French high-end

Even in the xenophobic UK, manufacturers such as Jadis and Micromega are now rated as true competition to local and US products. In direct contrast to many UK designers and consumers, the French place a lot of importance on visual style. On the whole the results look and sound good. However, a few OTT products always sneak in . . .

Audioanalyse demonstrated a range of pure Class A power amps topped by the *A90*, a dual mono 200-watter, necessarily fitted with monster heat-sinks posing as



Micromega's Trio 1-bit DAC and transport.

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space heaters. Much of the internal wiring is with copper bus bars and current delivery can reach a high of 90A. Beware of welded woofers! Most of its product is relatively expensive but, conscious of 1992 and a wider market, Audioanalyse is developing a high performance Class A/B integrated amp to compete with the Arcams and Audiolabs across Europe. The company is also working with Stax in Japan to produce modified Stax *Quattro* CD players using Audioanalyse Class A output stages, possibly a potent combination.

Micromega make CD players that some of the UK's specialist dealers rate above all else digital, and even the analogue freaks recognise the *Digital Duo* as something special. Possibly because, like all four current Micromega players, the *Duo* is top loading. With a dust cover to lift, a sub-chassis turntable to bounce and a disc clamp to fiddle with, it reminds me of something – but I can't remember what. The company is in the middle of making a wholesale changeover to 'bitstream' DACs, the designers feeling that when properly implemented bitstream is a clear musical improvement over existing technology.

The new Micromega *Trio* consists of a separate suspended transport, a differential bitstream DAC and a five way power supply, stacked vertically with the whole assembly being 'mechanically earthed' via



B&W's stylish new Solid high powered miniature.

spikes and rods set into the aluminium cases. The technical details could take up the rest of this article; suffice to say that all the parts are of the highest quality and great care has been taken over all aspects of circuit layout and earthing. Definitely worth an audition when it arrives in the UK.

French quirky

The French market seems to throw up at least as many little companies as does the UK, and for some reason France supports one of the largest concentrations of valve amp manufacturers in the world. Few appear to come to the UK although they are exported to Germany, Switzerland and other luxury markets.

The prototype of a wonderfully strange amp was shown by a small company called Selac. Designed by the owner, an ex naval engineer, the valve amp features small brass portholes at the front of the fascia and the volume control will be a miniature Shadburn ships telegraph! Full speed ahead.

Laboratoire JC Verdier makes a range of battleship valve gear and the model

250/275 which tops the range is a 50wpc power amp accurately described as 'le sixteen valve', a wonderful sight on a dark night.

The French market also produces an amazing range of loudspeaker driver designs. Two companies in particular stand out: Espace for using two coils and two magnets to drive one 'figure-of-eight' diaphragm; Rehdeko, designed by musician Weber Rehde, for mounting saucer shaped tweeter cones on a coaxial piston, centred in four inch oval drivers. The latter claim a response to 40kHz and output up to 100kHz plus a sensitivity for the system of 102dB. Unfortunately a poor room prevented any serious listening.

AESD took over the hotel theatre to demonstrate its high power active monitors. Looming very Dalek-ish, the larger models sounded clear and powerful and apparently have been ordered by Queen's producer as near field monitors for his new studio.

In complete contrast Audio Style presented 'the worlds smallest hi-fi loudspeakers' at around £800 a pair. Exquisitely made, each tiny speaker is carved out of one block of wood and the pair comes complete in wooden travelling case, with a matching subwoofer available for moving air when used at home. A boron dome tweeter and carbon/Teflon woofer combine to give 50watts power handling, a pretty flat response from 100Hz to 15kHz, and a sound that belies the size if not the price.

I've started saving.

Show report and photographs: Rob Follis.

IN BRIEF

Aston Audio is holding a Roksan music evening at the Stanneylands Hotel, in Wilmslow, Cheshire on June 27 at 8.30pm. Free tickets from Aston Audio. Tel: (0625) 582704.

Twist Acoustics' stylish £450 omni-directional loudspeaker, the *Puccini*, is available from The Cornflake Shop in Windmill Street, London W1.

Harman/Kardon says it expects its first Dolby S cassette decks this autumn. Touted as an equivalent sounding system to DAT, Dolby S promises state of the art noise reduction on compact cassette. But it's not for cheap equipment; the decks will be priced around £400 and £700.

Hi-Fi salon and purveyor of excellence audio DIN, in Melcomb Street, London NW1, has closed to be replaced by a fast food restaurant.


July's British Music Fair, at Olympia in London, will feature hi-fi equipment for the first time – alongside musical instruments and recording technology – in an effort to become all things musical under one roof.

Northwood, Middlesex has a new hi-fi shop. Hi-Fi Exchange can be found at 126 Pinner Road, and is managed by Graham Farmer. For demonstrations the shop can be contacted on (09274) 20877.

Real hi-fi is now available in Banbury at a new shop called *Overture*, 3 Church Lane, Banbury, Oxon OX16 8LR. Tel: (0295) 272158. Run by two ex-Absolute Sound & Video directors, *Overture* stocks the likes of Linn, Arcam, Quad, Creek, Marantz, Mission/Cyrus, Dual, Denon and Yamaha.



Beard's 12X oversampling DAC supports a Teac transport.

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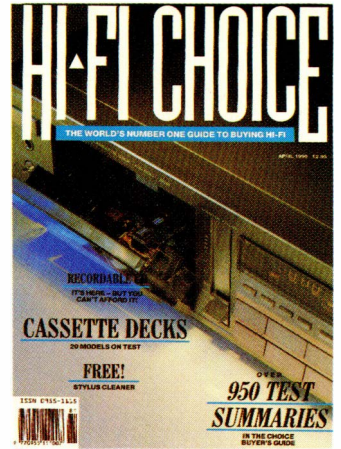
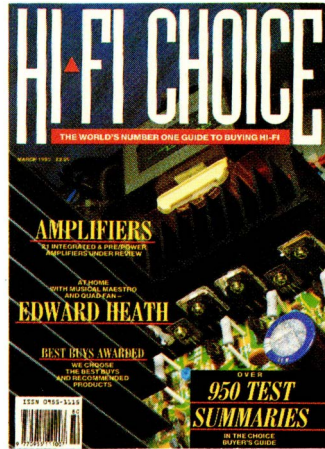
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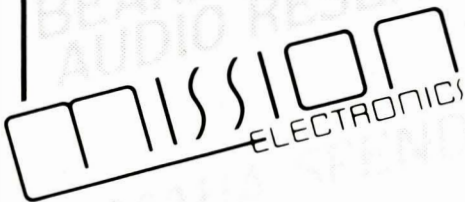
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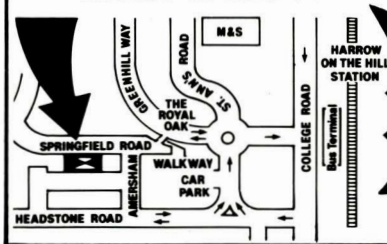
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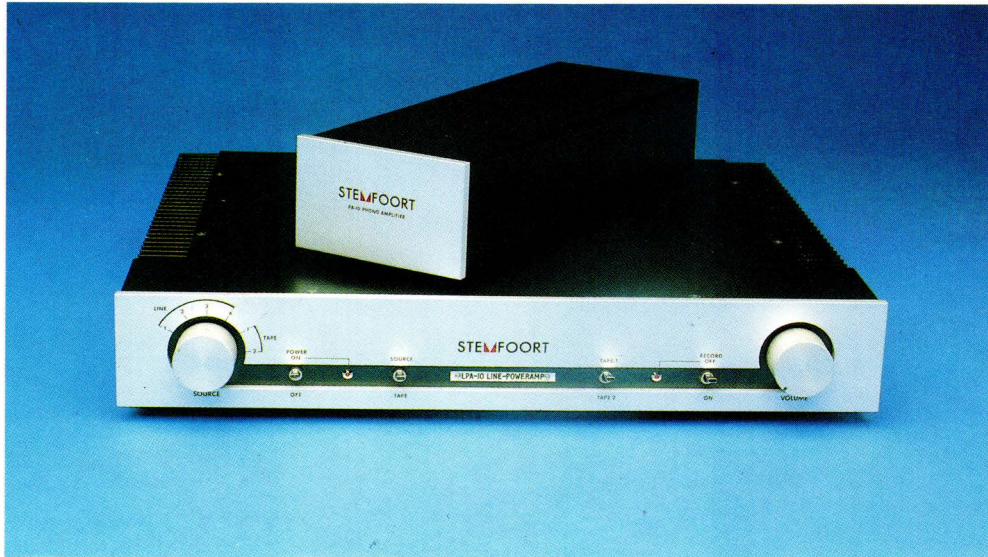
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Choice Sessions

Things we hear . . . This month, how we tested YFERE cables and came up trumps; SD Acoustics' SD1 loudspeaker; Yorkshire-built amplifiers called Stemfoort which sound great and look even better.



What's in a name?

Stan Vincent is impressed with the sound of the gorgeous-looking Stemfoort LPA-10 line-level amplifier and partnering PA-10 phono stage.

No, it's not an obscure word from *Call My Bluff*. Stemfoort is the name given to a range of amplifiers recently introduced to the UK from Holland.

While not obscure, Stemfoort is certainly esoteric. The LPA-10 'line power amp' (an integrated amp with no phono stage) is priced at £1,650 because of the high level of design and engineering that have gone into its manufacture. And even its partnering PA-10 phono cartridge preamp bears a price tag of £350. These components are not for beginners.

The Dutch designer of the Stemfoort components is a modest chap, preferring to keep his identity secret. Nonetheless he's in a good position to deal with the business of reproducing music, having recorded a good deal of it himself. Using equipment either designed, built or enhanced by his own fair hands, this man has recorded classical music and jazz for a number of European record labels. A recording of pianist Geoffrey Madge, playing the complete works of Ferruccio Busoni, won the Edison award in 1988.

All in all, the Stemfoort pedigree is impressive. A long-term association between Stemfoort and British manufacturers J E Sugden & Co has made it

Stemfoort LPA-10 with PA-10 phono amplifier: they're not inexpensive, but certainly look the part.

possible for Stemfoort products to become available on an international basis. Electronics designs originated in Holland are made flesh in Sugden's West Yorkshire works. Every unit is assembled by hand to ensure the reliability and constructional quality that befit a product of this calibre.

Externally, the Stemfoort units exude an air of restrained but tangible opulence, and the aesthetics of the LPA-10's 6mm thick aluminium front panel are reassuringly purposeful. On the right of the fascia there's a stepped ALPS potentiometer, while on the left sits a six-position input selector. The latter selects between four line sources, and two tape decks. To keep all signal paths as short as possible, the LPA-10 uses a logic-operated relay circuit to switch the input signals.

Between the front panel's two rotary controls there are four chrome toggle switches. Three of these are concerned with tape decks. (tape-to-tape dubbing is easily facilitated) while the fourth switch turns the LPA-10 on and off. On the rear there are RCA/phono sockets for all sources and the two tape loops. Line inputs 'one' and 'two' have gold plated connectors. In addition there's a preamp output, and a main amp input. Main and preamplifier can be separated by operating a switch inside the unit. The PA-10

phono preamp, which accepts both MM and MC cartridges, takes its DC current supply from a three-pin DIN socket on the rear of the LPA-10.

A key feature of the LPA-10 and PA-10 is the fact that their amplifier circuits are both DC-coupled. This circuit topology obviates the need for large numbers of coupling capacitors, putting the Stemfoort components above a petty debate over capacitor types. The LPA-10's circuit layouts are symmetrical, with individual power supplies provided for both line preamp and the power amplifier stages. High-grade power supply capacitors are used, to a total value of 59,000µF. The unit's output can be loaded down to 2ohm without complaint, and a combination of thermal, current and fuse protection devices are employed to ensure the LPA-10 is near bomb-proof. The manufacturers claim an output power of 150W into 8ohm and 200W into 4ohm.

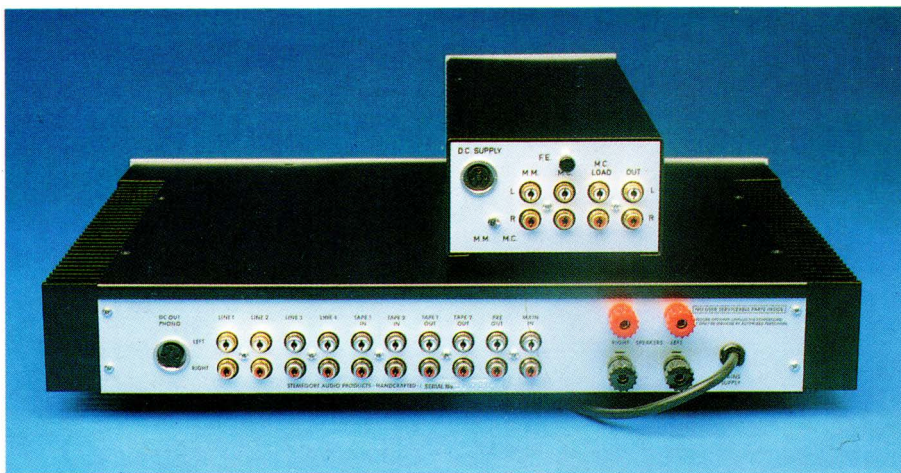
Listening to the LPA-10 was a revelatory experience, to say the least. Time after time I was struck by the sheer amount of musical information that it resolved, even from albums that previously I'd thought I knew well, such as Peter Gabriel's *So* and the Cowboy Junkies' *Trinity Session*. It was as though a muslin screen had been pulled from in front of each disc's performers, with a lens brought to focus on each piece's fine details. With such well-controlled power on tap, the LPA-10 allowed performances to grow and grow until they

seemed almost to be bursting out of the Snell *Type K* speakers that I used for near-field listening. Later auditioning with a pair of JBL *XPL200* enclosures, in a much larger room, gave the amps much more room for manoeuvre; the musical images that they produced were three-dimensional in every sense of the word, offering an open invitation to walk in and be part of each performance.

One reason for the impressive nature of the *LPA-10*'s sound is, I'm sure, its effortless and consummate handling of bass frequencies. Individual characters of different bass instruments were always preserved, from the sinuous fabric of an electric string instrument to the suffocating power of keyboard bass figures. The competent reproduction of subtle low-frequency ambient information made an equal contribution to the *LPA-10*'s commanding performance.

As a concept the *LPA-10* must be intended primarily for those listeners whose main sources are line-level ones. That includes CD players, tuners, and tape decks of all shape and size, from cassette to DAT. In providing a line-level amplifier, the Stemfoort units must have at least one eye trained upon a near vinyl-free future. Nonetheless, there are still a good many LPs and turntables in circulation, and for households that contain them the *PA-10* offers a visually and sonically co-ordinated way of connecting up to its more substantial relative, at a relatively modest price. Such is the transparency of the *LPA-10*, I'm sure that vinyl freaks would be repaid by substituting even more expensive phono preamplification for the *PA-10*.

The *LPA-10* is a thoroughbred among amplifiers. Its charms may not come cheap, but you only get what you pay for, and who's to put a price on beautiful music? Those who care about such matters will find the wherewithal. An early audition is recommended.



Two tape loops, and an input for every occasion . . .

Fingers Crossed

A few months ago we made YFERE cables available to readers by mail order, based solely on the fact that JK and JB thought they sounded pretty good for the money. Well, it transpires they measure pretty well in the test lab too. John Bamford unfolds the sequence of events . . .

Spend several months reading a wide selection of hi-fi magazines and you'll soon discover that it's not uncommon for hi-fi reviewers to vehemently disagree with one another. I say this as a preamble to a story which begins some months ago, when our publisher suggested it might be a nice idea to make some audio accessories available to *Choice* readers by mail order . . .

Around this time Quantum Audio's boss, John Carrick, had just begun touting some new Japanese cables with the unlikely brand name YFERE (pronounced 'eee...fur') which Jason Kennedy and I duly tried in our systems. Although not as transparent-sounding as the horribly expensive, cost-no-object cables we tend to have lying around at

home (it's a hard life, etc, etc . . .), we both came to similar conclusions: these cables sounded good, they were properly constructed and nicely finished, and seemed like good value for money all round.

One thing led to another, and soon we (that is, *Hi-Fi Choice*) came to an agreement with Quantum Audio to make YFERE cables – and, later, Furukawa speaker cables too – available as mail order items to *Choice* readers.

We pride ourselves on being fair and even-handed at *Choice*. Consequently, although in the meantime one or two other hi-fi magazines had published articles about YFERE and Furukawa cables, we chose to keep silent. The truth of the matter was we didn't want to lay ourselves open to criticism that we were promoting these cables simply in order to sell more of them.

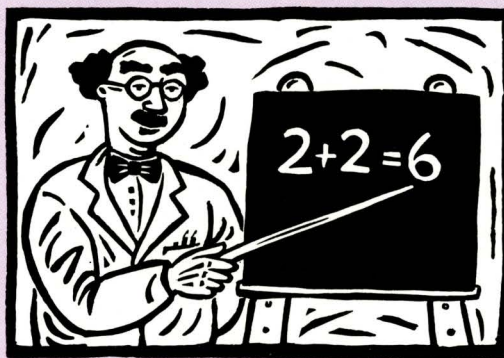
Several months passed, until we began to plan this month's *Cables, tables & speaker stands* supplement. At which point JK and I swallowed hard, crossed our fingers, and arranged for our technical reviewer, Paul Miller, to give some of the aforementioned cables a thorough workout in his test lab. Had Paul come to the conclusion that these wires were a load of old rubbish we'd have had egg all over our editorial faces, and we'd have had to hurriedly think of something else to put on page 99 this month! But it was a risk we had to take, because if we hadn't properly tested the cables many of you would doubtless have noticed the fact and wondered what we were trying to hide.

Jason and I need not have worried. As he was completing the test project, Paul Miller 'phoned the office one day to report on his progress. "Hey, this weirdly-named YFERE stuff is really quite superb for the money," said PM. "You should give it a try."

"Er, we already have Paul," said Jason. "In fact, if you have a look through the past few issues of *Choice* you'll see we've had the cables on special



YFERE cables: they're better than we thought!



For a while there our boffins were giving us cause for concern

Two, plus two, equals...six? Oh no, we thought, coming up with wizard hi-fi products time after time has finally taken its toll on our boffins' precious grey matter. Then again, they do say that genius is but a short jog from insanity.

'No, no, no', said Mad Mike our chief boffin, 'it's you who's got it wrong, not us'. (We hoped he wouldn't get violent). 'You see we've invented two brand new CD players...a mid-price model to join the Alpha range, and the transport only Delta 170.

'The Alpha incorporates a whole range of features normally associated only with much more expensive machines (such as twin power transformers to minimise sound-degrading internal interference) and a robust aluminium chassis. There's 20 track programming and an optional remote control. We reckon its sound quality is unbeatable in its price range; just like our universally commended Alpha amp.

'The Delta 170 is Britain's first CD transport. Whereas a normal CD player reads the digital data from the disc then converts it into an analogue signal, the Delta 170 simply does the first part...and does it with breathtaking accuracy. You need a separate digital to analogue converter (such as our award-reaping Black Box) to turn the transport's output (coaxial or optical!) into an amplifier-ready signal. To put it another way, the Delta 170 is dedicated purely to providing a digital signal of the highest possible integrity. It's a machine only for the most demanding audiophile.

'With our two existing units, the Delta 70.2 and the Black Box, there's now a choice of six configurations: Alpha CD alone, Alpha CD plus Black Box, Delta alone, Delta plus Black Box, 170 transport plus Black Box, and Black Box plus any other player with digital output.

'In other words, Arcam now offers a range of British CD players compatible with every audiophile's budget. So you see, two plus two equals six. Easy.'

Thank goodness for that, we sighed. One lot of men in white coats around our design department is quite enough, thank you.

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offer to readers via mail order."

I kid you not, but our reviewer hadn't even noticed! And in the meantime I'm rather content that, for once at least, a few of us reviewers have found something we all agree on.

Who'll get lucky?

John Bamford listens to the new version of SD Acoustics' SD1 loudspeaker. Did you enter the competition in last month's Choice to win a pair?

In last month's issue we ran a competition giving *Choice* readers the chance to win a pair of the latest *SD1* loudspeakers made by SD Acoustics of south London. The closing date for the competition has been set at 8th June, so, assuming you've bought this edition of *Choice* hot off the news-stand, there's still plenty of time for you to refer to last month's issue and try out your luck.

Many column inches have been written in hi-fi magazines over the years describing the uncompromising performance of the *SD1* loudspeaker. However, the *SD1* up for grabs in our competition – and the one I recently had the opportunity to audition – is a significantly different breed of SD loudspeaker. In fact I'm surprised the company is still calling it an *SD1*, because it's quite different to the *SD1* which many of you will have seen and heard on your hi-fi travels. In addition to new (and much improved) cabinetwork, which is now built in the UK by the same wood-working firm which makes cabinets for the likes of TDL loudspeakers, this *SD1* justifiably could be described as being less like the old *SD1* and more like a grown up version of the company's smaller *OBS* model. Gone is the old 10inch woofer, in favour of two 155mm drivers *a la SD Ribbon* (see *Choice* No 81), which means that the same bass driver is now being employed in all three of SD Acoustics' floorstanding models. (*OBS*, of course, uses just one of these drivers, not two.)

Like *OBS*, the *SD1* has its mid and treble drivers mounted in an open baffle arrangement, the difference being that *SD1* employs a ribbon tweeter. The Xinch midrange units are identical, however – and to see how refined a unit this is you need only to refer to the review of the *OBS* in last month's group loudspeaker test. The outcome of all this reworking is a much more relaxed-sounding *SD1*, yet in my opinion it has lost none of its 'speed' and immediacy. I put it to designer Steen Doessing that the new *SD1* sounded more inviting and 'warmer'. "I wouldn't say it was warm-



SD Acoustics' imposing SD1, top prize in our competition in last month's issue. It's as sweet as they come.

er," he replied, "it's simply less coloured and more accurate." Well, what should I have expected him to say?

As the *OBS* costs a not insubstantial £795 (per pair), in which areas of sound reproduction is the *SD1* an upgrade, to justify the £1,295 price tag? First, to my ears the ribbon tweeter is a faster and more delicate transducer than the metal dome used in the *OBS*. High frequencies sound less 'shut in'; the sound simply breathes more freely. More important than just the cosmetics of the sound, however, is the enlarged scale of the sound picture produced by the *SD1*. Standing 125cm tall, and with truly breathtaking imaging properties, *SD1* is capable of 'true to life' image height where musicians begin to appear almost life size rather than just three feet tall! This said, put a loudspeaker like *SD1* on the end of your system and you'll soon

hear what your electronics are really doing to the music signal . . .

Where the old-style *SD1* was sometimes criticised for being a touch overbearing and 'strident' – even later versions, which were far tamer in the extreme treble than *SD1*s of, say, three years ago – this new model is nothing of the sort. Consequently, in addition to being a more refined and capable loudspeaker overall, it should also prove to be more tolerant of less-than-ideal positioning in the listening room and should integrate better in small rooms where near-field monitoring is the only option available. It possesses the kind of 'sweetness' I associate with the US Vandersteens, and some expensive electrostatics.

And to think that one lucky *Choice* reader is going to run off with a pair for free!

House of Lord's Hi-Fi

An 'audiophile' since prep school days Lord Grey Gowrie is now President of the Federation of British Audio. Hi-fi, he tells Dan Houston, is his only indulgence. Photography by Chris Richardson.

“There should be something called Audio Anonymous for people like me,” says the 50-year-old ex Arts Minister, “I am not a guy with a great deal of money – I drive an eight-year-old car – and this (his gesture takes in a corner of his library filled with hi-fi and records) is my hobby. “Though I’d say I was a music freak rather than a techno freak.”

He may be right, but Greystiel Gowrie – The Right Honourable The Earl of Gowrie PC – now owns a ‘super’ system which just reeks both of technology and money, and has quite enough buttons and dials to satisfy the most gadget-hungry audiophile.

We are in his Kensington town house, to which he moved from Covent Garden 18 months ago. The house has been extensively refurbished by his wife Adelheid; several rooms have been removed to create a light and airy first floor ‘library’ with a gallery and huge skylight, which is effectively their living-room. A walk-through second kitchen, bedroom and bathroom have been tucked behind the library’s wall of books giving the whole area a more intimate ‘family’ feel. The extensive record collection (almost 3,000 Lps) is dominated by 30’s, 40’s and 50’s jazz, with an increasing emphasis on chamber and opera music, but surprisingly includes albums



by the Sex Pistols.

Moving home presented problems in terms of hi-fi for Lord Gowrie, although he describes his new house as ‘incredibly quiet’. “This is the first time in my life I have had to cope with a large room, the ceiling is 28 feet high” he says. Consequently it was time to rethink the established Linn/Naim equipment he was used to. “I’d never had a better jazz playing system than the ordinary two-stroke Linn and Naim set-up,” he says, “but I noticed I was playing less classical music on it and that is what I like best. This is an attempt to get a system that would do both.”

There began a nine-month trial of hi-fi, both here and at his home in the Welsh borders. The dealer chosen to supply and demonstrate the new “gramophone – I don’t terribly like the word hi-fi” was Doug Brady. The Earl describes him as ‘delightful and patient’ (and is honestly grateful for being allowed to make up his

Lord Gowrie: Would find it difficult to come off hi-fi.





mind in a way inconceivable to Tottenham Court Road).

"The system has been chosen with two priorities in mind – the size of the room and the need to cope with both jazz and classical music. The best classical system I ever heard was a Linn with Mission arm and cartridge and TVA valve amplifiers through Quads. That was in the early '70s at Noel Cloney's shop in Ireland."

The approach was to try to recreate the Quad sound in this room but Grey Gowrie admits that the environment is too demanding for Quad loudspeakers. "I read your magazine and John Chichester was in it," he reveals. "I know John (The Earl of Chichester) and he kindly let me listen to his system for a day."

The Apogee *Caliper* ribbon loudspeakers are the most obvious Chichester influence here but he has settled for a less American system – with a top notch

Apogee's ribbons set off Rinaldo de Juan's truncated pyramid (above).



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Denon CD player, equalised by using Cello's *Palette*.

The latter is described as having the capability to get CD sounding 'about 80 per cent' as good as vinyl – which is no small praise from a committed audiophile with no audio equivalent of Betty Ford's clinic to turn to. Although not really to his taste Gowrie had to have a CD player because of the disappearance of the classical repertoire on vinyl. He is waiting for the definitive affordable British CD player to arrive: "I'm reading about Wadia and Theta (American state-of-the-art digital to analogue converters) and digital can get better, I use a Deltac PDM and Arcam combination in the country. I admire Ivor Tiefunbrun (of Linn Products) and I know he has a good mind. I hope he dumps his obsession with analogue and that he and his band of tweekers help us to get a pleasant sounding digital system which isn't going to cost the earth."

Gowrie now has a system he describes as: "very natural, very clear and very nice. In fact very close to the old Quad *ESL 63* which is what we're all aiming for somehow. I'm very happy with it except that I do want to get the CD player sounding as good as the old stuff."

While as FBA chairman he hopes for a British made CD player, our host doesn't feel committed to buying British products. "You should buy what you think is the best," he says. The logic would appeal to Tiefunbrun; in 1980 as Minister of Employment (under Jim Prior) Lord Gowrie held up Linn Products and Ivor Tiefunbrun as "one of the few people who was actually adding to his workforce and doing something right."



With a perspective on the development of recorded sound Grey Gowrie prefers to call his system (below) a gramophone.

"I bought one of his decks and I visited the factory and found he was exporting like crazy – you must remember that at that time people were saying there wouldn't be three people employed in the UK in 20 minutes' time. But one saw that Britain could become an industrial country again if it made things which are

governed by one criterion: Do people want to buy them? That was an impressive lesson and we became friends . . . although being a friend of Ivor's is quite a strain when you're in government because you get 20-page letters of criticism every week. He's pretty right wing . . . I introduced him to Mrs Thatcher and I think he's the only person who ever silenced her!"

Since leaving his position in Mrs Thatcher's government in 1985 under a flurry of headlines publicising his 'not being able to live on a £33,000 salary' Grey Gowrie has been Sotheby's Chairman. There he has had the responsibility (some might say irresponsibility) for turning the discarded relics of pop stars into collectable art with his Rock and Roll Memorabilia sales and Elton John's cash-raising 'spring clean'. He's also looking forward to the day when the likes of an original McIntosh valve amplifier comes under the hammer.

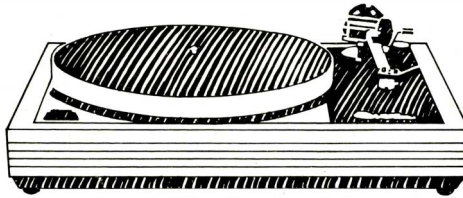
The job at Sotheby's follows a career as a lecturer at Buffalo, Harvard and London universities in the 1960s and later working as a junior minister in the Department of Employment for both Mr Heath's and Mrs Thatcher's administrations, using his position as a Privy Counsellor in the House of Lords as economic spokesman for the government.

"I had agreed to work for Mrs Thatcher for five years and was going to leave when she offered me the position as Arts Minister," he remembers. "That



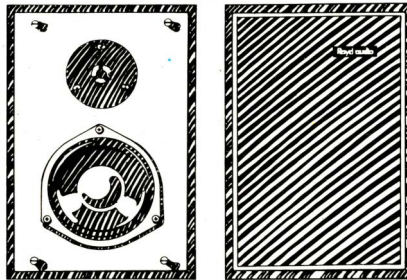
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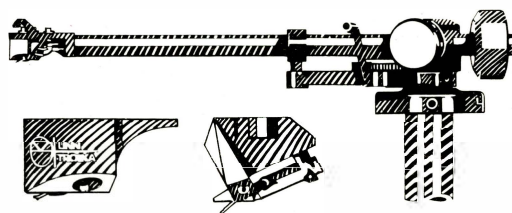


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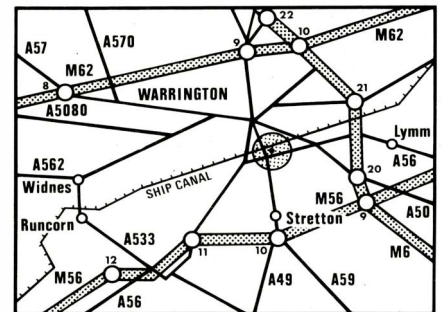


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was a fascinating job and too exciting to miss. But after nearly seven years in government I was getting into debt and so I asked to be relieved."

The Linn *Sondek* wasn't Lord Gowrie's first acquisition in hi-fi. He remembers his childhood in Ireland being brought up by grandparents, listening to Caruso 78s on a radiogram and admiring the sound quality of the wooden needles used then. He also had a Grundig radio but laments the populism on the airwaves now. "We had an enormous cultural education; there were plays, poetry, talks and music, and we had a wider cultural range then which wasn't actually elitist. The Third Programme was resolutely high-brow but there is nothing wrong with cultural snobbery; it's how we *all* pull ourselves up by our bootstraps. I don't think the BBC should have the power to raise taxes for pop music which advertisers can and do pay for anyway."

Even life at Eton was enhanced when a friend wired up a hidden gramophone player to play through the radio in his room. "Radios were allowed but record players weren't," he told me, "They never found out. I could play Haydn but I couldn't play jazz – because that wasn't played on the radio."

Grey Gowrie was a teenager when the long playing record, and indeed the vinyl single, were introduced. Unfortunately his teens also coincided with the end of the jazz era as a popular form of dance music, but he collected records by saxophone musicians – "side men of the big bands" which exploited the new freedom for improvisation offered by the LP. He also got into bebop music which was spawned with the longer playing format. (These, together with the childhood influence of classical music are still his favourite types of music.)

His first proper system was in mono. "It was an extremely good system I am sure," he says, "and I don't look at youth in a haze of nostalgia. I had a big mono corner loudspeaker to which I added a tweeter. I powered it with a Leak amplifier and a Connoisseur turntable with a Garrard arm. A friend of mine had a Quad system which he still uses. And I was staggered, when I listened to it with him the other day, how good mono could sound. Of course valve amps are back in fashion now."

We've come a long way since then. But the aim – that of recreating the musical experience – is essentially the same. Grey Gowrie says he gave up playing piano at the age of 16 and has since been strictly a 'gramophone player'. "But I do have the philosophy that one should



LPs are preferred but are sadly unavailable for many classical releases.

start by learning to play," he says and cites frequent attendance at the opera, as well as getting down to black R'n'B in wilder Buffalo days, as giving familiarity with the original.

And one gets the feeling that music is even more important than art. "I had to sell a very cherished picture to buy my gramophone so there was *some* pain and grief involved," he laments. There do seem to be quite a lot of pictures left though. He is lucky in being one of the few people who have actually touched Mozart's music (as opposed to the millions who have been touched by it). "One day at Sotheby's this young chap came in to my office with nine handwritten Mozart symphonies. You could tell they were by him from the strokes of my pen, the hair stood up on the back of my

neck. Anyway how do you value that?! We put a tag of £750,000 on them but in the end they made £2.5m."

The System

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Marantz CDA94 DAC	£800
Denon DCD-3300 CD player	n/a
Cello Audio Palette 'equaliser'	£11,775
Audio Research SP11 preamp	n/a
Musical Fidelity A370 power	£2,399
Apogee Caliper loudspeakers	£3,150

System supplied and installed by: Doug Brady Hi-Fi, 18 Monmouth Street, London WC2H 9HB. Tel: (071) 379 4010.



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SUGGESTED SYSTEMS

The suggested systems priced below all include the popular Dual CS503/1 turntable, but an alternative turntable or CD player is available at extra cost. Please see "OPTIONS" list below for further details.

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Rotel RA840BX4	379.95	389.95	409.95	419.95	429.95	459.95	499.95	499.95
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OPTIONS

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- Denon DCD920 add £80
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- Marantz CD50SE add £180
- Marantz CD60 add £230
- Marantz CD60SE add £70
- Nad 5320 add £100
- Nad 5325

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- Philips CD640 add £240
- Philips CD610 add £50
- Philips CD620 add £80
- Yamaha CDX630 add £80
- Yamaha CDX710 add £110
- Yamaha CDX810 add £170
- Rotel RCD855 add £130
- Rotel RCD865 add £180
- Sony CDP770 add £70
- Technics SLP202 add £40
- Technics SLP222 add £80
- Technics SLP333 add £120
- Technics SLP555 add £170

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- Dual CS503-2 add £20
- Dual CS505-3 add £25
- Dual CS430 deduct £20
- AR EB 101 add £100
- Nad 5120 add £100
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- Revolver Rebel add £150
- Systemdek + moth add £125
- Systemdek inc. arm add £30
- Ariston 'Q' Deck add £70
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Statements

*Monitoring what's happening on the high-end scene . . .
This month, Malcolm Steward gets his hands on
Naim Audio's long-awaited NAC52 preamplifier and
Jason Kennedy auditions a new line in electronics
from T&R Industries.*

The Naim NAC52 preamplifier has taken a long time to mature into its final production guise. It's only when one examines the product – and listens to it – that one realises why. To call it a complex and significant development is to be guilty of grossly understating what Naim has achieved. The design brief for the project was to build a preamplifier with a totally uncompromised sound quality, yet to incorporate into it a degree of flexibility and user friendliness rarely seen in the esoteric arena. It gives the kind of sound one associates with hair-shirt, minimalist preamps – although I haven't heard one that even approaches its quality – yet configuring and using the amplifier is child's play. It even has full remote control . . .

The NAC52 is a two-box design. The half with the buttons on is the preamp proper, and the half that makes one's temples bulge when lifting it is its associated NAC52PS power supply. Thus the

abbreviation '52 indicates the combination of these two items; neither can be used without the other. The '52 is the first Naim preamp that cannot be powered by the on-board supplies built into the company's smaller power amplifiers, the NAP90 and NAP140. Neither can the '52's power supply be used to upgrade any of the existing preamps, like the NAC62 or '72, as it contains the equivalent of six of the HiCap supplies used with those cheaper models within its casing . . . and more.

The reason for this apparent surfeit of power, handed out by a 530VA toroidal transformer through twelve, selected regulators, becomes clear with a little mathematics. The '52 has six audio inputs, each of which has two channels. Yes, each side of each input has its own individual regulated power supply! Further investigation reveals another transformer, this time smaller, lurking in the shadow of the massive analogue

device. This is to keep the digital side of the preamp fully isolated from the audio circuits. The '52 is logic controlled but in a special way. The digital circuitry within the preamp is only activated for the duration of control signals; when these are not present nothing of a digital nature occurs within the preamp, thereby avoiding any possible interference with the analogue circuits. In fact, there is no audible evidence of interference with this amplifier that I can detect – unlike other remote controlled amps and devices I have played with.

All the signals between the two boxes are handled by two cables; a regular 5-pin Naim SNAIC interconnect cable carries the digital power, whilst a sixteen-way lead connects the analogue stages to their juice. This takes the audio output away from the preamp to a pair of sockets on the power supply whence it travels to the next component in the chain, be that a power amplifier or electronic crossover.

The preamp is, as I've intimated, fully dual mono in construction. The bulk of its circuitry is housed on two large printed circuit 'mother' boards. Attached to these are smaller, plug-in boards designed to configure the input stages. One set, for example, is used to tailor the phono input to suit a variety of cartridges. Further boards allow line level stages to be altered from fixed to adjustable sensitivity. In fact, if you've deserted vinyl altogether, these boards can be used to adapt the input normally designated for phono use (Input 1) to

line level duties. This input is intended primarily for use with a turntable, however, as it is wired to BNC sockets, Naim's preferred termination for tonearm cables. The rest of the socketry is custom locking DIN. The preamp's second input is duplicated, the auxiliary socket having a power connection. This means that users with more than six source components can expand the '52's input capabilities by running, say, a '62 or '72 preamp into the second input, with the '52 supplying its power.

Its fascia remains tidy and uncluttered despite the range of facilities. Volume and balance controls are rotaries, capable of operation either manually or via the remote handset thanks to being motor driven through a clutch arrangement. To the right are two banks of push switches which control listen and record input selection, muting and mono/stereo switching. The input switch banks can be customised to provide the layout that the user desires by the simple act of changing their labels. The remote control handset similarly can be personalised. So if you wish, for example, to connect a CD player to input six, simply make sure that suitable daughter boards are in place inside the amp, fit 'CD' labels on the illuminated preamp fascia buttons and remote control keypad, and away you go.

The NAC52 combination is, I believe, Naim's most exciting product yet. I have it running now in my regular system and to say that it has wrought a transformation would not make me guilty of hyperbole. Yet the system gave me immense satisfaction before. It wasn't perfect, no hi-fi is, but it was hard to fault in terms of the mechanical expressions of sound reproduction we use, and it was an exemplar in the manner in which it com-

The NAC52 combination is, I believe, Naim's most exciting product yet. I have it running now in my regular system and to say that it has wrought a transformation would not make me guilty of hyperbole.

municated the emotional aspects of music to the listener.

I say this not out of immodesty, but simply to let you know where I was starting out. Bringing the very best out of this particular system is something I have worked on for a long time. All hi-fi equipment responds to care and attention in the way it is set-up and used. Active systems, however, can make one lazy. Because they have an inherent advantage over conventional passive systems in not having their performance strangled by loudspeaker crossovers, often they can still sound good when less than perfectly – even sloppily – set-up. They're rather like American muscle cars which, even when they desparately need a tune-up, by dint of their enormous cubic capacity still pull like trains. When they're properly attended to, however, they do it with yet more ease.

Before the '52 took up residence the system comprised a Linn Sondek LP12 with Naim ARO tonearm and Linn Troika cartridge, Naim's (then) top-of-the-range NAC72 preamp with HiCap power supplies for it, and the NAXO 2-4 electronic crossover into a brace of NAP250 power amps driving active Naim SBL loudspeakers. The turntable sits atop an Audiotech turntable table with the electronics on Sound Factory Tripod stands. One dedicated mains spur runs the Linn and a second the electronics. The amplification is also earthed to a copper earth-spike sunk below ground in the garden. Supplementary source

components include Naim's NAT-02 tuner and a Philips CDD 882 compact disc transport through an Arcam Black Box 2. The system is *never* powered down. One would expect it to sound good – and it did! But the NAC52's cup runneth over with improvements.

And the improvements weren't all in the areas where one would necessarily expect them. The '52 brings with it across-the-board changes that are most pleasing within themselves. For example, the frequency extremes have been, subjectively at least, extended. The response to transient information is nothing less than staggering, giving an impression of greater overall dynamics as well as further gradations to minor dynamic shading. And there's now a sense of general ease and extended headroom which makes even the most provocative recordings sound firmly under control.

This, however, is all icing on the cake. The most noticeable change in the system has been in the way it communicates with the listener. For example, listening to a vocalist via the '52 is a far more intimate experience than it was before. One is able to focus more accurately not only on the voice itself and the lyrics being sung, but on the character of the voice and the singer. The lyrics can even take on new meanings and relevance. Subtle clues in the voice betray the singer's intent: one can recognise tiny hints of irony, anger, happiness that passed unnoticed before. Looked at with an engineer's cynicism one has to admit that this increased emotional communication can *only* be due to mechanical and electrical phenomena. The '52 is just allowing more of the musical signal through, intact and unmolested; end of story. But to describe the impact of these phenomena in such cold, sterile terms denigrates the effect that this amplifier has upon the listener.

At a more fundamental level, and one probably responsible for much of my increased enjoyment of recorded music, the NAC52 has incredible temporal acuity. It displays timing information with alarming forthrightness. For example, I've always admired the band Little Feat for its use of subtle slips and pushes in the players' timing to add colour and variety to their music. The '52 highlights such interplay between musicians, the way one player feeds off another, in a way I've not experienced before. Perhaps this is due to its 'speed', its retrieval of low level detail, or its lack of 'hash' surrounding notes. This latter aspect has



How it might have been: shown a couple of years ago, Naim's first visualisation of its flagship remote control preamplifier. The finished NAC52 (top left) has been a long time in the making.

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much to do with it, I would contend.

Often, I have found, when listening to a familiar recording, there seems a dichotomy in the way the '52 presents music. Whilst more appears to be happening, the sound appears to be leaner, as though there were less going on. What's missing, in hi-fi parlance, is any vestige of overhang or slurring. The sound is cleaned up, leaving only what should be present, and not adding its own contributions to the music.

The improvements I have attempted to describe do not come cheaply: the NAC52 costs £4,249. Nonetheless I believe it offers real value for money, perhaps not for those who view hi-fi in terms of what components one gets, what kudos surrounds owning the products, or the status they bestow upon them, but for those who see music as a vital necessity to enrichen their lives. Or, to steal a line from the Our Price advertisements, people who are "mad about music".

At Hi-fi '90 (or was it Audio '90? Let's just call it 'The London Show' . . .) we came across an unfamiliar stack of reasonably small and solid-looking amplifiers in a room being used by Michell and Proac. They bore the rather unmemorable inscription 'T&R' and, going on looks alone, could have come from almost anywhere in Europe, such was the standard of construction and finish. Further investigation revealed that T&R Industries' pre and power amplifiers are constructed in Coventry by a fairly small company that's been producing amps for about five years.

In the process of collecting some more information for our show report we spoke to the man behind T&R Industries, Tuck Thong, who suggested that he bring one of his pre/power combos down for us to listen to. Never ones to say no to a new piece of kit, we had him down within the week . . .

What he turned up with was the APP6 Advanced Precision Preamplifier and the MPP9 Mono Precision Power amplifier. Both models come in two-box form: the preamp has a separate power supply, while the power amp – as you'd expect from the name – is a monoblok design. The power amps cost £1,099 each and deliver 150W into 6ohms; the preamp including power supply costs £1,799. The company also sells interconnect and three types of speaker cable specifically for these units and this was supplied and used for our listening.



APP6 and MPP9 pre/power combo from T&R Industries: power a-plenty in small neat packages.

The substantial 'feel' of these amplifiers, despite their relatively innocuous size, is one of the first things one notices. The casework is built out of aluminium, which is thicker than the steel usually encountered and allows an attractive and durable anodised finish to be used. It has sonic advantages as well; according to T&R (and some other manufacturers) avoiding magnetic metals gives a more open sound.

The power amps and power supply are adorned simply with a single illuminated power button. This operates a soft-start relay when depressed and glows quite faintly. However, after about 30 seconds, when the amp has warmed up, it becomes considerably brighter. The amplifier won't operate until you hear the second click of the relay. Thirty seconds is about as long as it takes for these amps to reach 90 per cent of their optimum operating temperature, which unlike many other amps in this price league means that you don't have leave them permanently powered to get the best results.

The preamp sports a row of four chunky milled aluminium knobs which are easy to manipulate if visually rather cumbersome. Separate listen and record selectors are provided, and something called 'trim' which is a fine balance control that operates in such a way that volume level doesn't alter with a change in left/right balance. Rather than reducing the level of one channel it increases that of one side and decreases that of the other simultaneously, which in practice means that image position can be more precisely placed.

Volume is controlled by a laser-trimmed stepped attenuator which might prove a bit of a bore if you're used

to the conventional infinite position variety. The difference in level between one step and the next isn't really small enough, although it is possible to set the gain between two detents.

On the facilities side the APP6 is equipped with two tape loops for DAT and cassette respectively, CD, tuner and phono inputs, a factory installed circuit board being available for either high or low output MC or MM cartridges. There is an additional set of inputs marked 'loading' which accept a separate out-board stage that can be used to accommodate cartridges that prefer to see an unusually high or low impedance, but in most cases this is unnecessary.

Statements is more about sound quality than technology, which is a good thing as we don't have a driver to undo the inverse Torx bolts that hold the lids onto the T&Rs! For what it's worth, the company specifies one per cent metal film resistors and polystyrene capacitors (in the power supplies only) used in a bipolar DC coupled configuration.

The amps were tested as a combination with *Rock/SME IV/Goldring Excel* and *Philips CD 840* sources using *Snell Type III* loudspeakers and 'Innovations *Series 1000/Second Audio* amps as a reference. First impressions inevitably were coloured by the jump in power output from the 15watts put out by the triodes to the 150watts of the T&Rs, which whilst not quite the increase in power that it would appear, does represent a good few extra dB before clipping sets in. And it's at higher levels that the T&Rs really come into their own, providing a smooth, controlled and powerful soundstage with precisely-located images that stay put and often sit way back from the speakers. Definition is in the very-

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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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The T&Rs are nothing if not revealing of what and how a signal is fed through them, different interconnect and speaker cables eliciting sharply differentiated results. The solid core bi-wire cable supplied by T&R produced slightly dry and sparse results compared with some heavier Furukawa, but did sound tighter and more powerful at low frequencies. The best results were achieved with T&R's heaviest OFC multistrand which outshone the alternatives with its wealth of information . . . but this isn't supposed to be a cable review.

If one were to pick out the *forté* of this pre/power combo it would have to be its superb resolution of information which, combined with excellent separation, creates very deep and tactile images. There's no shortage of detail, combined with a very firm sense of pace created by the conservative bass response that these amps produce with the Snells – which is slightly shallower than can be achieved with other amps but not short

on power, or dexterity.

The majority of auditioning was carried out using my turntable. I find that CD, even in its more listenable PDM form, is still unable to resolve important musical information to anything like the same degree as a half-decent gramophone. But realising that many of you use the CD input more and more, attention was paid to its performance, no less so than when Tuck Thong gave his heavily modified *CD94* an all too quick spin. He upgrades/tweaks this player to the tune of some £1,600 and the thing ends up weighing more than the *Rock* turntable (ie around 10kg). The results certainly seem worth the effort as the fleeting experience I had of it gave the distinct impression that a rosy future lies ahead for the digital medium in high-end audio. The results achieved with the *CD840* were less exciting I have to admit, but the input clearly was making the most of what it was given and matched the phono input for evenness and transparency.

Making direct comparisons with the

triode amps which usually drive my system (using T&R's cable) made the visiting amps sound slightly lacking in bass extension. But changing over to the AudioNote on the triodes and leaving the Hitachi OFC-based T&R cable on the 'trannies' resulted in a similar balance from both amps. The area where the T&Rs had to make way for the triodes (like most amps) was in the rendering of dynamic shading at lower-than-average levels, the ability to make music involving and enjoyable without disturbing the neighbours. In virtually all respects the *APP6* and *MPP9* are very capable amplifiers indeed. They are undoubtedly load tolerant – Tuck uses the notorious Celestion *SL700* loudspeakers – and very user friendly and practical as a result of the quick warm up time and diminutive size of the superbly built cases. The degree of sonic refinement and quality of construction makes them a welcome entrant to this competitive field.

T&R Industries Ltd., 55 Frankton Avenue, Styvechale, Coventry, CV3 5BA. Tel: (0203) 419605.

High-end Update

The latest cartridge to emerge from the prestigious Koetsu stable is the £1,612 *Urushi*. With the exception of the limited edition *80th Anniversary* (only 80 available worldwide!) it is the most expensive Koetsu in the range. Despite appearances (see right), the beautiful body of the *Urushi* is aluminium, the unusual finish being achieved with a lacquer called – you guessed it – *urushi*, which is made from a tree sap and continues to harden even as the cartridge is used.

John Smith at central London hi-fi emporium KJ Leisuresound (who lent us the cartridge to photograph) likens its sound quality to that of the £3,000 *80th Anniversary* model, and applauds its maker Sugano for creating a cartridge that offers such phenomenal insight into the grooves of the humble LP. CD still has a long way to go . . .

Beard Audio has been busy creating a new amplifier called the *M1000*. This monoblok uses eight 6550 triode-coupled output valves and offers 50W in Class A with a further 3dB in Class A/B bringing it up to 100W into any load between four and eight ohms. As one might expect from such impressive specs for a tube amp, the *M1000* carries a rather serious £3,000 price tag. We saw a pair fitted with wooden picture frame surrounds at the Paris show which looked a real



treat. The company is also bringing out a 35W integrated amp with line level inputs and a separate phono stage, due to retail for £1,000.

Beard has also made its first foray into the land of digital with a 12-times oversampling DAC using a valve driven output stage. And it isn't the only amplifier manufacturer to venture into the land of ones and zeros. Conrad-Johnson and Linx (the latter with a £1,000 two-box model) have also joined the fray, although the C-J is still in prototype form. Madrigal meanwhile has launched a new

Proceed digital processor capable of converting all three digital frequencies with an 18-bit 8X oversampling DAC. Price is £1,395.

Madrigal's UK distributor, Path Premier, has decided to bring in the Sequerra *Metronome* range of American loudspeakers. The line is composed of three modular units: the *Metronome 9* super tweeter, *Metronome 8* subwoofer and *Metronome 7* which operates as a standalone loudspeaker or as part of the complete system sitting a-top the '8 and below the '9. More details next month.

The dark horse of hi-fi

An unassuming factory at Hackney in London's East End sends state of the art valve amplifiers to discerning audiophiles around the world. Dan Houston met the men at Mentmore. Photographs by Chris Richardson.

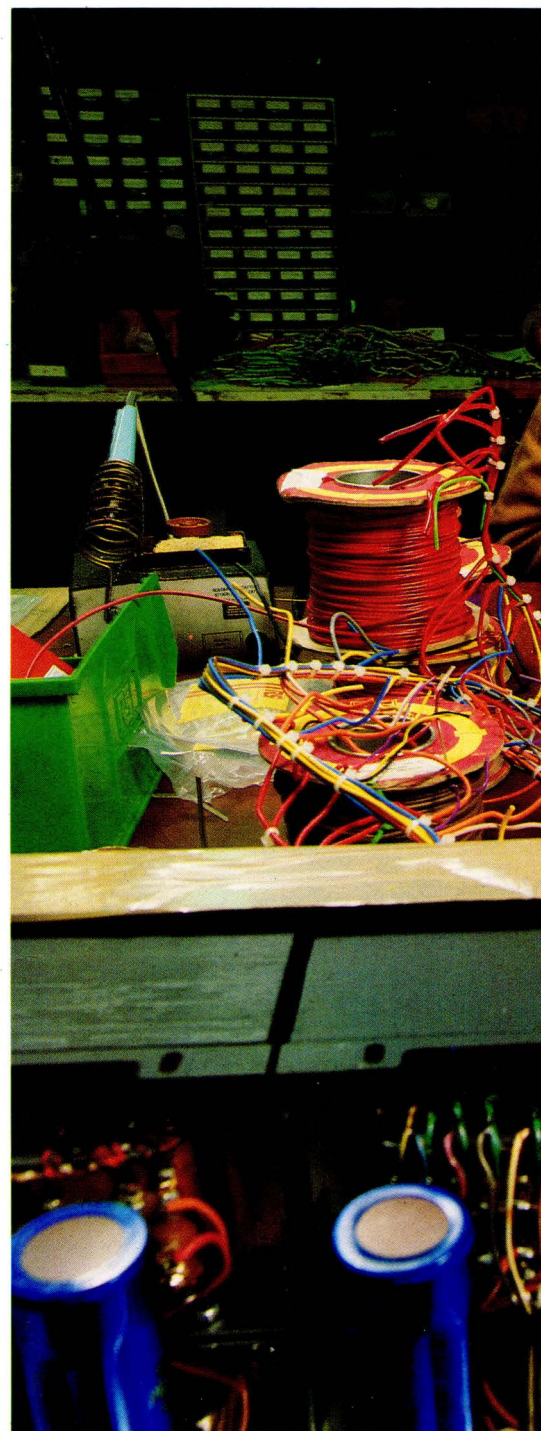
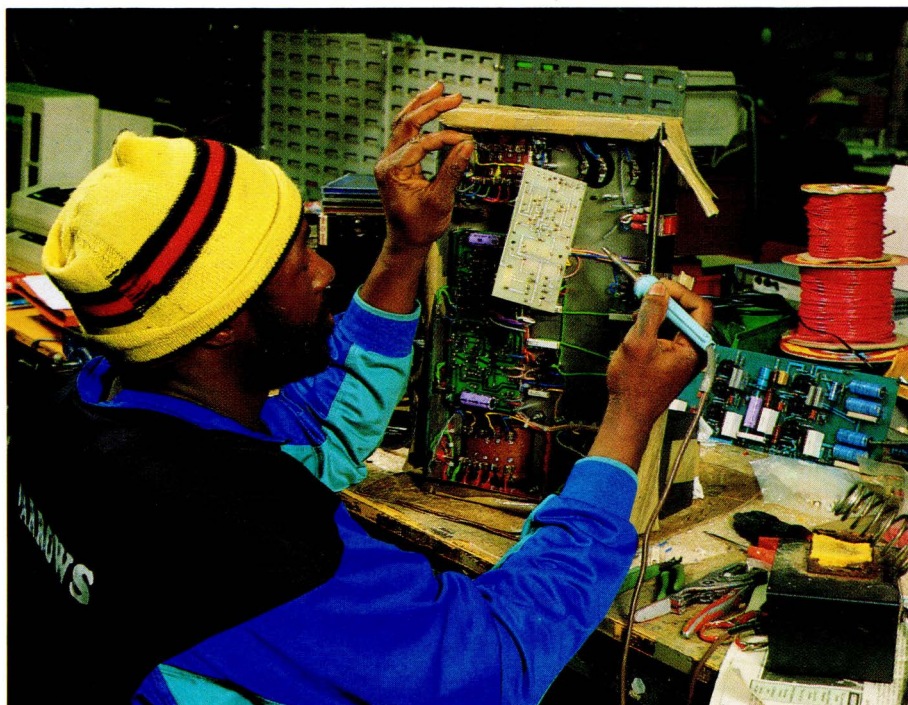
Mentmore Industries is a pioneering project started by the local Labour council and the Manpower Services Commission 11 years ago. The factory makes a variety of electronic goods but MI's own range of exotic valve power amplifiers is becoming more and more important in terms of turnover (though sadly the majority of them are sold overseas). The difference between this and most other electronics factories, is that 25 of its 35 employees are physically handicapped.

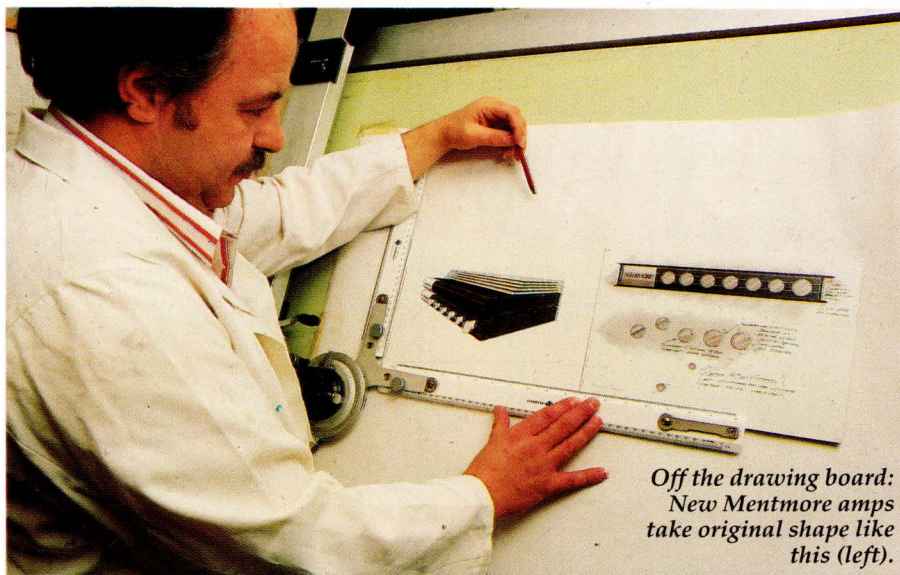
Mentmore Industries is run by five managers who have all been drawn from local private industry. They have limited resources to advertise their product and tend to rely on word of mouth. They describe themselves as a 'strong team' and say they share the responsibilities (from designing amplifiers to doing the washing up) of working in their unique environment. In spite of being first and foremost engineers they are also part 'carer', although there are no nursing

facilities and employees have to get to work five days a week under their own steam.

The factory employs men and women with almost any physical disability from paraplegia, through cerebral palsy to back trouble. They are paid the same as in any similar factory. "We can't employ people with a mental disability," says Robert Seaman the General Manager, "because of the high voltages involved." Founded more or less as a pilot project Mentmore Industries' task has been to counter the waste of skills from people disabled during their working life. As Hackney's Deputy Mayor Carole Young points out: "They wouldn't be able to work as skilled employees anywhere else; they'd be making baskets or something."

Often MI acts as a kind of holding bay for the disabled, offering them employment while they adjust to their handicap, and giving them the confidence to apply for jobs in industry again. Lathes





Off the drawing board: New Mentmore amps take original shape like this (left).

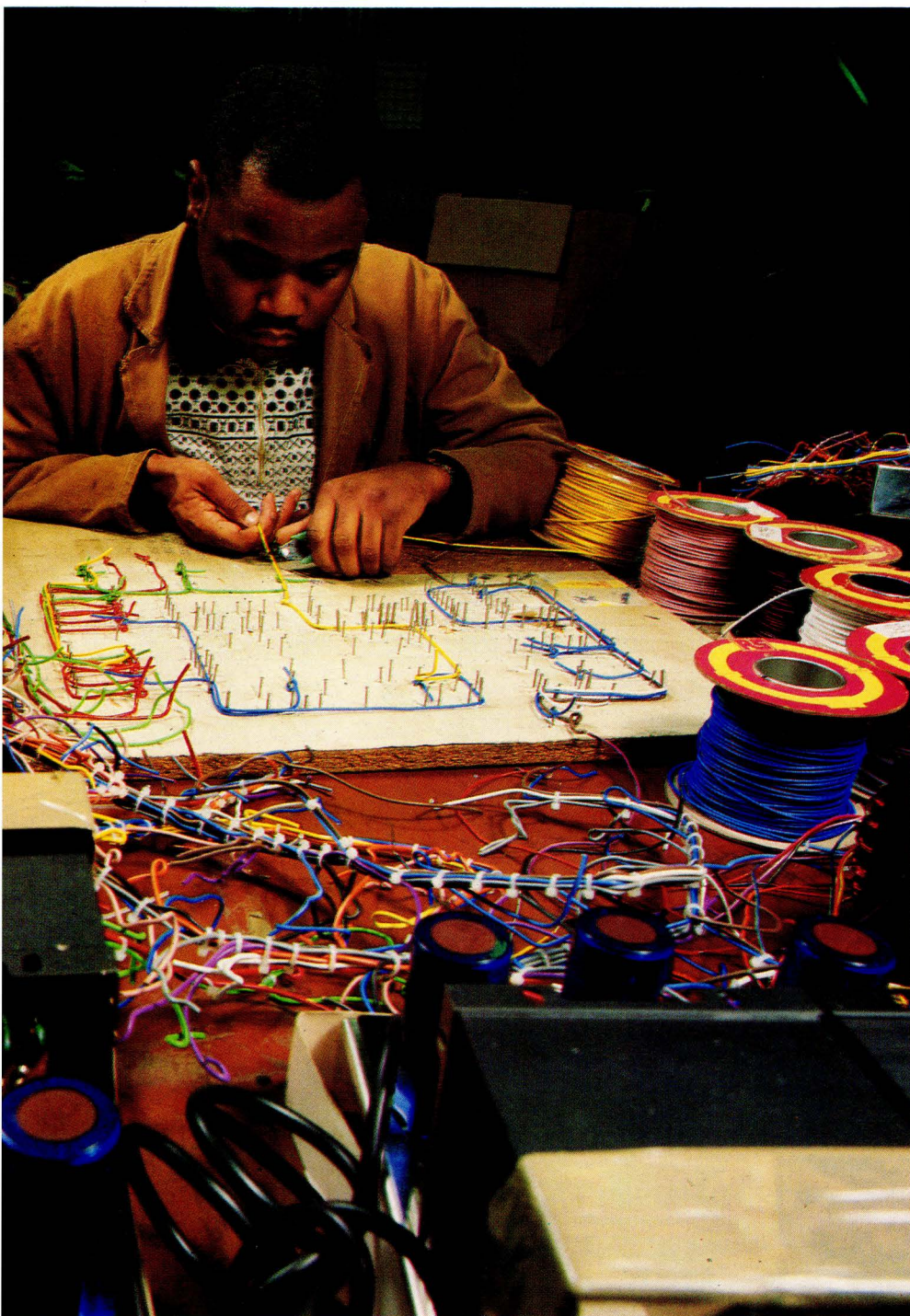
and machinery have been adapted so that they can be operated by workers in wheelchairs and although the company is not expected to make a profit comparable with other industries it nevertheless has to satisfy auditors that it has a healthy turnover.

The sad legacy of government policy over the last ten years, according to Carole Young, is that the project hasn't been emulated by other local authorities; the physically handicapped for the most part end up with tedious jobs however capable they are. "Other boroughs haven't taken the lead," adds Young, "they send their disabled people to us." The company's proponents, councillors such as Young, also have to fight for its survival in the (often creatively accounted for) world of borough economics.

Mentmore's engineering and electronics bias means that only a quarter of the workforce are women; candidates have to have electrical or mechanical experience. "But a lot of our workers were experts before they came to join us," says Robert Seaman, "and we do encourage them to move on from here to other things. We must be about the only industry which encourages its best workers to leave."

Although amplifiers are a source of pride to the firm and offer individuals a sense of achievement in making them, Mentmore is also geared up to be a mass production engineering plant. Huge lathes turn out just about anything 'latheable' to order, and the company also has regular contracts with the BBC, MoD, and motor industry for other electronic work.

Mentmore became involved in amplifier construction in the early 1980s, when it supplied parts for a Michaelson and Austin amplifier. "They went out of business and we bought the company and began putting our own ideas into the design," remembers Brian Flint, the Works Manager. That was in 1985 and since then Mentmore's reputation has grown so that it now offers three valve power amplifiers and has a new range including a preamplifier on the way. "Amplifiers have been worth about 50 per cent of our business," says Flint, "but now we are having to concentrate more and more on them, and we could



A study in concentration: valve amps are crafted by Leroy Dobson (far left) and Anthony George.



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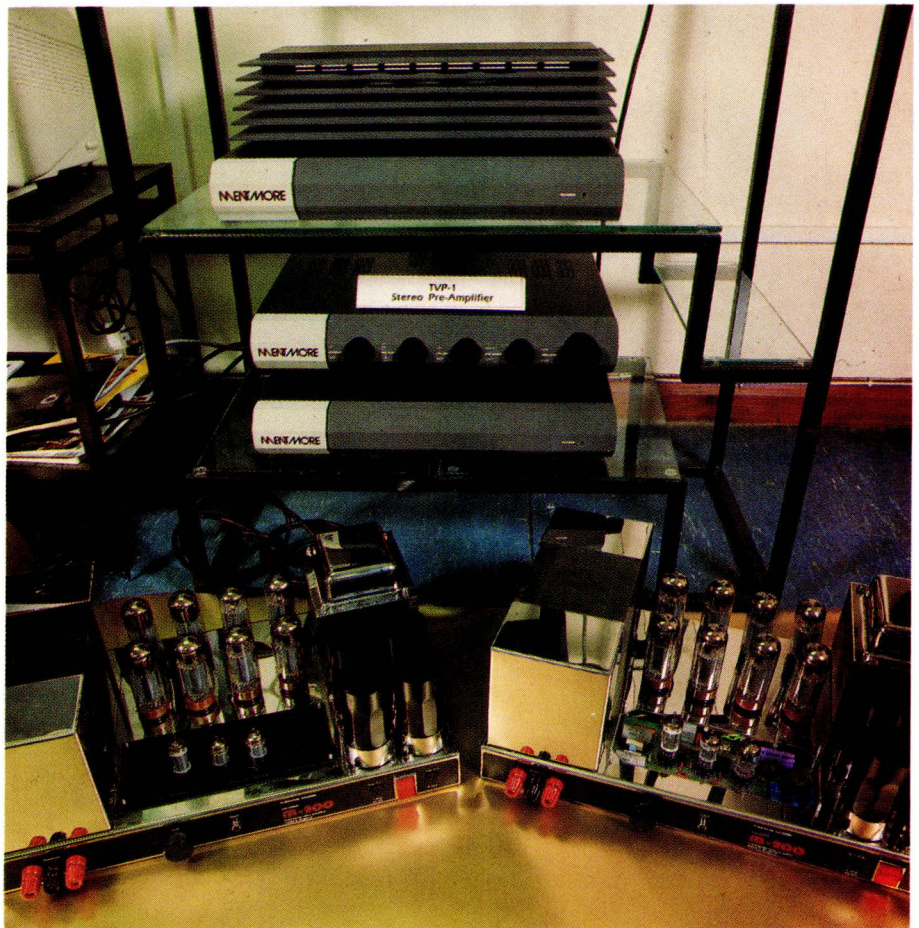
 **RADFORD**

become mainly an amplifier maker although we'll never be solely involved in amps; we need more irons in the fire than that."

So how come you can't find one of these be-bottled beauties in the shops? By all accounts they seem good value for money. "If someone wants to buy one they have to come to us," says Seaman. "We only make about 400 units a year and we sell . . . maybe 50 of those in this country."

"We have felt that people (dealers) in this country were only capable of selling brown boxes. We did a tour of the UK about three years ago and we were very disappointed. Overseas we were more impressed. The distributors had their own test equipment and they were able to do their own repairs. In fact they pride themselves on being able to repair something if it goes wrong and they showed willing to understand the product." This doesn't necessarily mean the product is unreliable, but one can understand that at nearly 40 kilograms each it's important to have a dealer who wants to look after one of these amps himself.

Most of the amplifiers fly out in pairs, to Hong Kong or Japanese audiophiles who treat them like rare birds praising their sweet song (albeit at 200watts RMS) through something like Quad electrostatics. The amplifiers' secret is partly in the quality of the output transformer – in the case of the £1,000 M200 it looks and weighs like a cannon ball of wound wire. "That's the amplifier that everyone wants to own," says Flint, the firm's transformer expert, "we've got a frequency bandwidth from 10Hz to 70kHz from that . . . and it does sound good!" To stay on the subject, even the M100, a mere 18kg, offers a 10Hz to 30kHz range. "I'm working on a new transformer which will go down to one cycle," Flint



The new design and thoroughbred M200s on show (above). Testing finished amps (below).

confides.

All the circuitry is originally designed in-house. Mentmore once went to the Cranfield Institute of Technology (responsible for designs such as *The Rock turntable*) for help but didn't find the level of expertise it was looking for; much of the circuitry is designed by Imtaz 'Raj' Akhtar, the Electronics Manager, with input from his colleagues. The

more mundane tasks in assembly – such as casework – are farmed out to other firms to meet Mentmore's specifications. This holds with the original philosophy that the workforce should have stimulating tasks. Wiring and final assembly is only trusted to the Mentmore staff.

It's a tribute to the project that managers such as Flint and Seaman say they no longer notice disability in a worker. And in spite of Councillor Young's pessimism they say they are changing people's minds about attitude to physical handicap in the workplace – citing the numbers of workers who pass through Mentmore's doors and later move on to other 'regular' jobs.

However, in order to qualify for subsidy they have to be competitive and it was good to hear them talking about taking the range to British dealers again. If looks alone are anything to go by (and ironically in the high-end they are) then we could be seeing, and hearing a lot more of Mentmore's amplifiers here.

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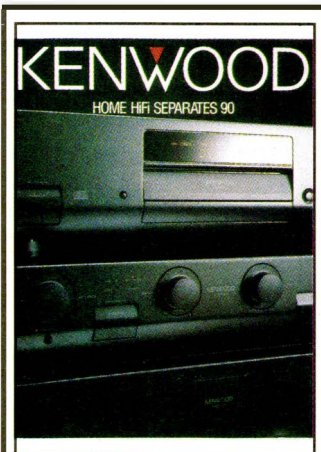
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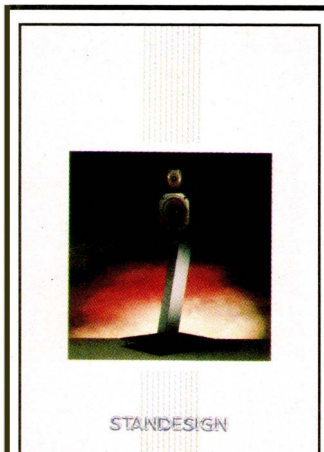
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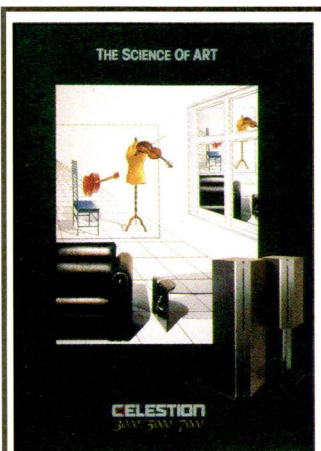


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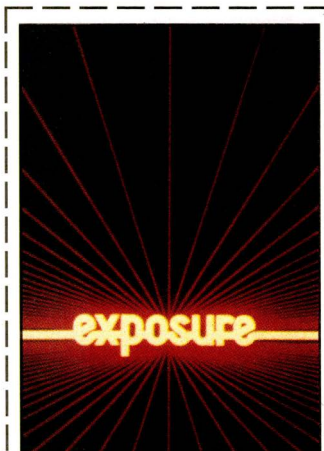
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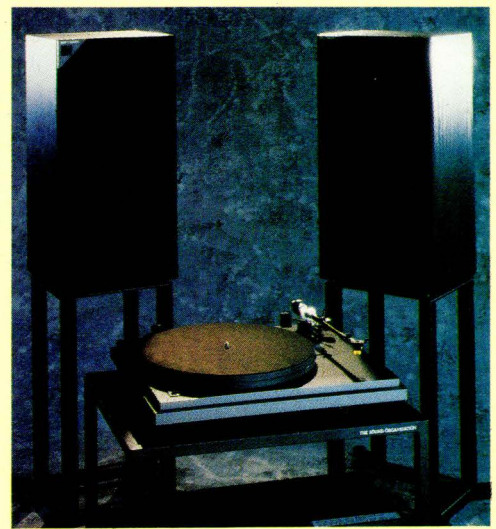
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All that glows . . .

The popularity of valve amplifiers is as great today as it's ever been. Guy Adams (of Voyd Turntables Ltd) and Alan Bateman outline the operating principles of different valve types, and set out to explain why some amplifier designers feel that vacuum tubes are superior to solid-state devices.

When Thomas Edison first demonstrated the Phonograph it was a practical illustration of the discovery that speech and music could be described as variations in air pressure (amplitude) over time. Now that we use electronics rather than thorn needles and horns the fact remains that, for maximum fidelity, an audio amplifier should amplify the audio signal with minimum amplitude and time distortion.

In recent years there has been a great revival of interest in the use of valves in audio amplifiers. Indeed, many highly regarded designs use this apparently obsolete technology. A number of respected designers feel that valves are superior for the basic task of amplifying a signal with minimum amplitude and time distortion. In order to find out why this is we need to know how valves work, the differences between the various types, and the ways they can be used. Anyone who reaches for the Aspirin bottle at the first sight of equations need not worry – this can all be done without recourse to higher mathematics, and the graphs which are used should help to make things clearer.

So what exactly is a valve, and how does it work? Electronics requires a flow of electrons, and in a valve these are provided by an element called an emitter. As the emitter is heated electrons can break free from the surface, like steam rising from a liquid. Again like steam, the hotter the emitter the more electrons are released. In most valves the emitter is

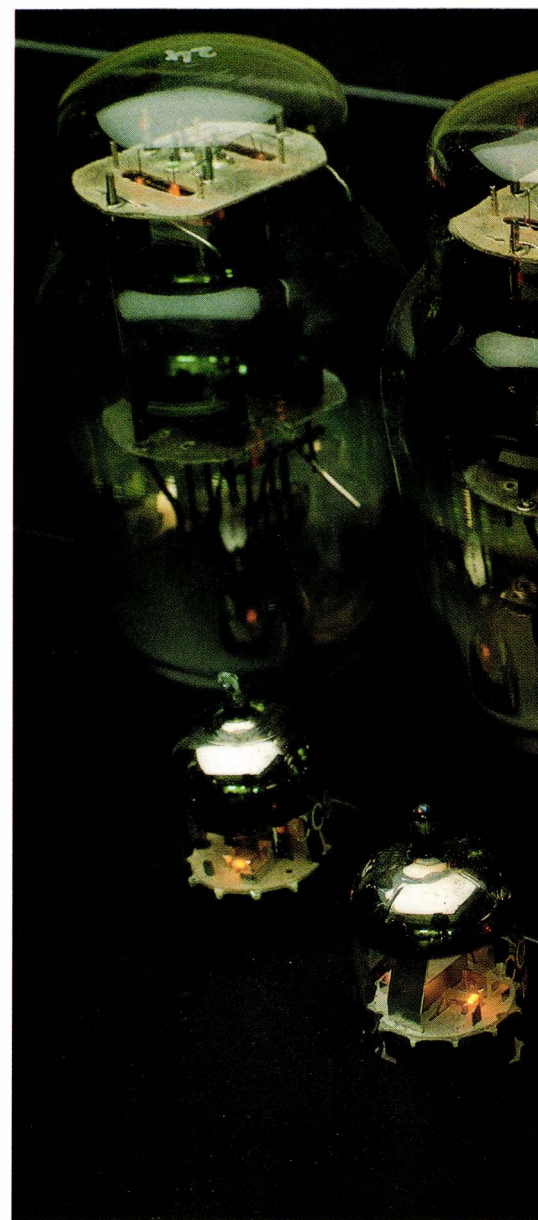
made from a barium strontium oxide or from tungsten. Depending on the type the best operating temperature is between 750 and 1500 degrees centigrade which explains why valves need to run hot! Some valve types heat the element directly with an electric current while others use a separate heater which then warms up the emitter. The emitter serves as the negative electrode, or *cathode* in the valve.

If a second electrode is brought close to this cathode and a battery is connected between the two, interesting things happen. If this second electrode, or *anode*, is connected to the negative terminal of the battery then the negative charge on the anode repels the electrons and no current flows. If however the anode is connected to the positive terminal of the battery, then the electrons are attracted to the anode and an electric current starts to flow. In order to minimise resistance to the flow of electrons the anode and cathode are sealed into a vacuum glass tube. In most commercial designs the voltage between the anode and cathode is several hundred volts.

This simplest type of valve is called a **diode** (because it has two electrodes) and is used in electric circuits as a switch, since it will only conduct current when there is a positive voltage on the anode, and also to ensure that current flows only one way.

Third factor

In 1907 Lee De Forest added a third fac-



tor – a control grid between the two electrodes. This consists of an open mesh or spiral surrounding the cathode. Because this is nearer to the cathode than the anode, any voltage on the grid has a greater effect on the current flow than a similar voltage on the anode. The charge on the grid thus controls the flow of current between the anode and cathode; a small change in voltage on the grid results in a large change in current flow between the electrodes. This three element valve, or **triode**, actually outputs a signal which is a larger version of the signal on the control grid. Put another way, the triode amplifies the control grid voltage. The first audio amplifiers were made in the USA around 1912 using Western Electric VT1 and VT2 direct heated triodes. The first commercial application was in telephone line amplifiers in 1917/18.

In some applications, particularly radio frequency work, the capacitance between the anode and cathode of the triode led to some instability, and this led to the development of the four ele-



ment valve or **tetrode**. Here a screen surrounds the anode and is run at a slightly lower voltage. This removes the instability problem but has other side effects, such as distortion caused by secondary emission from the screen, which normally preclude its use in audio amplifiers. The KT (kingless tetrode) series of valves, such as the *KT66* are a special case being engineered to operate more like pentodes.

Five electrode valves, or **pentodes**, were first developed in 1926. Adding an additional grid, known as the suppressor grid, between the screen grid and the anode overcomes the secondary emission problems of the tetrode. This permits higher power output and greater efficiency than either of the other types. A number of other valve types have also been developed, such as cold cathode diodes, thyristors and nuvistors, however these are not commonly used in audio systems.

The most important factors in the performance of a valve, known as the valve constants, are the amplification factor,

'There is little to be gained from running a valve for a high power output if this comprises reliability, although some manufacturers seem to believe owners will not mind replacing valves every six months in the interests of fidelity.'

the anode resistance and the transconductance. The amplification factor of a valve, as you might expect, is the measure of the change in the output caused by a change in the input (control grid) voltage. The amplification factor for a typical triode valve is around 20, while the values for tetrodes are between 400 and 800 and pentodes may rise as high as 1,000 or more – although only around a tenth of this can be used in high quality amplifiers. The anode resistance is the measure of the internal resistance of the valve. This is normally measured using alternating current at some point in the valve's linear operating area (of which more later). Typical values for triodes are in the region of 1,000ohm for power valves and 100,000ohm for signal devices, while pentodes may have anode resistances of as much as 1,000,000ohm.

Transconductance, or mutual conductance, measured in Siemens, describes the effectiveness of the valve in translating a change in voltage at the control grid into a change in anode current, and thus in signal output. Triodes tend to have transconductance values of around 5,000 micro Siemens, whereas typical values for tetrodes and pentodes are around 2,000. These factors are all inter-related; for instance it is the high internal resistance of the pentode which indirectly limits the current it can deliver and thus prevents the amplification factor being fully used.

How linear?

The operating characteristics of the different types of valve can best be shown in a series of simple charts. These characteristic curves provide a graphical means of determining the suitability and optimum operating points of a particular device. If our valve is linear in operation then a given change in the input voltage on the grid results in the same change in output voltage whatever the level. Thus if a change in input voltage from 0 to 1 volt gave an output of 20 volts then a change from 0 to 2 volts should give 40 volts output. A non-linear amplifier might give the 20 volt change for the 1 volt change in input voltage, but only a 35 volt change for the 2 volt change in input. The graph for a perfect device would look like Figure 1. Note that the lines are perfectly straight, equally spaced and vertical. Thus if this device is correctly used the output will be a linear amplification of the input (thus the lines are identically spaced and straight) and the device will be a true voltage amplifier

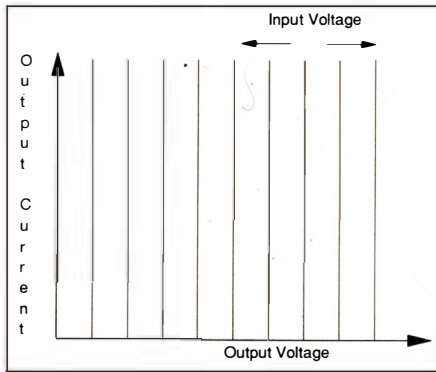


Figure 1: the perfect device.

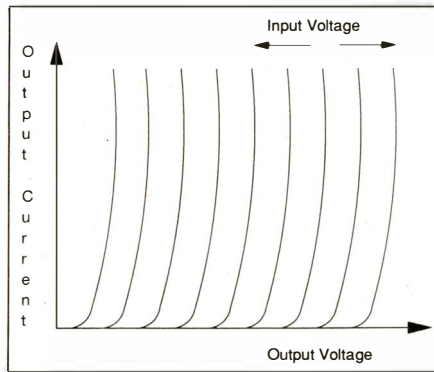


Figure 2: direct heated triode.

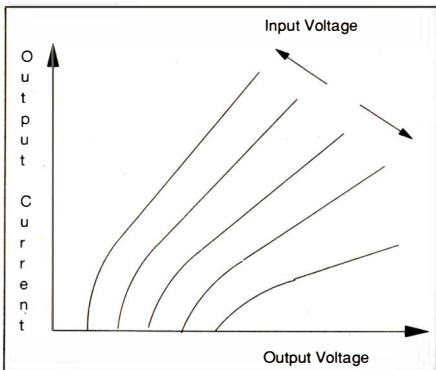


Figure 3: tetrode.

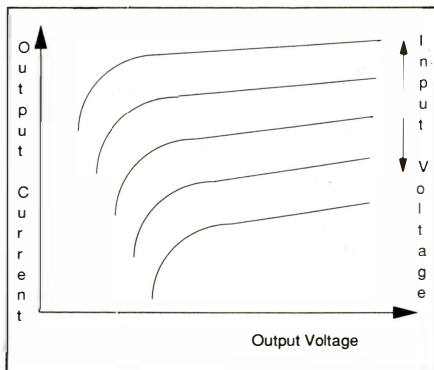


Figure 4: pentode.

– that is, it will be able to supply sufficient current to maintain the output voltage (thus the lines are vertical). This requires the internal resistance of the valve to be zero.

No real world device can match these perfect lines, but some can come very close. Figure 2 is for the 2A3 valve, a direct heated triode. As we can see, the lines are evenly spaced and straight, showing the linear amplification capability, but the lines lean to the right slightly. Because of the finite internal resistance of the valve it can not quite function as a true voltage source. Compare this to the set of curves for a tetrode, shown in Figure 3. Here we can see that the valve does not function as a true voltage source, and also that its amplification is not entirely linear, especially at low signal levels; the lines are not evenly spaced and start to curve at the low end. The graph for a pentode (Figure 4) takes this a stage further showing significant non-linearities, especially at low signal levels.

Some manufacturers have used a tech-

nique where pentode valves are triode coupled. This reduces the output by about 50 per cent but provides for more linear operation. In fact the characteristic curves for a triode coupled pentode look similar to those for the triodes.

For comparison, the typical curves for an audio power transistor are shown in Figure 5. Not only is the performance less linear than any of the valve types, but the output voltage is proportional to the input *current* rather than the voltage.

In order to determine the conditions a valve will operate under in a given circuit, designers use a load line. The choice of the load line is one of the areas of design where many choices have to be made. The aim is to utilise the best operating area of the curves without exceeding any of the maximum ratings for the particular device. There are many factors to be traded off against each other such as power output, linearity and valve life. There is little to be gained from running a valve for a high power output if this compromises reliability, although some

manufacturers seem to believe owners will not mind replacing valves every six months in the interests of fidelity. In Figure 6, the slope of the line is the anode load and the load line graphically shows what the output will be for a given input. The operating point (Q) is the point on the load line at which the device operates when there is no input signal.

Obviously a designer requires the positive and negative halves of the signal to be amplified evenly within the limits of the device. The choice of operating point is fairly straightforward for triodes because of their excellent linearity, but tetrodes and pentodes may have to operate slightly away from this optimal point to avoid the area where the curves bunch together. This definition of operating point applies for Class A amplifiers where the device is tied to operate along the load line up to its rated output, at which point clipping of the signal will occur symmetrically.

For a Class AB amplifier the operating point is moved down the load line, thus reducing the available output swing in



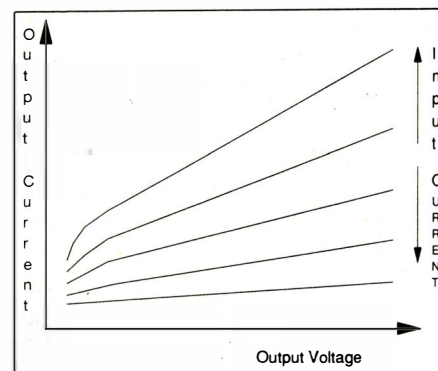


Figure 5: typical curves for an audio power transistor.

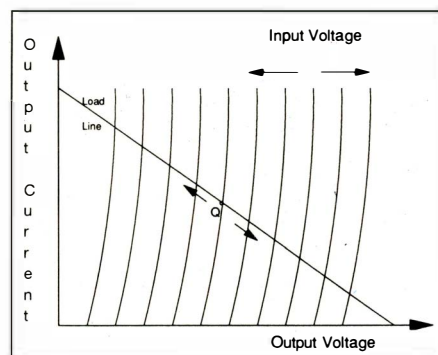


Figure 6: a load line is used to determine a device's optimum operating conditions.

one direction. This is compensated for by using two valves in anti-phase, each handling one half of the signal. A small standing current ensures that both output valves are 'on' at the cross-over point to cover the switching from one device to the other. The use of Class AB allows higher power outputs to be achieved but requires the use of negative feedback as an error correcting mechanism to cover the distortion inevitably generated at the cross-over point. As we hope to explain in a future article, this is not always desirable.

To sum up this discussion of valve characteristics we can say that, on one hand, tetrodes and pentodes provide the highest amplification factors and can thus provide higher power for audio use (or conversely that an amplifier of a given output can be made much smaller using these devices). The commonly available power triodes provide no more than 8watts of output when operated in Class A, while there are many pentodes giving 25watts or more. Triodes are also much more expensive.

When it comes to linearity, however, the boot is on the other foot, and the triode is considerably superior. This explains why the valves used for small

'To sum up this discussion of valve characteristics we can say that, on one hand, tetrodes and pentodes provide the highest amplification factors and can thus provide higher power for audio use . . .'

signal levels, such as ECC88s, ECC83 and ECC82 are all double triodes (two triodes in a single glass shell) while pentodes have been preferred for power ampli-

fiers. Many designers however are rediscovering the advantages of triodes for power amplification. Unfortunately, as has happened with Class A operation, some manufacturers are leaping on the bandwagon and claiming triode operation when in fact they are using triode coupled pentodes or tetrodes. As we saw earlier, while this does have benefits, it is emphatically not as linear as a true triode.

There is of course much more to the design of a valve amplifier than just the choice of valve. The type of circuit used is at least as important. In a future article we will look at the various options available to the designer, how negative feedback can appear to improve the operation of some devices and why the side effects it brings often cause more problems than it solves, why transformers are needed and what effect they may have, and at some novel ways of measuring the output of amplifiers in the time domain which give much better correlation with listening tests than traditional methods.

Readers Write Choice Answers

Taking The Plunge

I have been faithfully following your magazine for nearly two years, and the time has come for me to upgrade my present system. I have a budget of five hundred pounds with which to put together a CD based system and had short-listed the following components: Denon DCD 620 CD player, Arcam Alpha II amplifier and Celestion 3 loudspeakers.

I am set on the speakers, but having read the amplifier review in March, and having seen more CD players, the other two components are sounding somewhat second best. My cousin has a Musical Fidelity B1 which impressed me immensely and I'm less than certain about what to buy. Do you have any suggestions?

BEN COLEMAN,
SHREWSBURY.

The time has come for you to make a visit to your local serious hi-fi emporium, wherein you can sit down and listen to some of the components which take your fancy. We can give you more recommendations, but the bottom line is that at the end of the day you will be living with and listening to the system – so it is logical for you to choose it.

The most rational way to do this is to visit local specialist dealers and listen to some of your own CDs on systems that suit your budget. After you've heard

two or three alternatives you should be able to assess A) which one has the most appeal and B) the areas in which it is possible to improve it by substituting different components. This is not to suggest that you should buy your amp from one place and your CD player and speakers from another, but that once you know what you like and what can be achieved with your budget you can go to the shop that made the best sounds and explain the sort of thing you are after. If the dealer is worth his/her salt he/she will be able to substitute components to achieve an optimised system for your tastes. Don't worry if that sounds complicated. It's quite simple in practice.

The Big League

I am hoping to upgrade my present system and would appreciate your remarks concerning components and cables. At the moment the system comprises Linn LP12/Ittok/Asaka turntable, Pink Triangle Pip preamp (original version), Beard P100 power amp, and Magneplanar MG 2.5R loudspeakers connected with Naim cable.

I have set my heart on the Oracle Delphi III with an Airtangent arm and Koetsu Red Signature cartridge. However, Oracle is about to bring out a Delphi IV and I wondered if you had had a chance to review this model yet?

I would also like to



A classic front end: Delphi/Airtangent/Red Signature.

upgrade my amplifier as I don't think that it has adequate power to drive my 'Maggies'. Do you have any suggestions?

And, finally, speaker cables. Can you tell me anything about the Audioquest Hyperlitz range? Are there really advantages to be had from using cables in this price range, and can you suggest any alternatives?

Whilst appreciating that at the end of the day the final choice is up to me and my ears, I would appreciate some guidance so as to avoid unnecessary expense and time wasting.
CHARLES BENENSON,
HENDON, LONDON.

It looks as though you are heading for what is fundamentally an Absolute Sounds system, albeit that Oracle turntables are now distributed in the UK by Gamepath. One avenue of investigation must be to visit a dealer who specialises in this equipment and have a listen to the sort of results that it offers. It's possible that the change in turntable distribution might make hearing the Delphi in the context of your choice of arm and cartridge a little difficult, but given your proposed expenditure a good dealer should make the effort to get the system together.

On the more specific points the answers are: not yet, a big one, and no/yes . . . but. To expand a little, we haven't heard the Delphi mkIV as yet, but given Oracle's track record on the

upgrading-of-turntables-front it is probably safe to assume that the IV will be at least as good if not better than the III. But don't take our word for it – find one and listen.

As for a suitable amp for the Maggies, despite presenting a fairly benign load to amplifiers these speakers are not particularly efficient and require fairly hefty amplification to really give of their best. Paul Miller, for instance, is in the process of moving up to a pair of bridged Deltec DSP-100S power amps to drive his 2.5s. Apart from the Deltecs you should try to listen to a couple of the following amps: Denon POA-6600, Krell KSA-100.2, Musical Fidelity A370.2 and the Sumo Andromeda.

And last but not least, Audioquest Hyperlitz, which we haven't tested, and other expensive cables . . . Surprisingly enough these can be very effective when carefully selected, but that is the crux of the matter. You can spend an awful lot of money on cables which only bring about subtle improvements in sound quality and it's definitely worth consulting a dealer who is au fait with the amp and speaker for recommendations. That said, this month's issue contains a supplement with six speaker cable reviews carried out using Magneplanar loudspeakers and a Deltec amplifier which, because it extends the feedback loop out to the end of its cables (which are an integral part of the amp), allows each cable to be compared with the sound of no cable at all. Thus



Celestion's eponymously named 3, a stylish budget loudspeaker.

you should be able to get an idea of the sort of wire that will suit your system, but ultimately, buying both amp and cable together is the most rational approach.

Finally, as you say, your ears should be the final arbiter, but whilst you're at this stage it might be of interest to listen to a couple of the alternative approaches available to the well-heeled music lover. The Choice staff are, as you may have gathered, keen advocates of the Townshend International and Audio by Design schools of thought and we would suggest you listen to systems comprising the equipment that those companies make and distribute, namely the Rock Reference/Glastonbury and Voyd/Audio Innovations/Snell combos respectively. It would do no harm and probably be of some interest to hear what systems like these have to offer before you finally take the plunge.

look at 'Beginners guide to hi-fi' by Ian Sinclair published by Newnes Books (1986), or 'Newnes Audio and hi-fi engineer's pocket book' by Vivian Capel published by Heinemann (1988). The latter is more of a reference book but at a glance doesn't seem a lot more technical than the Beginners guide.

Perhaps the most readable and informative book for the non-technically minded is 'Bluff your way in hi-fi' by Sue Hudson and ex-Hi-Fi News editor John Crabbe, a concise and witty little volume that's very revealing of the hi-fi junkie and his esoteric world - it's published by Ravette and costs £1.95.

The situation with societies is less impressive; most of those that we have come across are purely for the trade. The only other one is the Audio Engineering Society (AES), a world wide organisation with a membership largely made up of engineers and others concerned

replace the 101B as it doesn't belong to me.

As far as I can see there are two options that I can pursue. One is to wait for the Artaxerxes MC amplifier and use it with a good quality line-only preamp, the other is to get a preamp with a good MC stage onboard. Which course of action would you suggest I follow and which preamps should I listen to?

I would also be interested to know why the Darius loudspeakers don't figure in high-end recommendations. They are expensive and difficult to set up, but I found them to be superior to anything that I heard.

KEVIN REEVES,
LONDON W1.

Because of the Shiraz' high 'ish output for a moving coil cartridge (it can overload some MC inputs), and because the Artaxerxes is custom made for that particular cartridge (not to mention the inherent advantages of amplifying its output within the turntable) your first option would seem to be the most logical one to pursue. The Artaxerxes MC amplifier should be in the shops by the time you read this and will retail for £495, which leaves you about the same again for a line preamp.

Here you have two alternatives: passive or active. The former variety are generally less expensive but end results are highly dependent upon the length and type of the pre-to-power interconnect and the input impedance of the power amplifier. On the other hand preamps with buffered (ie active) line stages are far less dependent upon external factors (although they still have an effect nonetheless).

Most of the preamps that we rate highly for their line level inputs are priced higher than the change you'll have after purchasing the Artaxerxes, but there are a couple of models that would suit the system well. One is the Hafler DH-110 which retails for £360 and was regarded by Paul Miller as being "open, transparent and inherently 'musical'"; another, which is more of an audiophile product (ie it's got less knobs) is the £395

Kelvin Labs Absolute Zero line preamp. It would be wise to try both of these in the context of the Artaxerxes and as much of your system as possible.

As for the Darius loudspeakers, these were tested when they first appeared in 1987 but were subsequently withdrawn from the Directory because alterations to the original design rendered our review obsolete. We intend to get them in for a future speaker issue or Choice Sessions piece because, as you say, they do seem to be pretty good.

Strike Out

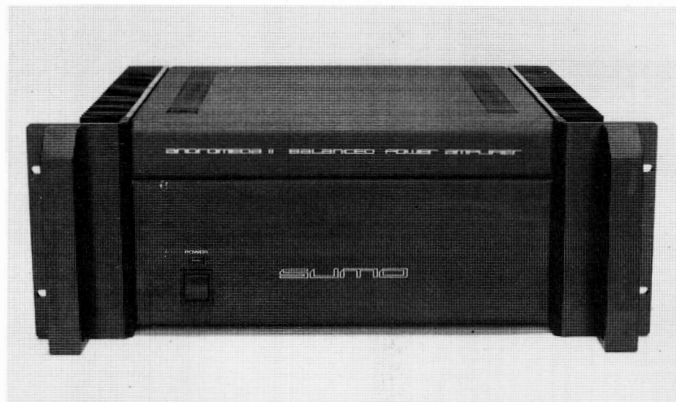
I was exceedingly glad to receive the stylus cleaner free in the April issue.

Being of an older school of hi fi enthusiasts, I cast a somewhat glazed eye over many of the freakish and fadish mods often suggested in current magazines; however, having diligently followed the instructions for the use of the cleaner I did notice a new sparkle to my stylus. Indeed as it traced the first record it almost seemed to be on fire, as it passed through the sun's rays! And the resultant sound had been 'lightened' beyond belief! This is the only way I can possibly describe the effect. (That's enough match references - ed!)

I now come to the real reason for my letter, as no doubt many of your readers have already found for themselves the enlightened effect of the cleaner. It occurred to me that the cleaner could be put to even further use. Everyone who uses matches must have found that the 'striker' on the sides of large boxes is soon worn out, so your readers might be interested to know the cleaner, besides bearing a striking (excuse the pun!) similarity to the striker found on a book of matches does in fact make an admirable striker itself!

So thank you again Hi-Fi Choice for your dual purpose free gift!

J. H. L. CHAPPLE,
ASHFORD, KENT.



More than a match for the Maggies, Sumo's Andromeda II.

Searching For The Fountain Of Audio Knowledge

I have recently become interested in listening to 'real' high fidelity systems and am starting to upgrade my own. Although the pages of your magazine provide some very useful information, I am keen to learn as much about hi-fi as possible. I would be grateful, therefore, if you could recommend any books on audio principles and inform me of any societies or associations that I might be able to join which could help me increase my rather limited knowledge.

NIGEL ASHWORTH,
MID GLAMORGAN.

Most of the books we have come across are rather heavy going for the beginner unless you have a technical mind. However, if you are of that leaning then have a

with the leading edge of audio design. Associations do occasionally crop up on a local basis and it's worth asking nearby hi-fi dealers if they know of such an organisation.

Otherwise why not set up one yourself? We'd be able to give it a bit of publicity and there're probably plenty of people in your area who'd like to meet and natter about their hobby once a month or so.

Pre-amplifiers

After many hours, and many miles, spent visiting London-based specialist dealers, I have purchased a system which comprises: Roksan Xerxes/Artemiz/Shiraz turntable, Quad 606 power amplifier and Roksan Darius loudspeakers (in their full frame stands). The preamp I currently use is a Meridian 101B. As a complete system this works extremely well, but I'm going to have to



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Where Quality Matters

Choosing and Using . . . CD Players

CD players are now the most popular component in the hi-fi chain and while prices slip gently downwards, quality moves up steadily.

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 recently started to slip, 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. 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 now available on CD has grown spectacularly, particularly in the classical and jazz fields, 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, it remains to be seen what sort of long term price premium compact discs can command over LP and musicassette rivals. 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

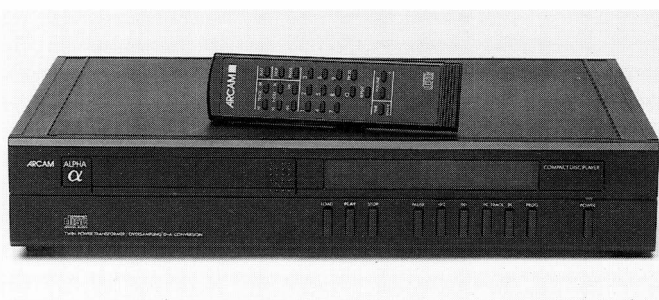
The conventional CD player may simply be plugged into any hi-fi system, as one would a tuner or cassette deck. The amplifier's 'aux', or 'tape' inputs will be perfectly adequate, though the results might be a little loud through the speakers, and require a lower volume control setting than usual. Many 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.

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.



Arcam Alpha CD player: it can't compete on price with Japanese offerings, but sound quality is first-rate. (See page 55)

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Akai CD-55

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After starting life as a tape recorder specialist, Akai has manufactured a full range of hi-fi components for many years, whilst also participating vigorously in the videorecorder and midi system markets. Having recently forged parent company links with the much larger Mitsubishi conglomerate, the company is well placed to strengthen its position as a hi-fi specialist, and offers an extensive range of CD players including those for the cheap'n'midi end of the market, plus a number of full size machines for the hi-fi separates sector.

The £230 CD-55 is a brand new machine in the UK – the accompanying instructions and propaganda wasn't ready at the time of the review. It slots in to the same price point as the CD-52 that received a Best Buy rating when reviewed some eighteen months ago.

If the 10cm high '52 was a fine example of the typical slimline full width player, the 14cm '55 must go down as one of the early harbingers of the new fatline (see also Technics PS50). It looks big and impressive enough, but seems to weigh almost nothing. It's certainly a simple one-hand lift, and appearances are clearly intended to impress the eyes first and foremost.

It is a large machine, though quite handsome with it, thanks to the measure of symmetry introduced by the central control/display/drawer section. The fascia line is enhanced by a horizontal split at loading drawer level. Ergonomics are fine and the control layout is sensible, though there are enough buttons to make the whole thing look rather busy. The display area is large – rather larger than the display itself, though that is comprehensive enough.

The CD-55 is not overburdened with features, but not short of them either. There are eleven keys for direct track entry on both handset and player, various editing-to-cassette aids including a

peak level check button, repeat and random play modes. The remote itself is a bit chunky and button-rich, and includes control of a motorised potentiometer on the player, which feeds both the variable output sockets and the front headphone jack.

Built in Taiwan, a plastic box section has metal fascia, top and bottom. There's a lot of empty space and the small transformer and boards look a little lost inside the box, though all is neatly made, with ribbon cable where possible. Fairly simple circuitry uses Sony control chips and straightforward op-amp analogue output, with normal commercial grade components. The worm drive transport has spring decoupling and a magnetic disc clamp. The digital side uses a Sony 8X oversampling digital filter with 16-bit DAC.

Lab Report

Low level linearity proved a bit disappointing, the transfer curve bending at -65dB but hanging on in pretty well thereafter. Elsewhere the '55 passes muster, but in fact falls somewhat short of the benchmarks established by the '52 eighteen months ago.

Distortion is nevertheless respectable enough, dynamic range is slightly limited, in-band noise is low and the frequency response flat. Error correction is satisfactory, and shock and vibration immunity pretty good, though some clipping was found at high levels. Track access times are on the slow side and there's some mechanical noise.

Sound Quality

Although the CD-55 has a pretty well balanced sound, it is not without flaws. Musical climaxes show a tendency to congestion, and there's a loss of timing in the bass in particular which rather muddles things up.

Dynamics and transients are lively

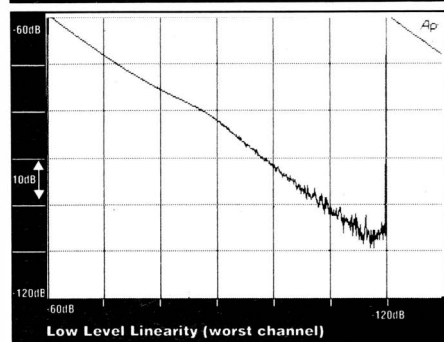
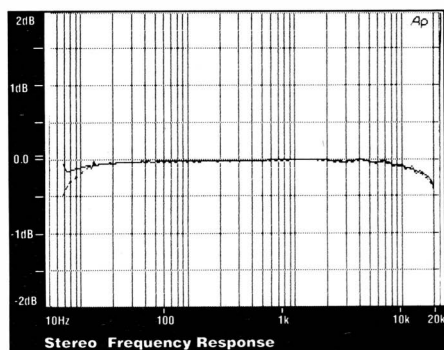
enough, but the low bass in particular is a bit slow, if firm and clean. The stereo soundstage is quite adequate and the treble is sweeter than many price rivals. The midband is tonally neutral, but suffers from some muddle.

Conclusions

The CD-55 looks like a lot of machine for the money, but ultimately fails to impress either the ears or the computing spectrum analyser to the same degree as its more compact predecessor. It doesn't miss the mark by all that much, but doesn't really hit it either.

TEST RESULTS

Test resolution (L/R av)	14.5 bits
Output level, source impedance	2.06V, 0.26dB 400 ohms
Effective dynamic range	93dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Ref 0dB	-84dB -85dB >-90dB
at ±70dB encode + dither	-26/30dB, 5.01/3.16%
Stereo separation	118dB 92dB -74dB
Stereo balance L/R	0dB 0.01dB 0.03dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.4dB
High frequency intermodulation	-92dB, 0.00251%
Electrical noise (CCIR/ARM, 1kHz)	-100dB
Mechanical noise	below average
Ultrasonic noise	100dB
Error correction	1.25mm gap
Shock/vibration resistance	above average
De-emphasis	±0.17dB to 16kHz
Track finding speed (15, YEDS 2)	4 secs
White noise overload test	peak clip
Size (w x h x d)	42.5 x 14 x 35cms
Typical price inc VAT	£230



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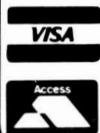
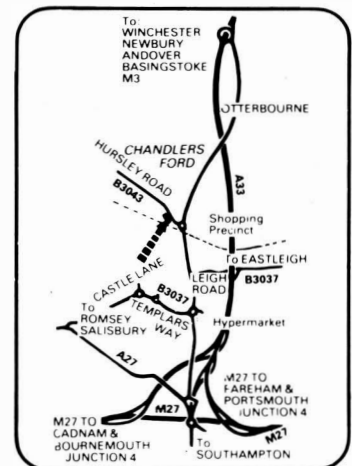
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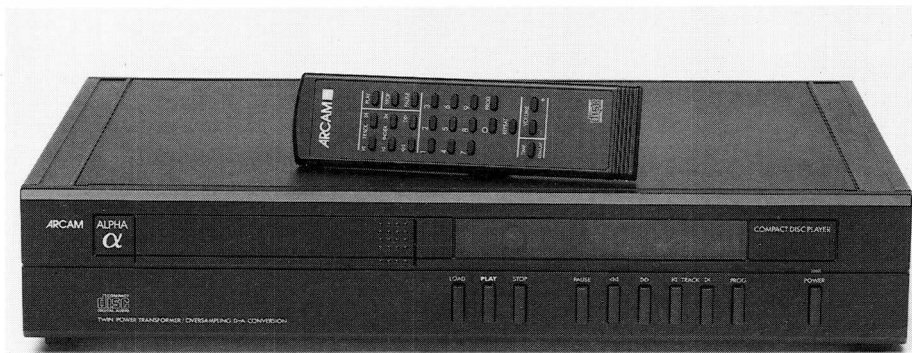


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Arcam Alpha

Best Buy

A&R CAMBRIDGE LTD., DENNY END IND. CENTRE, WATERBEACH,
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Cambridge-based manufacturer Arcam is known best of all for its popular budget amplifiers that have been a strong feature of the market for more than a decade, though various matching tuners, CD players and loudspeakers allow the company to offer several complete CD systems, the cheapest of which is the *Alpha*.

Bottom of Arcam's range it may be, the *Alpha*, however, carries a £380 pricetag which takes it well above the normal budget stratum. But then it doesn't look or feel like a budget player either, so in this respect at least you get what you pay for.

It's pretty solid, being mainly metal in construction. The top plate might be persuaded to rattle under adverse conditions, though it's thoughtfully foam damped. Discreet and tasteful design follows the usual Arcam house style, dividing the plastic fascia into two by a horizontal line. The loading drawer and display take up the top half, while clearly labelled but identical pushbuttons covering just basic facilities are sensibly grouped along the lower section.

The handset is a pretty basic Philips-sourced item, though it fits nicely into the hand and the intelligent use of graphics improves ease of use over simple button labels. The rear panel has a 3-core IEC mains socket, a stereo phono audio pair and a single phono socket carrying digital data in electrical form. The latter permits future upgrading by the addition of an outboard D-to-A converter such as the *Black Box* that is successful in its own right, as well as making up half the company's 'two box' CD player.

Inside, the dual transformers are mounted on the right (better to suit Arcam amplifiers). The basic Philips board is augmented by an Arcam board which is sited behind the transport and contains the power regulation, DACs and audio circuitry – good quality com-

ponents and design care are both evident. The DAC/filter technology is to the latest Philips specification, as is the plastic chassis, brush motor CDM4 transport which uses a weighted disc clamp.

Lab Report

The fixed output level is 2.5dB above the CD format standard, which will do no harm except perhaps to fool the unwary when conducting A/B comparisons. The frequency response shows a very mild (probably inaudible) HF rolloff, down about 0.5dB at 20kHz. Distortion measurements are pretty good while dynamic range and in- and out-of-band noise figures are excellent, as is low level linearity.

Error correction capabilities and track access times are fine, if less than the best. Shock and vibration poses no problems and mechanical background noise is low.

Sound Quality

More than adequate in the lab, the *Alpha* proceeded to turn in a remarkable performance during the listening tests, its overall attainment in the test group matched and beaten only by significantly more expensive machinery. Recognisable Philips technology is subtly reworked and enhanced to create a supremely well balanced performance, doubtless thanks in part to the avoidance of the compromise which remote volume controls often introduce.

The music drives along well, with convincing dynamics, clean transients and a fine sense of pace. The bass is firm, articulate and well balanced, while the mid-band provides plenty of detail within an essentially neutral character. Treble grain is well controlled and string tone is sweet, with no perceptible unwanted exaggerations. The stereo soundstage is generous in scale and precise in focus

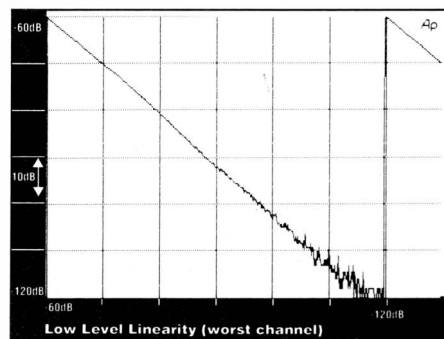
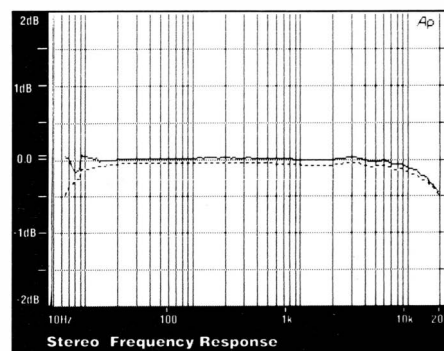
and location in all planes.

Conclusions

Eminently listenable and significantly less fatiguing in the long term than some rivals, even at £380 the Arcam *Alpha* is just as obvious a Best Buy amongst CD players as the speakers of the same name were in last month's loudspeaker tests. Indeed in some respects it puts earlier, more expensive Arcam CD players somewhat in the shade, and makes equal sense as a source component in the complete *Alpha* system or as a top quality single-box standalone player in its own right.

TEST RESULTS

Test resolution (L/R av)	15.8 bits
Output level, source impedance	2.47V, 1.85dB, 26 ohms
Effective dynamic range	109dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Ref 0dB	-91dB -86dB -76dB
at -70dB encode + dither	-36dB, 1.58%
Stereo separation	98dB 100dB 90dB
Stereo balance L/R	0.06dB 0.06dB 0.03dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.5dB
High frequency intermodulation	-81dB or 0.0089%
Electrical noise (CCIR/ARM, 1kHz)	-108dB
Mechanical noise	low
Ultrasonic noise	-111dB
Error correction	2.4mm gap
Shock/vibration resistance	good
De-emphasis	-0.13dB to 16kHz
Track finding speed (15, YEDS 2)	3.5 secs
White noise overload test	OK
Size (w x h x d)	43 x 8.4 x 29.5cms
Typical price inc VAT	£380



**NORTH HERTS
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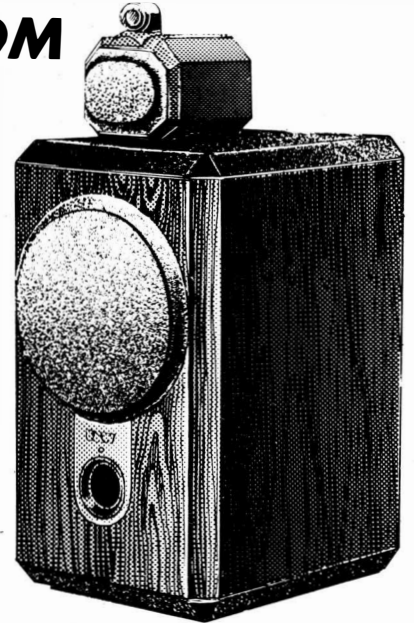
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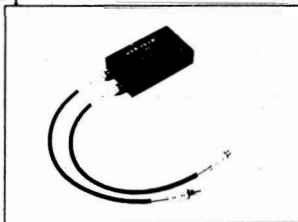
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Carver TL-3300

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TEL: (071) 607 2717.



Carver is a comparatively young US specialist hi-fi brand, though principal Bob Carver's background extends back to the birth of Phase Linear, successful in Britain during the Seventies, and subsequently purchased by Pioneer. Since founding a company under his own name, Carver has imbued most of his products with unconventional features which have intriguing names: 'magnetic field' power amplifiers and 'sonic holography' preamplifiers are two examples, while the review TL-3300 CD player incorporates a unique 'digital time lens' (DTL).

Carver operates at well above normal mass market prices, hence the £695 pricetag on this machine, not to mention the hitherto rather limited UK availability. It's an attractive slimline machine, and has a cleverly metallised solid plastic front panel that follows traditional US 'pro-style' practice with overlapping rackmount edges and grab handles – the lack of screw holes or slots is the giveaway that this isn't really a bit of pro gear. It may not mount an equipment rack, but it's the only machine in this month's test group with feet which actually act as proper spring decoupling for the entire machine, which is a nice touch of integrity.

The DTL feature is more a matter for debate. Based on observations of the qualitative differences between CD and vinyl replay (presumably from some years back), operating the DTL switch adds equalisation and adjusts stereo separation so as to mimic more closely the positive attributes of vinyl. The philosophical objection of course is that two wrongs rarely make a right, but it's probably more sensible to regard this as a 'taste' button, whose flavour some listeners may enjoy.

The machine itself is nicely laid out, though the handset with 22 track keys presents lots of identical buttons and

only limited graphics to help find the way around. Aside from the abovementioned, the facilities are the usual standard stuff, and might possibly be considered a little limited given the price of the machine; certainly the display is a little small.

The TL-3300 is actually made in Japan, is of medium weight, all metal build, with a slightly rattly wrap. The insides are rather disappointing in view of the price: the power transformer is small, and there's no evidence of any audiophile componentry, just normal Japanese commercial grade. Chips come from a variety of sources, including NEC and Toshiba, while a Yamaha 18-bit 8X oversampling digital filter operates alongside the Burr Brown PCM58P DAC. There's no digital output of any kind, just a fixed phono stereo pair.

Lab Report

The DTL acts very much as its description suggests, reducing stereo separation from the high figures shown in the test results to around 16dB, and introducing a high frequency cut that amounts to around 2.2dB. DTL aside, the measurement set is generally very competent, with excellent low level linearity and frequency response, very good dynamic range and noise figures and satisfactory distortion, though HFIM is a bit weak. Finding the test track took a tardy 7secs – slower than many autochangers. Shock and vibration rejection seems only average, though in practice the feet will probably help.

Sound Quality

Disregarding the DTL feature for the moment, the TL-3300 sounds distinctly old fashioned, and was ranked no higher than beer budget models overall. Pace is slowed, dynamics and transients are softened, and stereo images lack depth and precise focus. The bass is rather ill-

defined, somehow managing to sound both heavy and soft. The midrange is reasonably clear, if a shade artificial, while the treble is also soft, yet with a certain gritty/grainy quality.

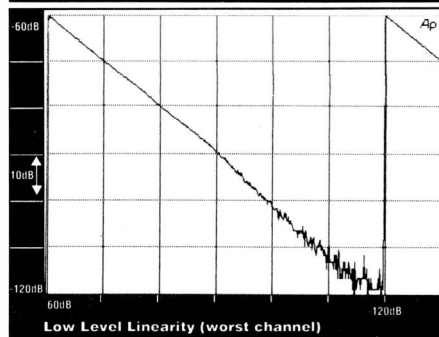
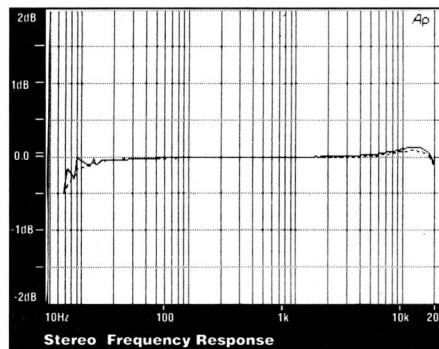
Switch in the DTL and the sound becomes thicker, slower and more slurred. The saving grace is that it can help tame overbright discs.

Conclusions

Irrespective of the rights and wrongs or likes and dislikes of the digital time lens, the TL-3300 does not deliver the level of sound quality expected of a £700 CD player. The DTL adds minuses as well as pluses to the overall equation, and at the end of the day it must be regarded as a rather expensive way of adding a little equalisation and stereo blending.

TEST RESULTS

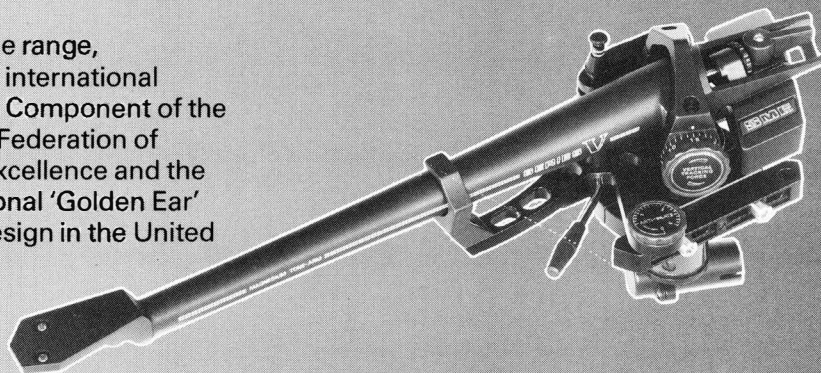
Test resolution (L/R av)	15.9 bits		
Output level, source impedance	2.09V, -0.39dB 230 ohms		
Effective dynamic range	108dB		
Harmonic distortion	20kHz	1.0kHz	20kHz
Ref 0dB	-92dB	-92dB	-90dB
at -70dB encode + dither	-42/38dB, 1%		
Stereo separation	1.02dB	114dB	83/89dB
Stereo balance L/R	0dB	0dB	0.04dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.18dB		
High frequency intermodulation	-60dB, 0.1%		
Electrical noise (CCIR/ARM, 1kHz)	-104dB		
Mechanical noise	low		
Ultrasonic noise	117dB		
Error correction	1.0mm gap		
Shock/vibration resistance	average		
De-emphasis	±0.02dB to 16kHz		
Track finding speed (15, YEDS 2)	7 secs		
White noise overload test	OK		
Size (w x h x d)	48.4 x 10.0 x 32cms		
Typical price inc VAT	£695		



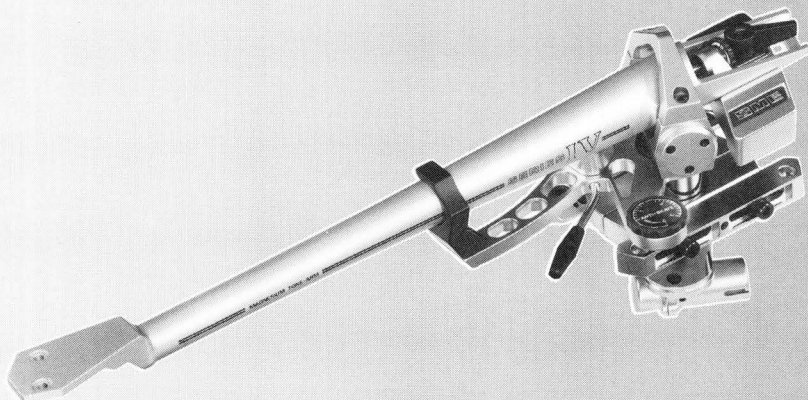
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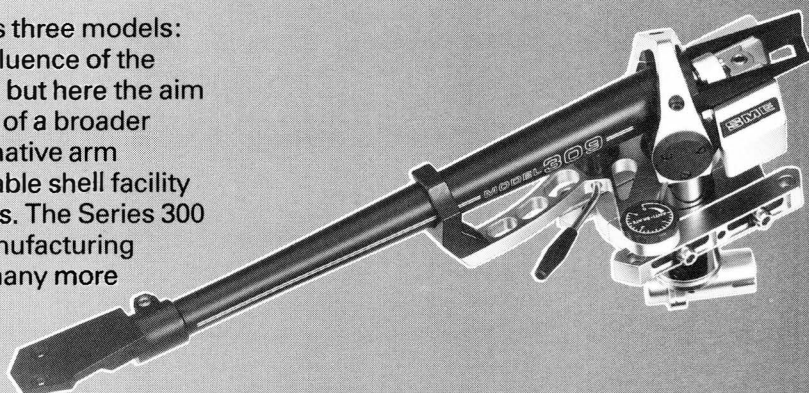
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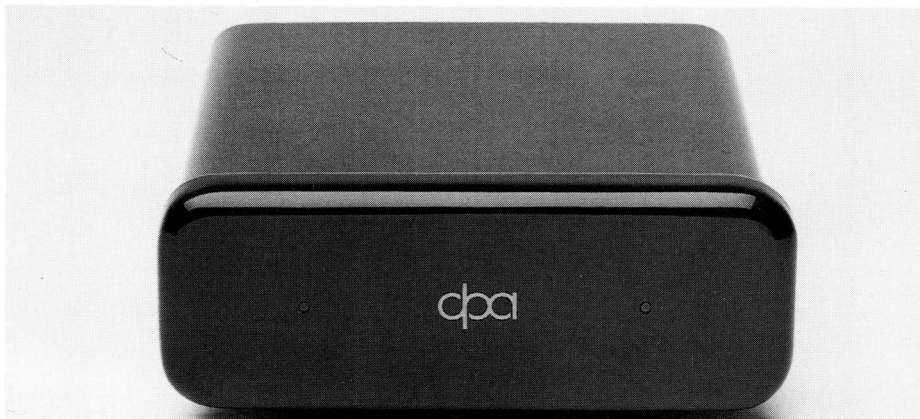
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Deltec PDM One (DAC)

Recommended

DELTEC LTD., UNIT 7, EAST MOORS BUSINESS PARK, EAST MOORS RD., CARDIFF CF1 5EG. TEL: (0222) 482818.



Deltec is a small, young but very committed amplifier specialist based in Wales. Ultra-modern styling and high speed transistor circuitry, plus an elegant line in interconnect cables have all helped create a strong sense of identity, marking Deltec as a brand well worth watching closely.

The *PDM One* is neither amplifier nor CD player, but rather sits between the two. It's a digital-to-analogue signal processor, and as such takes the digital signal from the (electrical/coaxial) digital output of any so equipped CD player or dedicated CD transport. But this is not just any ordinary, conventional multi-bit DAC, it's an example of the latest Philips low-bit 'bitstream' converter, though in this instance packaged very much as an audiophile product, spartan in terms of facilities and features but with luxury build and a £500 pricetag.

For which you don't get a great deal, it must be said. Just a small three-legged box, fitted with IEC mains input socket, an electrical (co-axial) digital signal input, a 1m length of Deltec's *Digilink* cable (worth £25 as a separate item), and a stereo phono pair output. There are none of the additional features – admittedly of arguable value – which are sometimes found on outboard DACs, such as optical inputs and variable sampling frequencies. Deltec makes some optional extras too, such as a special mains cable and a power filter to tweak the utmost performance out of the unit.

Good build and careful audiophile practice is confirmed on internal inspection. Single board construction minimises wiring while separate and generously regulated transformers are used for the analogue and digital power supplies. The analogue output is Deltec's own thick film device, while the digital decoding uses a single Philips bitstream DAC in a fairly straightforward and simple application.

Lab Report

The lab performance of the *PDM One* must be regarded as something of a disappointment; certainly it is below average in most respects, though that should not necessarily be regarded as grounds for condemnation.

The output level is nearly 3dB above the CD standard, and absolute phase is inverted as well, so attempts at A/B comparison will be rather fraught. Low level linearity is acceptable enough, though it did vary between samples, averaging 15.5 bits. The frequency response is quite noticeably tailored, with a slight (1.2dB) but audible HF rolloff.

Dynamic range is satisfactory, ultrasonic spurious are low and intermodulation distortion is good, but harmonic distortion, stereo separation and in-band noise are all a bit below par.

Sound Quality

Driven from a high quality CD transport, the Deltec sounds very good indeed, confirming both the tenuous link between measured and subjective performance, and the potential of even a comparatively simple 'bitstream' decoder application.

The overall effect is very natural, almost 'analogue' in character, with notably good stereo soundstaging and a sweet and neutral midband. Pace is a shade lacking, and both dynamics and transients could have been more convincing; the bass is detailed, firm and extended, if a trifle heavy with it. The treble sounds just a little dull, but is qualitatively very fine with very good resolution.

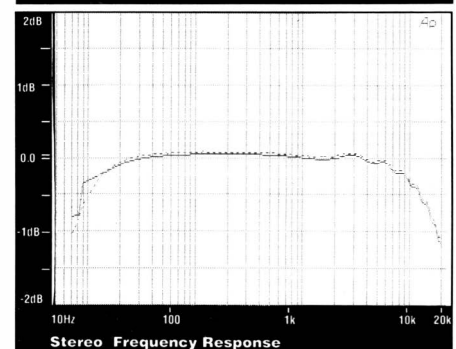
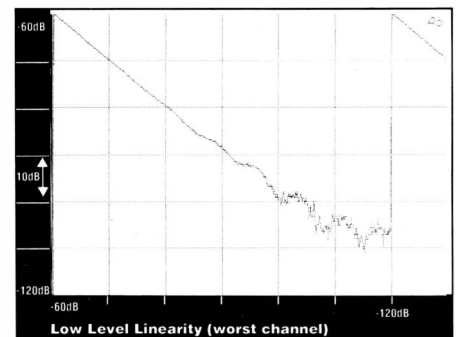
Conclusions

One might quibble that the technological content is no more sophisticated than the on-board converter that accounted for £50 of the price of the Sony *TA-F630ESD* digital amplifier, but Deltec has

applied the audiophile techniques with their associated costs to elevate the sound quality onto a different plane. Not a match for the more elaborate and expensive Meridian bitstream application, the *PDM One* is nevertheless currently the best sounding reasonably priced outboard decoder currently on the market, a situation which demands Recommendation.

TEST RESULTS

Test resolution (L/R av)	15.5 bits		
Output level,			
source impedance	2.8V, +3dB 0.5 ohms		
Effective dynamic range	94dB		
Harmonic distortion	20kHz	1.0kHz	20kHz
Ref 0dB	-81dB	-82dB	-90dB
at -70dB encode + dither	-33dB, 2.2%		
Stereo separation	80dB	85dB	84dB
Stereo balance L/R	0.03dB	0.025dB	0.04dB
Frequency response (ref 1kHz) 20Hz to 20kHz	+0, -1.2dB		
High frequency intermodulation	-90dB, 0.003%		
Electrical noise (CCIR/ARM, 1kHz)	-85dB		
Mechanical noise	low hum		
Ultrasonic noise	-100dB		
De-emphasis	±0.3dB to 16kHz		
White noise overload test	OK		
Size (w x h x d)	19.5 x 8.2 x 22cms		
Typical price inc VAT	£500		



Denon DCD-620

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



Although Denon is the most recent of the Japanese hi-fi specialists to become established in the UK, it is also currently amongst the most successful. Much of this has come through treating the humble cassette deck much more seriously than most rivals, though Denon was also in on the ground floor of digital audio technology more than a decade ago, in association with Japan's national broadcaster NHK. All of which provides a pretty convincing background story behind a range of CD players.

And quite a range it is too, covering all price points from the £170 'budget' DCD-520 up to the £1,000 3520 'flagship'. A glance through the Directory shows a string of Recommendations, and that the 610 predecessor of the £200 620 covered here was itself a Best Buy; the two models have much in common, the 620 featuring more advanced digital technology and a slightly greater feature count.

Denon is past master of the delicate art of creating an extended and carefully differentiated hierarchy of models from a limited number of building blocks. The 620 is pretty well featured, though you don't get the remote volume control or digital output that comes with the 820, next rung up the ladder. What you do get is the same size display and the same 20-bit 8X oversampling digital filter and dual 16-bit DAC circuitry as the 820, which doesn't come in the 520, though all three share the same transport.

It's very nicely finished and sensibly laid out for easy use, but entirely conservative in styling. Indeed, in some senses it is the stereotype slimline full width CD player. Quite solidly built, the plastic tray with metal top and fascia cover sits on the obligatory large pseudofeet. Showing lamentable lack of taste, Denon persistently covers its fascias with advertising slogans: "20bit 8times oversampling digital filter", "computer multi function display", "direct music select sys-

tem" are entirely spurious to the activity of playing compact discs.

The feature count is more than adequate, including a volume controlled headphone socket, editing functions, direct track entry on machine and handset, plus a couple of repeats and random play modes. The grey-on-black handset is pretty and discreet.

Inside, the power supply is less impressive than the propaganda implies, and there's no evidence of selected audio grade components. The single-sided main board is well built and neatly incorporated with the minimum of wiring. Sony chips control the worm-drive linear tracking transport, the sub-chassis moving up against a fixed clamp. The digital side uses an NPC filter and Burr Brown dual 16-bit DAC.

Lab Report

The 620 delivers an entirely satisfactory if unspectacular performance in the lab. It's interesting to make comparisons with its 610 predecessor (Nov '88), and noting both the close similarity, but also that the new model scores sufficient extra points here and there to make the upgrade worthwhile. Distortion and stereo separation are both improved, though channel balance and low level resolution – both functions of quality control – are a little below par here, as is error correction.

Sound Quality

In the listening room, the sound quality was considered respectable enough, though mildly disappointing in today's context and against the strength of budget competition elsewhere. It's as if Denon has remained where it was a year or so ago whilst rivals have been moving steadily forward.

The sound is generally cheerful, with respectable detail and an attractive 'open' character. It's dynamically quite

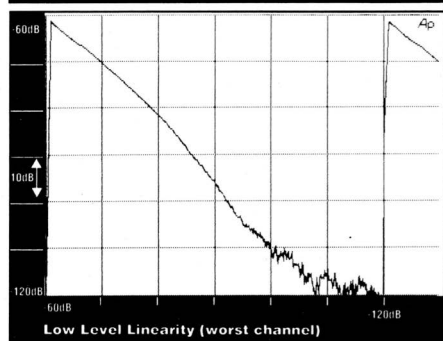
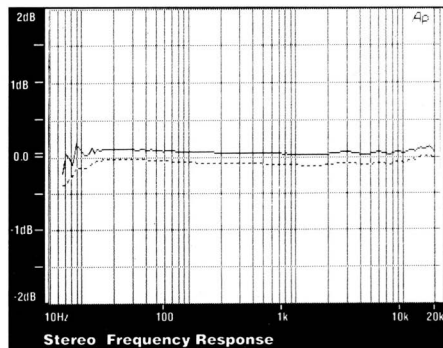
lively, and the bass shows good articulation and extension. But pace is laboured, and timing lacks total co-ordination, while stereo images are smaller and less precisely formed than the best. The treble is not without a measure of tizz and grain, while the midrange is slightly hard, though detailed and precise.

Conclusions

Good build and fine presentation at a sensible price will almost certainly ensure that the 620 repeats the success of its predecessor in the marketplace. It is worth consideration, to be sure, but is insufficiently special in both technical and subjective performance to warrant the same degree of praise accorded the 610, now that we're all some eighteen months further down the road.

TEST RESULTS

Test resolution (L/R av)	15.7 bits
Output level, source impedance	1.79V, -0.95dB 860 ohms
Effective dynamic range	102dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Ref 0dB	-85dB -86dB -90dB
at -70dB encode + dither	-36dB, 1.58%
Stereo separation	109dB 91dB 70dB
Stereo balance L/R	0.14dB 0.13dB 0.08dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.13dB
High frequency intermodulation	-93dB, 0.00224%
Electrical noise (CCIR/ARM, 1kHz)	-99dB
Mechanical noise	low
Ultrasonic noise	110dB
Error correction	0.75mm gap
Shock/vibration resistance	good
De-emphasis	±0.25dB to 16kHz
Track finding speed (15, YEDS 2)	4 secs
White noise overload test	OK
Size (w x h x d)	43.5 x 10.6 x 31cms
Typical price inc VAT	£200



Denon DCD-920

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



Denon is a Japanese hi-fi company that has strong links with professional and broadcast sound activities. Its work with NHK was an important part of the pioneering days of digital audio, making recordings for release on the company's own record label. The brand was one of the last to get properly established in the UK, but has been amongst the most successful over the last few years, concentrating solely on hi-fi separates and making some attempt to tailor products to British tastes.

Whether the £320 DCD-920 is top of the budget range or bottom of the upmarket models must be a moot point. As usual, Denon has carefully manipulated the various features and building blocks so as to create an almost continuous hierarchy. It shares the same basic slimline chassis with the cheaper 520, 620 and 820 models, but takes on board the twin 20-bit DAC technology, motor driven remote volume control and optical/electrical digital outputs featured in the larger £400 1420.

Though light, the whole affair feels quite solid and well built, within a plastic tray chassis with metal top and fascia. There are lots of features to fit on the slim panel, so inevitably the button count is a bit daunting, though nice 'feel', good grouping and intelligent labelling helps ease the way, as does the attractive partnering handset with its contrasting textures. Finish is excellent, though style can only be described as staid and unadventurous (which probably makes sound commercial sense).

To list all the additional features would be sheer tedium, but the display is pretty comprehensive, there are editing functions, index search, three repeat modes and so on. The headphone socket shares the same motorised potentiometer as that connected to the variable output sockets.

It's difficult to understand why Denon

chose to inscribe: "real 20bit 8times oversampling digital filter" on the front panel. Was it in order to point out that those used in the "20bit 8times oversampling digital filter" of the DCD-620 were of a purely imaginary nature? Or was it to take a collective swipe at other manufacturers (eg Sony) who use lots of big numbers without specifying whether they're referring to digital filters or DACs? Whatever the reason, it lacks both style and taste, just like the whole futile numbers race itself.

Inside, the power supplies are simple and small and there is no evidence of audiophile practice or components. All is neatly laid out and assembled on one main board. Sony control chips are used for the worm drive, spring suspended laser transport. The digital side uses an NPC 8X oversampling digital filter and two Burr Brown PCM61P DACs.

Lab Report

After suffering the front panel hype, it is pretty disappointing to find the 920 delivering below par low level linearity, amounting to a net resolution of only 15 bits (average), though this is partly because one channel was less than optimally adjusted. In other respects the measurements are fine, though no better than those for the DCD-910 eighteen months back – or indeed the '620 reviewed in this issue. However, track finding is a little faster, and resistance to shock and vibration a little better.

Sound Quality

The 920 may not measure any better than the 620, but fortunately it does sound rather nicer – though not to the degree where it can be said to justify a 60 per cent price differential. The 920 has better pace and timing than the cheaper Denon model, is quite convincing dynamically and seems enthusiastic to get on with the task of making music.

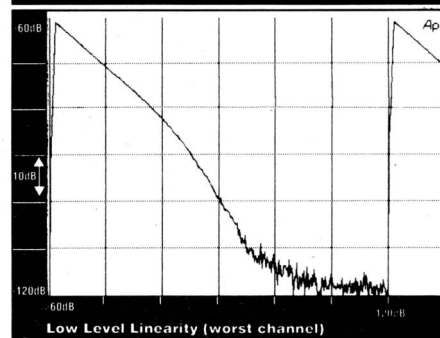
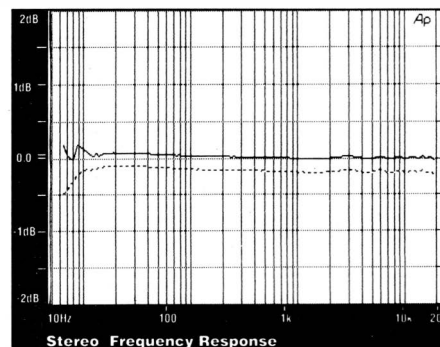
The bass has firm weight that avoids softness or boom, but the midrange is a little on the thin side, and string tone is a little 'wiry'. The treble could be smoother too, and is a little grainy, while the stereo soundstaging is no better than average. In all it's a slightly old fashioned sound – as good as Denon's more upmarket machinery of a couple of years back, but not really cutting it against the latest competition at the price.

Conclusions

There's no arguing with the build, finish or feature count, but the 920 doesn't really deliver the goods for the price, either in the lab or – more important – as a source component in a good quality specialist hi-fi system.

TEST RESULTS

Test resolution (L/R av)	14.2 bits
Output level, source impedance	1.91V, -0.40dB 350 ohms
Effective dynamic range	98dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Ref 0dB	-86dB -84dB -86dB
at -70dB encode + dither	-28/34dB
Stereo separation	114dB 106dB 85dB
Stereo balance L/R	0.18dB 0.16dB 0.19dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.02dB
High frequency intermodulation	-92dB, 0.0025%
Electrical noise (CCIR/ARM, 1kHz)	-98dB
Mechanical noise	low
Ultrasonic noise	105dB
Error correction	0.75mm gap
Shock/vibration resistance	very good
De-emphasis	±0.63dB to 16kHz
Track finding speed (15, YEDS 2)	3 secs
White noise overload test	OK
Size (w x h x d)	43.5 x 10.8 x 31 cms
Typical price inc VAT	£320



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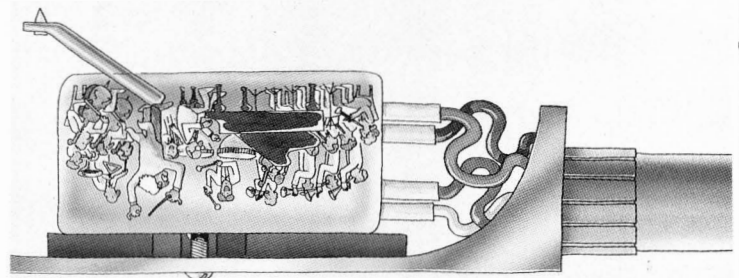
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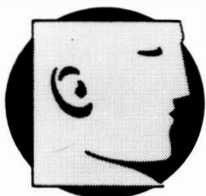
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Goodmans GCD 530

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South Coast speaker specialist Goodmans, largest component in the TGI group, probably has a higher turnover than any other UK hi-fi company, though that is partly due to extensive activity in the in-car market and a policy of distributing a wide range of budget price consumer electronics products under the Goodmans brand.

The GCD 530 is an example of the latter, though it certainly fits in better with the core business than the microwave ovens we've seen recently. A remote control CD player with a major brand name for £140 sounds like an interesting proposition, though handling the machine itself is reminder enough that you get what you pay for.

It's a midi size and very lightweight affair in solid plastic, relieved only by a metal top plate. Made in Taiwan, it feels and looks like cheap midi stacker fodder, with all manner of coloured graphics and clashing typefaces. Red, white, grey, yellow and blue are sprinkled willy nilly across the fascia, the net result bringing to mind another reviewer's favourite phrase: 'a mug's eye-ful'.

Basic feel is unavoidably cheap, with sharpish corners. The display is tiny and the control buttons feel plasticky. Features and options are very basic, the rear panel carrying a captive mains lead and a stereo phono pair of outputs only. The unit sits on silly decorative feet, and has the usual basic budget facilities, including the capability of handling both five and three inch CDs. The remote handset is a similarly simple affair, covering only basic functions.

Economy is very much the order of the day inside the box too. Construction is cheap, the power supply transformer small and the wiring a little messy, though some tidier ribbon is used to feed the display. The sheet metal and plastic worm drive linear tracking transport is mounted on rubber bushes. The digital

circuitry uses a simple 16-bit 2X oversampling Yamaha chip set, and components are all standard commercial grade.

Lab Report

Those planning to conduct A/B listening comparisons should bear in mind the extra dB output level that the '530 has over the CD standard. Left and right channel balance is excellent, and low level linearity is very good too, though overall resolution is mildly compromised by full level compression.

Most other parameters are satisfactory enough, though below average for all that. Harmonic distortion deteriorates towards high frequencies and intermodulation distortion is a comparatively weak 0.45% (-47dB). The frequency response rises 0.8dB at high frequencies, which is just audible, while the low mass makes the player quite susceptible to shock and vibration, and somewhat mechanically noisy besides. Track access takes rather longer than usual, and error correction is only satisfactory.

Sound Quality

That the GCD-530 came at the bottom of the sound quality list only mirrors its position on the price ladder. And to be fair, its overall ranking was less than that 12.5% behind quite a number of other machines, so the level of attainment was pretty commensurate with the price. However, the bottom line is that this Goodmans comes closer to the standards of cheap midi systems than genuine budget hi-fi, and in many respects only reflects the rather mediocre measured performance.

Pace is slowed, timing is lazy and music becomes uninvolved in consequence. The bass is thick and boomy, lacking definition and speed, while the mid-band sounds thin, hard and compressed. The treble is grainy, detached

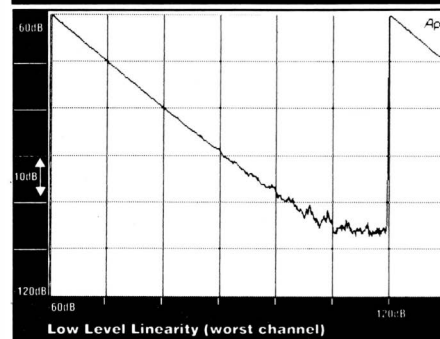
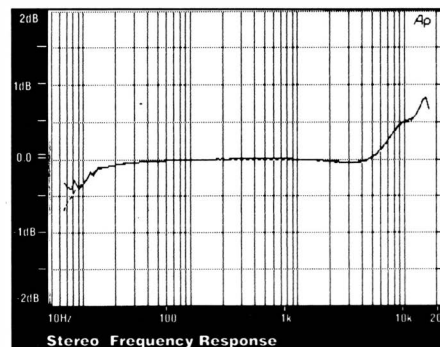
and inclined to 'splashy' sibilant emphasis. The stereo soundstage is fairly respectable, which is one saving grace.

Conclusions

There's no avoiding the fact that the GCD-530 carries a pricetag some £20 less than most of the competition, but in the final analysis the extra £20 is well worth finding. That it can replay compact discs to a tolerable standard and with remote control convenience may be sufficient for many people, but it does not achieve sufficient sound or build quality for formal *Choice* recommendation.

TEST RESULTS

Test resolution (L/R av)	15.5 bits		
Output level, source impedance	2.19V, 0.77dB, 1kohm		
Effective dynamic range	97dB		
Harmonic distortion	20kHz	1.0kHz	20kHz
Ref 0dB	-82dB	-79dB	-42dB
at -70dB encode + dither	-40dB, 1%		
Stereo separation	83dB	84dB	73dB
Stereo balance L/R	0.01 dB	0dB	0.08dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.8dB		
High frequency intermodulation	-47dB or 0.45%		
Electrical noise (CCIR/ARM, 1kHz)	-94dB		
Mechanical noise	below average		
Ultrasonic noise	96dB		
Error correction	0.75mm gap		
Shock/vibration resistance	below average		
De-emphasis	±0.23dB to 16kHz		
Track finding speed (15, YEDS 2)	4.5secs		
White noise overload test	OK		
Size (w x h x d)	35 x 9.2 x 27.5cms		
Typical price inc VAT	£140		





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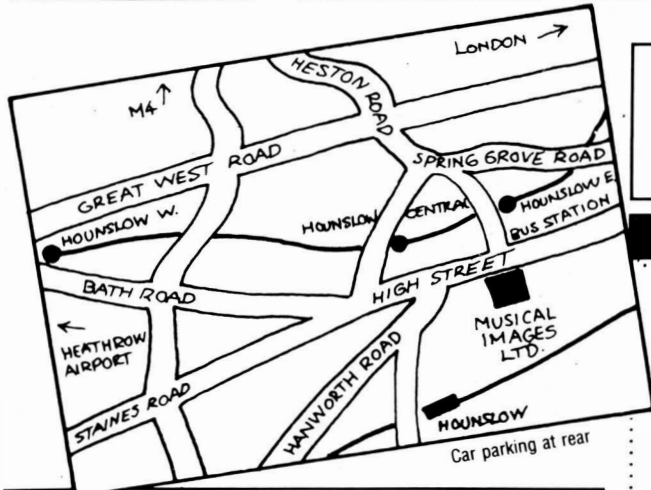
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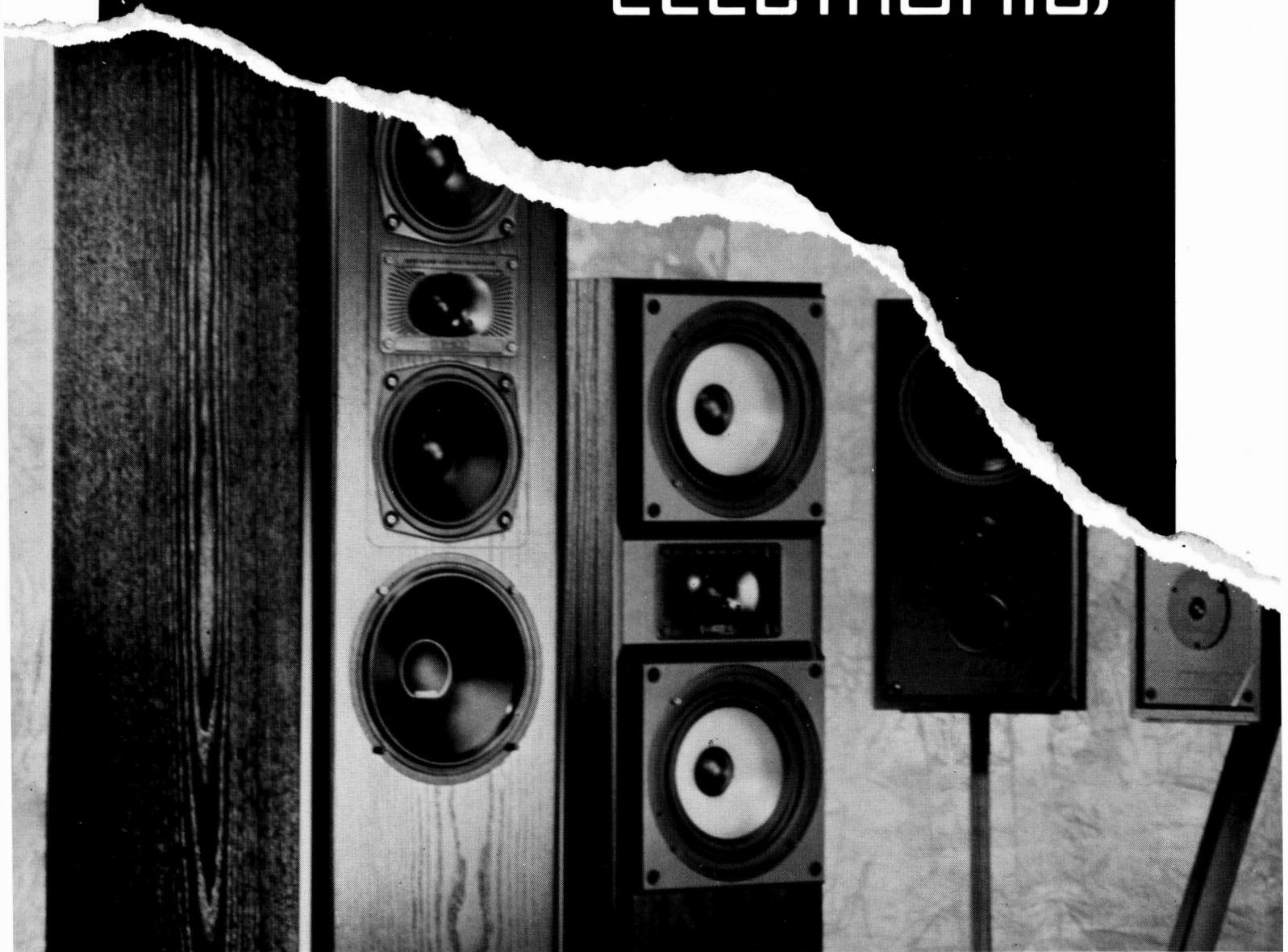
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Harman is by nature and history an American brand, though manufacture has been carried out in the Far East for a number of years. Amplifiers are its main stock in trade, though the brand has covered full line electronics for many years now, and has a respected niche in upmarket cassette decks too, for example.

The 7300 is the £199 hands-on-only base model in a four strong range of closely related CD players. An extra £50 buys the remote control 7400 which is otherwise identical, while a few extra features are added for the £299 7500 covered on the next page. Design is clearly American, though Taiwan is the source of manufacture on this occasion. And the package here seems generous enough in size and weight – not to mention attractive styling – to help justify its premium over current beer-budget prices.

There's certainly a touch of class – laced with a smidgeon of affectation – in the neat italic graphics on the moulded plastic fascia. The legends combine discretion with (just) legibility, and the 7400's remote handset shows similar visual elegance, albeit with limited facilities.

Centrepiece of the aesthetics is a one inch high section of front panel, embossed as a pronounced curve across the whole width. This includes display, drawer and five switches – only two of which are important. Six much smaller radiused keys are used to cover the operational functions and are less clearly identifiable below the display, which is ergonomically silly.

The display itself is quite small and simple, as are the options, the rear panel carrying just a single pair of stereo phono output sockets and a fixed mains lead. Only the usual roster of basic features are fitted – programming, repeat, display functions and so on.

The fascia moulding is neat enough, though there are sharp corners where it just fails to butt up against the all-metal wrap. Underskin build is to a high standard, with fair sized separate power supplies for digital and analogue circuitry, a well laid out main board with neat wiring, and a discrete component analogue output stage. Sony chips control a metal chassis, rubber decoupled subchassis, worm drive transport, while the DAC/digital filter uses a hybrid high oversampling/low bit Sanyo chip set. Good quality standard commercial grade components are used.

Lab Report

The test programme produced generally satisfactory results, with excellent low level linearity and distortion, alongside very close channel balance. Harmonic distortion was only satisfactory at high levels, the high frequency figure being some 40dB poorer than the midband equivalent.

Intermodulation distortion and noise levels are also a little below average, leading to a mildly restricted overall dynamic range. The frequency response is basically flat, with a mild HF ripple, while ultrasonic spurious are very well suppressed. Shock and vibration rejection is good and error correction satisfactory.

Sound Quality

The H/K was a disappointment in listening tests. The sound was described as soft and soggy, its most positive attribute being a lack of any aggression. Dynamics are muted and transients softened, and the lack of any particular pace and urgency made for an uninvolved overall experience.

The bass sounds a little plump, and is short of both punch and authority, while the treble is soft, dulled and slightly 'mushy' in character. Though tonally

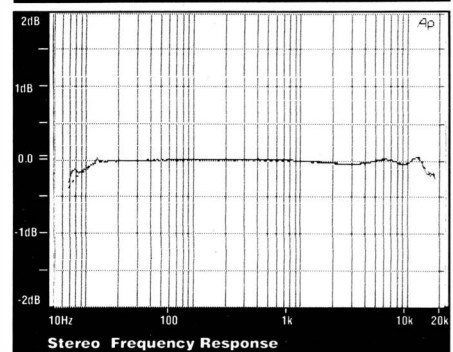
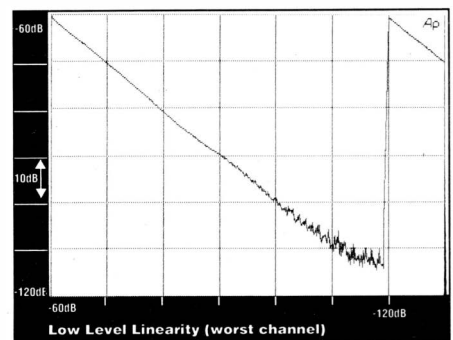
neutral enough, the midband seemed somehow obscured and compressed, as is the stereo soundstage, leading to an overall sound which seemed deadened and bland.

Conclusions

These Harman/Kardon models certainly look pretty enough – indeed, most others could learn from their example in this respect – but £50 for the simple remote handset seems a bit steep, and at the end of the day the sound quality is disappointing. Whether the latter is a function of the hybrid low-bit digital-to-analogue converter technology must remain open to debate, though a finger of suspicion must be pointing in that direction.

TEST RESULTS

Test resolution (L/R av)	15.9 bits		
Output level, source impedance	1.95V, -0.21dB	100 ohms	
Effective dynamic range	97dB		
Harmonic distortion	20kHz	1.0kHz	20kHz
Ref 0dB	-86dB	-79dB	-39dB
at -70dB encode + dither	-37.0dB, 1.3%		
Stereo separation	80dB	80dB	86dB
Stereo balance L/R	0dB	0dB	0.04dB
High frequency intermodulation	-73dB or 0.022%		
Electrical noise (CCIR/ARM, 1kHz)	-94dB		
Mechanical noise	low		
Ultrasonic noise	111dB		
Error correction	1mm gap		
Shock/vibration resistance	good		
De-emphasis	±0.2dB to 16kHz		
Track finding speed (15, YEDS 2)	3.5 secs		
White noise overload test	OK		
Size (w x h x d)	44 x 10 x 33.5cms		
Typical price inc VAT	£199/£249		



Harman/Kardon HD7500

HARMAN (AUDIO) UK LTD., MILL STREET, SLOUGH, BERKS SL2 5DD.
TEL: (0753) 76911.



Harman/Kardon has weathered its fair share of ups and downs over the years, but is now internationally the best known and established of the US electronics brands, preserving a recognisable identity that sets it apart from the Japanese majors, even though the products themselves are manufactured mainly in the Far East. Amplifiers are central to HK's activities, the latest examples anticipating the latest trend towards the integration of hi-fi with video/TV systems, but there's a new range of CD players around too.

Like its 7300/7400 brother, the HD7500 comes from Taiwan, though this model carries a £299 pricetag and comes complete with the remote handset and a much greater complement of features. The end result is certainly busier looking, but fortunately the extras have been included without spoiling the attractively clean lines. The front panel graphics remain an object lesson in good taste that other brands would do well to imitate, though the decision to put the most inconsequential and least useful buttons in the most prominent place, on the proudly embossed strip right next to the display, remains inexplicable.

The extras you get on the machine itself are a headphone socket with volume control, a row of direct track entry keys (1-10+10), and twice the number of buttons on the raised section, with the addition of display, check and clear buttons. The display is four times the size (and complexity) of that fitted to the cheaper models, while the rear panel now has both fixed and variable audio outputs, though the variation is introduced by the headphone volume control on the player itself, not via the remote handset.

The latter looks as pretty as the machine, though it feels rather chunky to hold and point, and incorporates four extra operating features: intro scan, A-B

repeat, space and index.

The plastic fascia has sharp corners when meeting the metal wrap, but otherwise the machine feels solid and well built. The internals are well constructed and neatly laid out on the steel chassis, though one or two post-production modifications are evident. Decent size separate power supplies are fitted for the analogue and digital circuitry, some selected grade capacitors are included and the output amplifier uses discrete devices.

The digital-to-analogue operation uses a hybrid high oversampling/low bit Sanyo chip set, while Sony control chips drive the metal chassis, rubber decoupled subchassis worm drive transport.

Lab Report

Output level is nearly a dB over the standard, but elsewhere the 7500 has most of the strengths of the 73/7400 model, with fewer weaknesses. Improved component quality is reflected in significantly better harmonic and intermodulation distortions, stereo separation and electrical in-band noise figures. Low level linearity is exceptionally good, though the error correction and shock/vibration resistance of our sample was only adequate, and presumably would have benefited from more careful factory set-up. Ultrasonic spurious are also more obvious with the 7500 than the 73/7400.

Sound Quality

Although it sounded significantly better than its cheaper stablemate, the 7500 still did little to excite the listening panel. Indeed the general lack of musical excitement seems to be the main problem here. Dynamics and transients are a bit muted and softened, while energy and bounce seem lacking and pace is distinctly lethargic.

The stereo soundstage is pretty order-

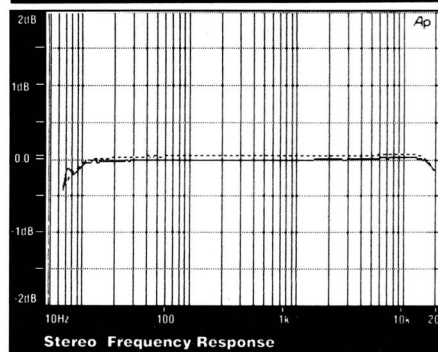
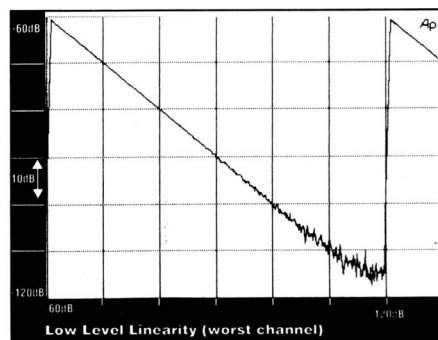
ly, and the treble sounds tidy, detailed and precise. The midband too is smooth, subtle, neutral and rather engaging, but the bass lacks articulate exposition and is softened.

Conclusions

Harman/Kardon's hybrid low-bit DAC must be regarded as a mild disappointment at this stage of its development. Good treble delicacy is insufficient compensation for the attendant loss of drive and pace encountered here, so despite the pretty appearance, recommendation is inappropriate.

TEST RESULTS

Test resolution (L/R av)	16 bits	
Output level, source impedance	2.19V, -0.75dB	150 ohms
Effective dynamic range	103dB	
Harmonic distortion	20kHz	1.0kHz
Ref 0dB	-88dB	-89dB
at -70dB encode + dither	-46.5dB, 0.473%	
Stereo separation	120dB	127dB
Stereo balance L/R	0.05dB	0.04dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.2dB	
High frequency intermodulation	-95dB or 0.0015%	
Electrical noise (CCIR/ARM, 1kHz)	-101dB	
Mechanical noise	low	
Ultrasonic noise	93dB	
Error correction	0.5mm gap	
Shock/vibration resistance	average	
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)	44 x 10.2 x 33cms	
Typical price inc VAT	£299	



Kenwood DP-8020

Recommended

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



Known for decades as Trio, to avoid any possibility of confusion with the British small appliance maker, Kenwood took the name change plunge a few years ago, and doesn't seem to have suffered in consequence. Indeed rather the reverse, since this full range, audio only Japanese brand seems to have strengthened its market share in all three sectors – mainstream hi-fi, upmarket midi systems and in-car hi-fi.

The company has an extensive range of CD players, most of which cluster in the under-£250 budget sector, and most of which have yet to undergo *Choice* scrutiny. The exception is presumably this model's predecessor, the £450 *DP-8010*, reviewed a year or so back, and delivering a rather disappointing sound considering its elaborate engineering.

The *8020* costs a little more than its predecessor, but shares much the same heavyweight build – this is no one-handed lift – and high standard of finish and feel. Styling, however, is quite different, following the current Japanese trend for symmetry about a centrally sited disc drawer and display. There's no denying it's prettier than the normal lop-sided presentation that most rivals adopt, and it's also apparently justified from a mechanical standpoint, especially as the disc drive is also deliberately sited as low as possible for maximum stability, in an arrangement borrowed in part from the company's more upmarket *9010* CD transport.

Technophobes will welcome the fact that it's also an unusually simple machine, at any rate on first acquaintance, with large, clearly labelled controls. The fascia button count is deliberately kept down, and the operation of subsidiary frills and furbelows is relegated to the handset. This in turn does look a bit fussy, with 20-key direct track entry and less than intuitive labelling and layout, but it does include both vol-

ume (output) and display off.

The rear panel carries fixed and variable phono pairs, plus optical digital and system remote interface socketry. The substantial feet seem largely decorative, but inside the well damped case the individual boards and high quality linear transport are individually decoupled from vibration. Analogue and digital circuitry is kept separate, with internal screening, and there is plenty of evidence of audiophile practice in layout and choice of components. Digitally it uses an advanced multi-bit approach, effectively 8X oversampling with 18-bit resolution.

Lab Report

Given the engineering content, not to mention the serious price ticket, it would have been surprising had the *8020* not turned in a top quality performance in our test laboratory. As it turned out everything bar error correction falls into the very good and excellent grades. Track finding is particularly rapid, low level linearity very good indeed, and immunity from shock and vibration in the top class. It seems almost churlish to point out that Kenwood's *8010* predecessor did a similarly fine job . . .

Sound Quality

Happily, the area where the *8020* does score over its antecedent is sound quality. If the earlier model was something of a disappointment, the '20 delivers a solid, articulate and thoroughly impressive performance.

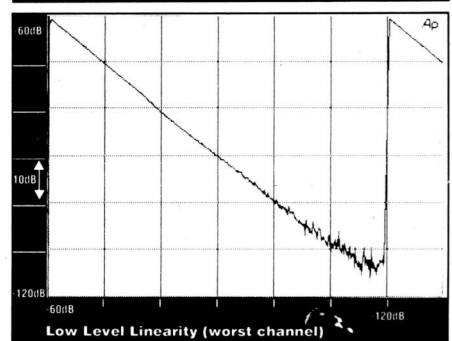
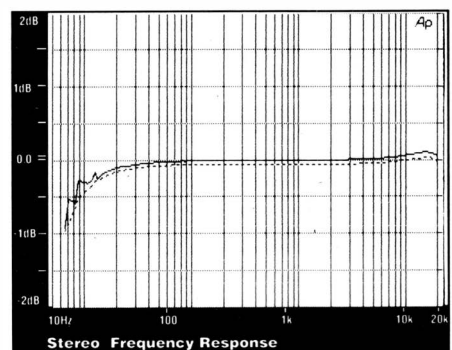
The bass in particular has good slam, and this drives things along at a more or less convincing pace, with crisp and lively dynamics. The treble is well defined, if slightly grainy, while the midrange is clean and clear, if a shade forward and projected. Stereo focus and width are very good, depth slightly less so.

Conclusions

This is a high class performer in every respect – build, presentation, sound, lab. Others may be able to deliver comparable sound quality for less money, but the *8020* is certainly one of the best CD players to come out of Japan, with all that that implies in terms of luxury build and finish, and deserves confident Recommendation.

TEST RESULTS

Test resolution (L/R av)	15.9 bits	
Output level, source impedance	2.1V, -0.44dB 11 ohms	
Effective dynamic range	106dB	
Harmonic distortion	20kHz	1.0kHz 20kHz
Ref 0dB	-95dB	-95dB -91dB
at -70dB encode + dither	-44dB, 0.6%	
Stereo separation	111dB	111dB 90dB
Stereo balance L/R	0.05dB	0.05dB 0.06dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.2dB	
High frequency intermodulation	-90/96dB, 0.002%	
Electrical noise (CCIR/ARM, 1kHz)	-104dB	
Mechanical noise	very low	
Ultrasonic noise	108dB	
Error correction	0.75mm gap	
Shock/vibration resistance	excellent	
De-emphasis	±0.14dB to 16kHz	
Track finding speed (15, YEDS 2)	2 secs	
White noise overload test	OK	
Size (w x h x d)	44 x 13.3 x 36.5cms	
Typical price inc VAT	£500	



Marantz CD50SE

Best Buy

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



The £330 CD50SE is three steps up the Marantz hierarchy, paradoxically sharing precisely the same price point as the standard CD60 without the SE tweaks. Identified from the outside only by a rather tacky stick-on *Special Edition* badge, this is more or less the audio equivalent of a GTI specification on a modern hatchback. Basic production is carried out at the Philips factory in Hasselt, Belgium, based on the usual (high quality) Philips 'building blocks', and then the additional internal SE modifications are carried out in the UK, to 'fine tune' the sound quality to British audiophile tastes.

It's a full size model in the latest – somewhat controversial – Marantz style. The new plastic fascia is aesthetically much more distinct than previous generations from the Philips models that share much of the same innards, and somehow also seems closer to US and Japanese than European tastes.

Finished in obligatory black and sitting on large decorative feet, it's built on a lightweight plastic chassis/case with some metal cladding and optional metal side plates. Front panel legends are small and not that easy to distinguish, especially the group for skip repeat and random play. However, most operations will presumably be carried out using the attractively redesigned and comprehensively equipped remote handset.

There's all the usual track and play mode selection capabilities, including direct track entry buttons, while the display is comprehensive but has smallish characters. Despite lacking the front panel switch fitted to the '60 models, the 50SE is nevertheless fitted with FTS, the 'favourite track selection' feature which allows the owner to store semi-permanently a specific pre-programmed selection of tracks from any disc.

There is also a remote control volume adjustment, though instead of the

motorised potentiometer used in the '60s, the '50s have a rather limited example of the type, using thick film resistors to provide seven steps of 3dB each (21dB in total). Enthusiasts have the option of fixed level outputs at normal line level, though there remains an element of sonic compromise in the overall execution.

Under the skin this model starts out as a typical basic Philips 16-bit 4X oversampling package, built into a strong lattice-braced polystyrene box. This has more steel cladding than before, and the basic brush-motor CDM-4 transport with weighted clamp is now better integrated within the package.

Good quality Cerafine capacitors are used at strategic points, along with selected 5532 op-amps. A shorting plug is supplied for the co-ax (electrical) digital output, to maximise sound quality when using the machine as a normal standalone player.

Lab Report

The '50SE passed the lab test programme with no evidence of any weakness. Mid-band distortion is a little short of the best, but intermodulation is excellent, as are frequency response and dynamic range, while low level linearity is very good. The test track was accessed in a rapid 3 seconds, the machine is mechanically fairly quiet, and shows good resistance to shock and vibration.

Sound Quality

Well above the average for both this test group and the market as a whole, the '50SE delivers an overall sound quality which is outstanding, and unusually involving considering its relatively modest price. It has good basic timing and pace, delivering lively dynamics and crisply defined transients.

The stereo soundstage is well developed with fine focus, good width and

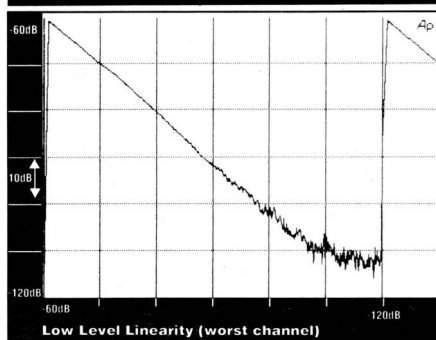
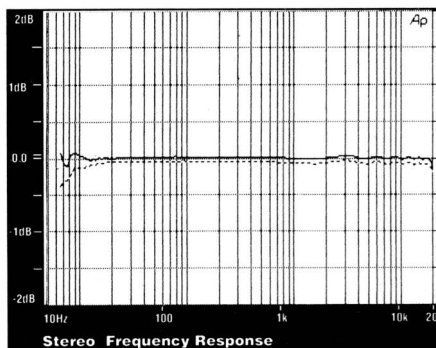
very good depth. Ambient information is convincingly portrayed. The bass is a touch lightweight, though crisp and well poised nonetheless. The midband is clear and well defined, though with a mild underlying hardness that falls short of the capabilities of more upmarket machinery. The treble has slight 'grain', but is fundamentally lively, open and quite transparent.

Conclusions

Value judgement on the aesthetics and presentation must be down to the individual concerned, but in other respects the CD50SE passes with flying colours. Build quality and lab performance are both ample while the sound quality is sufficiently excellent at the £330 price to justify Best Buy rating.

TEST RESULTS

Test resolution (L/R av)	15.8 bits
Output level, source impedance	1.96V, -0.18dB, 200 ohms
Effective dynamic range	107dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Ref 0dB	-94dB -86dB -90dB
at -70dB encode + dither	-38dB, 1.26%
Stereo separation	118dB 114dB 100dB
Stereo balance L/R	0.05dB 0.05dB 0.07dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.06dB
High frequency intermodulation	-106dB or 0.0005%
Electrical noise (CCIR/ARM, 1kHz)	-107dB
Mechanical noise	low
Ultrasonic noise	105dB
Error correction	3mm gap
Shock/vibration resistance	very good
De-emphasis	±0.12dB to 16kHz
Track finding speed (15, YEDS 2)	3 secs
White noise overload test	OK
Size (w x h x d)	42 x 12 x 28.5cms
Typical price inc VAT	£330



the Audio shop

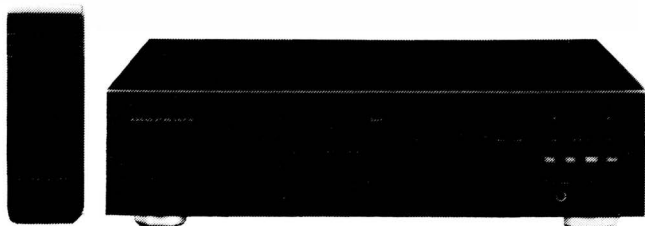
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No specialist hi-fi company better deserves the multinational epithet than Marantz. Originally American but currently owned by Dutch multinational Philips, it also has a significant Japanese design and manufacturing base that is put to good use in the interests of both brands.

Marantz has used the arrival of CD as a major opportunity to expand its market share in hi-fi separates. The products have benefited from access to the top quality Philips technology, while the company has done its level best to establish a separate market identity and positioning for its specialist – and hence slightly more expensive – range.

One successful strategy has been the introduction of *Special Edition (SE)* models like the £380 60SE covered here. These carry a £50 premium over the standard Marantz-badged Philips production, having undergone a package of audiophile-oriented modifications in the UK in order to enhance sound quality.

The latest Marantz models, exemplified by the '50 and '60SE variations reviewed in this issue, but also including '40 and '80 models that we'll doubtless get around to next time, show a much more marked styling variation from the Philips norm than heretofore. Whether you regard it as more, less or equally pretty is a matter of taste, and certainly there's a good match with the latest Marantz amplifiers. But it all looks a bit bulky, with the display and most of the buttons crammed into the top half, and some quite small and difficult to distinguish.

Costing £50 more than the 50SE, the extra money buys several extra buttons and facilities. There's now an FTS switch on the fascia as well as the handset, a (motorised) volume control beside the headphone socket, an optical as well as a co-axial (electrical) digital output, extra copper case screws, and an extra time

display mode. Less trivial, the motorised Alps potentiometer mentioned above provides infinite range and adjustment on the remote volume control. Fixed output sockets are provided for optimum quality via a preamplifier, but there remains an element of compromise involved.

A carefully designed, structurally reinforced plastic tray forms the basis of the machine, with optional metal side panels. The technology base is the redoubtable Philips multi-bit (16-bit 4X oversampling) DAC chip set, and the latest composite-plastics CDM4 transport. The SE specification involves the use of better quality 5532 op-amps, and extensive replacement of standard grade capacitors with superior quality items.

Lab Report

That the lab performance of the '60SE is virtually identical to that of the '50SE is unlikely to come as a surprise, though it does reflect well on the consistency of both the manufacturing and 'tuning' operations involved. Splitting the odd hair, if anything the '50 has the slight edge, performing better on error correction, but that is simply a reflection of sample variation. Suffice to say that the 60SE passes with honours.

Sound Quality

Much the same may be said of the sound quality, though here the '60SE shows a slight edge over the '50SE, sufficient to more or less justify its price premium when taking the extra features into account.

The Philips multi-bit chipset once again demonstrates its characteristically lively and engaging sound, which is given a touch of extra class in the Marantz treatment room. The stereo soundstage is generously proportioned with very good focus and fine depth. Transients and dynamics are recreated

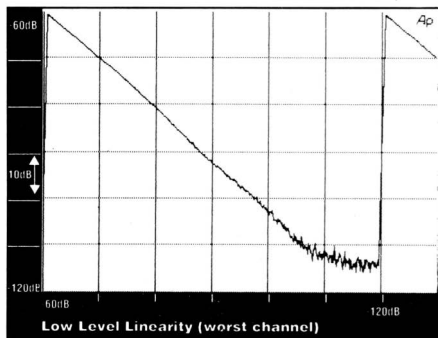
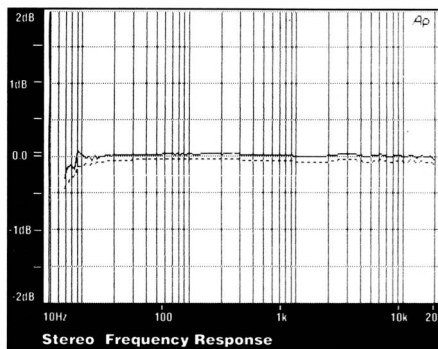
with convincing life, while the bass shows good extension, slam and definition. The midrange and treble sound neutral and unforced, with low distortion and fine resolution. The variable output is best avoided for the very best results (though it may come into its own by enabling a preamplifier to be avoided completely).

Conclusions

Not quite the prettiest nor the best in its class, the CD60SE is nevertheless another Marantz winner that clearly deserves the Best Buy accolade. Furthermore, it provides positive proof that a carefully refined package based on the sensitively developed Philips multi-bit chip set is more than a match for the much hyped 'bitstream' technology.

TEST RESULTS

Test resolution (L/R av)	15.7 bits
Output level, source impedance	1.98V, -0.09dB, 200 ohms
Effective dynamic range	107dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Ref 0dB	-86dB -86dB -86dB
at -70dB encode + dither	-35dB
Stereo separation	115dB 113dB 101dB
Stereo balance L/R	0.06dB 0.06dB 0.06dB
High frequency intermodulation	-1.06dB or 0.00048%
Electrical noise (CCIR/ARM, 1kHz)	-106dB
Mechanical noise	low
Ultrasonic noise	111dB
Error correction	2mm gap
Shock/vibration resistance	very good
De-emphasis	±0.1dB to 16kHz
Track finding speed (15, YEDS 2)	3 secs
White noise overload test	OK
Size (w x h x d)	42 x 12 x 28cms
Typical price inc VAT	£380



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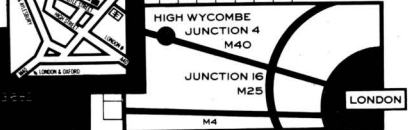
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Although ownership passed to KEF a year or two back, Meridian has retained its unique and stylish identity as one of Britain's leading hi-fi innovators. The company has pioneered active loudspeakers and round-the-house hi-fi.

Meridian has been a consistent leader in British CD developments since the introduction of the format, working initially with Philips building blocks but soon adding its own original contributions. The original PRO MCD model set the benchmark in its day, but the 207-Pro was the radical step, placing Meridian for all time in the CD player hall of fame.

The 207 remained in production for several years (an aeon in CD terms), undergoing continuous development and remaining fully competitive when last assessed a year or so back (July 1989). Now it is replaced, by the almost simultaneous release of not one but two models, both of which closely mirror its unusual appearance. The cheaper of these is the 206, which at £800 is about £300 less than its predecessor; the upmarket (!) 208 is covered on the next page.

The 207 was a 2-box design, with two half-width modules making up a roughly mid-size square. The two were linked by a fixed umbilical and could not be used separately, though this did present the elegant option of stacking one atop the other. That is no longer possible, since the two modules that make up the 206 are firmly bolted together side by side.

This arrangement, and also the removal of the extensive preamplifier facilities fitted to the 207, have helped bring costs down, leaving the 206 as a comparatively conventional (at least by Meridian standards) standalone CD player. Again to keep the entry price down, a simpler though nonetheless quite adequate handset is supplied in place of the elaborate and costly 209

remote control panel.

Build is reassuringly solid, especially the substantial disc drive/drawer mechanism, and controls have good feel. Presentation is smart and discreet, with a picture-framed glass panel fascia. Features are adequate rather than elaborate, the display being rather a modest affair, and the control system a shade sluggish responding to commands. A coaxial digital output is fitted alongside a fixed output stereo phono pair.

Internally the 207 influence is seen in the multi-board layout, ribbon cable neatly linking the two modules. The sorbothane-decoupled cast chassis transport and control chips seem to be straight from the 207, without some of the modifications used in the 208. Digital decoding is based on the latest Philips multi-bit (16-bit 4X oversampling) dual DAC chip set. Good quality analogue components and circuitry is used throughout, with a discrete transistor current-to-voltage implementation. Power supplies are generously rated; filtering and de-emphasis are passive.

Lab Report

Output level is 1.4dB over the standard, and absolute phase is inverted, both factors likely to cause confusion if attempting to compare the 206 to other CD players. The frequency response is flat apart from a gentle roll-off at very high frequencies.

Dynamic range and both in- and out-of-band noise figures are very good. Low level linearity is perfectly satisfactory, as are the rather less impressive distortion and stereo separation figures, the latter showing significant asymmetry. Shock and vibration is handled well, and error correction is powerful.

Sound Quality

Exemplifying the top quality available from the Philips multi-bit chip set, and

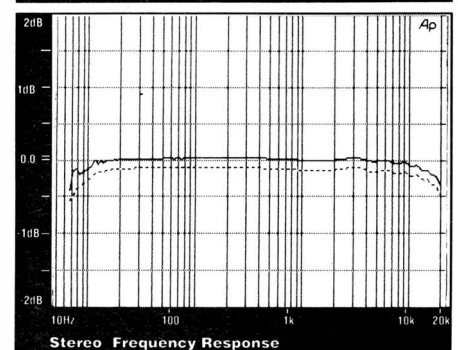
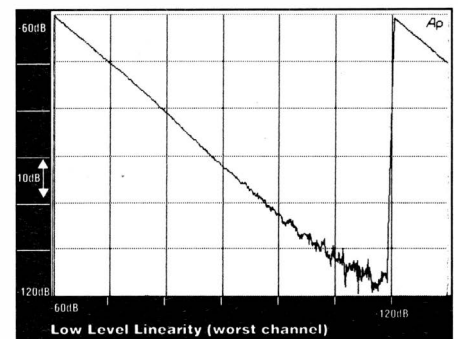
improving significantly on the 207-Pro, the 206 sets a lively pace with firm and articulate bass slam, confident dynamic contrasts and convincing transients. Stereo soundstages are very good indeed, with plenty of scale and space, plus fine depth and focus. The treble is tidy with good detail resolution, while the midband is crisp and clear, if slightly thin with it.

Conclusions

While it's true to say that comparable sound quality is available elsewhere for rather less money, the 206 is nevertheless a most attractive package with fine build and just the right touch of class to make up the difference. Recommendation is mandatory.

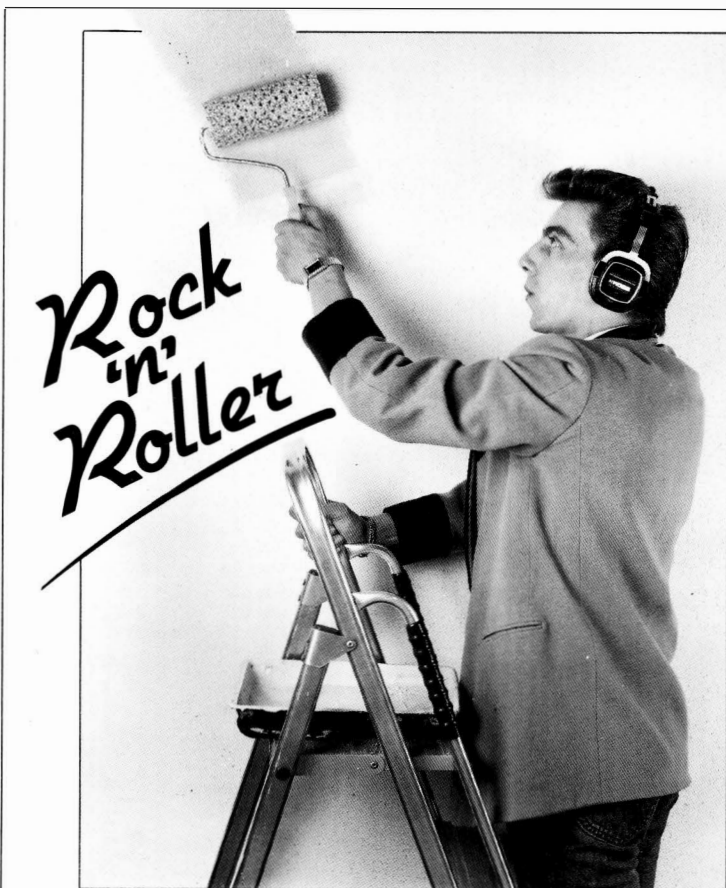
TEST RESULTS

Test resolution (L/R av)	15.5 bits
Output level, source impedance	2.35V, 1.4dB 100 ohms
Effective dynamic range	108dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Ref 0dB	-74dB -81dB -90dB
at -70dB encode + dither	-40dB, 1%
Stereo separation	114/64dB 97/64dB -71/-63dB
Stereo balance L/R	0.15dB 0.16dB 0.13dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.3dB
High frequency intermodulation	-76dB, 0.0158%
Electrical noise (CCIR/ARM, 1kHz)	-106dB
Mechanical noise	low
Ultrasonic noise	114dB
Error correction	2.4mm gap
Shock/vibration resistance	good
De-emphasis	-0.3dB to 16kHz
Track finding speed (15, YEDS 2)	3secs
White noise overload test	OK
Size (w x h x d)	32 x 10.0 x 33.5cms
Typical price inc VAT	£800





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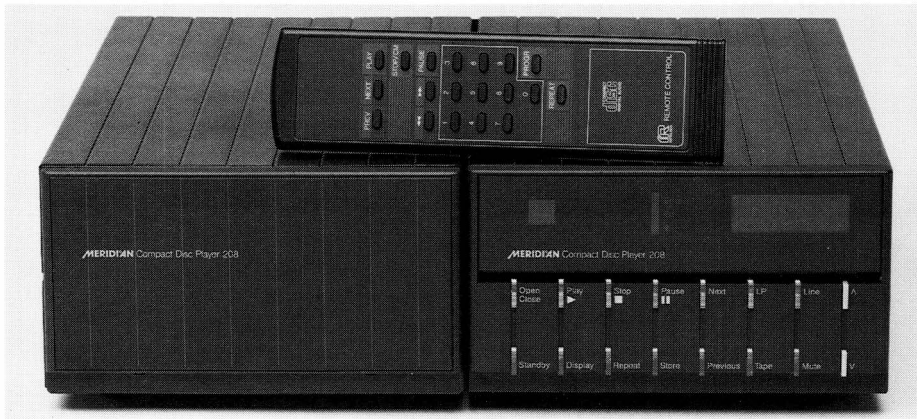
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Meridian 208

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MERIDIAN AUDIO LTD., ECCLESTON ROAD, TOVIL, MAIDSTONE, KENT ME15 6QP. TEL: (0622) 672269.



Throughout an unusually long life by CD player standards, the 207 has steadily been refined and developed, the 16-bit variant retaining to the last its place as one of the benchmarks of CD sound quality. But all good things must come to an end, and it is now being phased out in favour of not one but two replacements. The simpler, more conventional and less expensive 206 is covered in detail on the previous page. This new £1,490 flagship 208 may look very similar indeed, but it differs radically beneath the skin.

The unique feature of the 207, carried over to 208 (but not 206) was that the package included a simple but high quality remote control preamplifier alongside the CD player. Add a pair of active (amplified) loudspeakers such as those that Meridian thoughtfully provides and you have a complete single source hi-fi system, with the capacity to add tuner, tape deck and even vinyl disc, with the further option of feeding other remote-linked loudspeakers in other rooms of the house.

Part of the £500 price increase from 207 to 208 is down to the inclusion of a £100 remote control panel, which in this case is no handset but an elegant and quite heavy coffee table adornment, covering complete system requirements including a good quality 64 x 1dB remote volume. It takes a bit of learning, but that's the price of style. The other part of the extra cost goes on an elaborate and creative exposition of the new Philips 'bitstream' PDM digital-to-analogue converter technology, which amounts to 1-bit decoding with 256X oversampling, plus quite a few other engineering goodies, including a substantial redesign of the preamplifier.

As a CD player, facilities are adequate rather than generous, and the display is rather small, but presentation is compact, stylish and luxurious, and build inspires confidence. Inside, all Meridian

boards are neatly laid out with fine attention to detail and linked by ribbon cable. The latest chip set controls a Philips CDM1Mk2 disc drive. The digital decoding uses two DAC3/B 'bitstream' DACs in differential mode operation for improved linearity and noise. Audiophile grade components and elaborate layout, screening and power supply arrangements provide further justification for the high price. Optical and electrical digital outputs are available, alongside the full preamplifier interconnection socketry and headphone drive.

Lab Report

Output is about 1.5dB above the standard, with a regrettable channel imbalance of 0.5dB; absolute phase is correct, unlike the 206. Low level resolution is excellent, as is low level distortion – indeed all distortions for that matter. The frequency response shows slight tailoring and the dynamic range is impressive, though slight peak clipping was detected and stereo separation is a little asymmetric. Track access is fast (especially by Meridian standards), shock and vibration rejection good, and error correction fine.

Comparison with the 206 is interesting, though possibly misleading since the many detailed differences muddle any attempt to isolate the multi-bit versus 1-bit comparison.

Sound Quality

The 208 establishes a new CD sound quality benchmark for any commercially available player, redefining the state of an art which, it must be admitted, still falls somewhat short of the very best analogue vinyl on pace and drive, but which has its own compensations.

The bass demonstrates good slam and powerful, even extension; the midband is neutral, immensely detailed and very precise; the treble can only be described

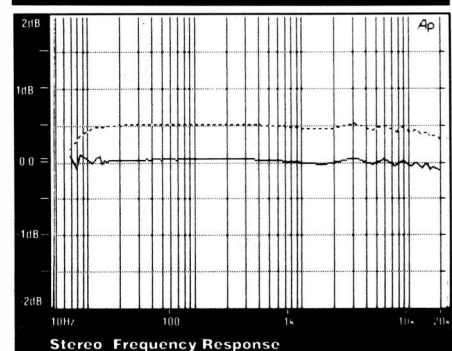
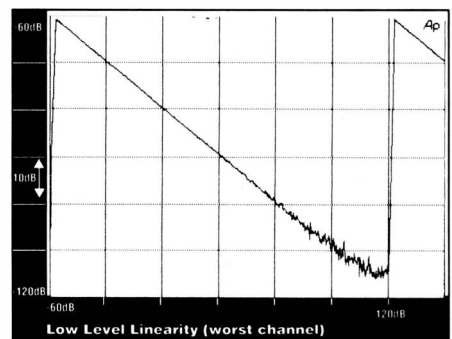
as silky for the remarkable lack of grain, alongside exceptional resolution and low distortion. Images have superb scale and focus, with fine coherence.

Conclusions

Setting a new sound quality reference standard way ahead of the pack would seem to be a total vindication of the bitstream/low-bit approach to digital decoding, though it is equally a reflection of the very high price, and of the elaborate engineering involved in this application. Though expensive, the 208 must be strongly Recommended, not only as an exceptional single-box player at an (arguably) affordable price, but also for its fine convenience potential in a Meridian system context.

TEST RESULTS

Test resolution (L/R av)	16 bits
Output level,	
source impedance	2.35/2.47V, 1.40/1.83dB 16.5 ohms
Effective dynamic range	110dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Ref 0dB	-94dB -91dB -91dB
at -70dB encode + dither	-47.5dB, 0.42%
Stereo separation	125dB 100/120dB 74/104dB
Stereo balance L/R	0.48dB 0.47dB 0.43dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.1dB
High frequency intermodulation	-106dB, 0.0005%
Electrical noise (CCIR/ARM, 1kHz)	-100dB
Mechanical noise	low
Ultrasonic noise	98dB
Error correction	2mm gap
Shock/vibration resistance	good
De-emphasis	-0.35dB to 16kHz
Track finding speed (15, YEDS 2)	2.5secs
White noise overload test	slight clip
Size (w x h x d)	32 x 10 x 35cms
Typical price inc VAT	£1,490



Mission Cyrus PCMII

Recommended

MISSION ELECTRONICS, STONEHILL, HUNTINGDON, CAMBS
PE18 6ED. TEL: (0480) 52777.



Mission was one of the first of the British hi-fi specialists to become involved in CD. The *PCMII* is its second-generation player, and is now starting to get a little long in the tooth by CD player standards, having in fact been originally reviewed by *Choice* some eighteen months ago (Nov '88). But subtle changes and a substantial price cut from £600 to £400 rationalises a revisit to what must be one of the more important models around from a specialist hi-fi perspective.

The basis is straightforward enough Philips technology, though Mission has introduced a number of rather unusual features in the interests of sound quality and ergonomics.

The display may not have the complexity of some, and its red and blue illumination is a touch lurid. But at least it's possible to read the track number in daylight from ten feet away without squinting. And then a button push on the handset switches it off in order to improve the sound quality and remove the distraction.

Another handset button inverts the absolute phase of the signal. This makes more difference with some discs than others, and is not subject to hard and fast rules. But one position often sounds more 'right' than the other, and ringing the changes can become an audiophile obsession – certainly it's fun. Owners of Cyrus PSX outboard power supplies can obtain a slight extra quality improvement by feeding low voltage power into a special socket on the rear.

Remote volume control is part of the package too, and cannot be bypassed in the interests of sound quality as is usually the case. Although some sonic compromise is inevitable, this is not just any old remote volume with limited range and large jumps. It covers a wide 64dB range in gentle 1dB steps, making direct connection from player to power ampli-

fier practical and feasible, and so enabling any degradation introduced by the preamplifier to be avoided. The downside of course is that the signal passes through two volume controls if the player is used conventionally.

Under the skin the *PCMII* is a full size Philips-sourced 16-bit 4X oversampling player, albeit with large Mission designed PCBs. These are stacked up inside and linked with rather untidy wiring harnesses. Weight is about average, and the case is metal with some two-layer damping for the lid. The transport is a CDM4 with plastic swing-arm and good quality Hall-effect motor.

Lab Report

The results from the test programme show close similarity with those from eighteen months earlier, though this latest sample is just a little 'cleaner' and more linear overall, especially at high frequencies. The figures match up well to the current state of the marketplace too, indicating that CD players are improving only slightly on the normal range of objective tests.

Distortion figures are all very good and the frequency response is perfectly tailored. Low level linearity is a fine 15.8 bits; error correction and resistance to shock and vibration is very good. We did receive a faulty sample that showed some output clipping, though its replacement was fine.

Sound Quality

Sound quality has stood up to the test of time pretty well too. The *PCMII* has good power and 'slam' in the bass, ensuring confident rhythmic drive. Although the Philips technology is clearly evident, the fundamental character is nevertheless quite distinctively Mission's own – a strong, crisp, lively sound with good drive.

Stereo images are well focused and

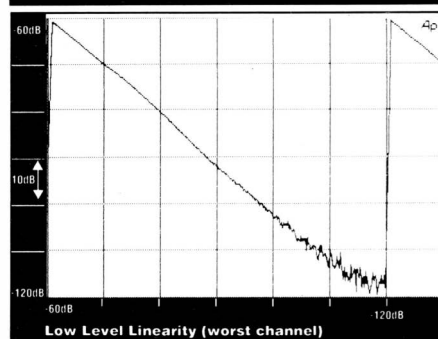
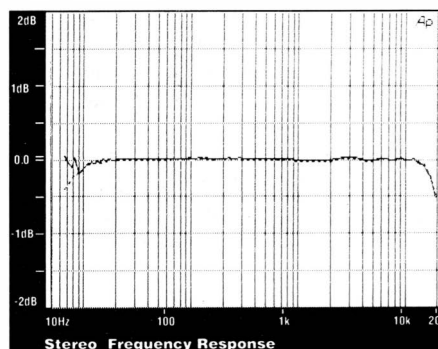
stable with pretty good depth, while the midrange does sound a little 'thin' and 'pinched'. Treble is clear and well defined, though not without some grain and edge. The permanent remote volume control limits the attainable transparency and sweetness, though only to a comparatively mild degree.

Conclusions

The new £400 pricetag is a realistic reflection of the pace of CD progress, and ensures that the *PCMII* remains fully competitive with more recent models from rival manufacturers, and continues to deserve its Recommended status. The remote volume is a good example of the type, and will be welcomed by most users, while the display remains a uniquely sensible bit of ergonomic design.

TEST RESULTS

Test resolution (L/R av)		15.8 bits	
Output level, source impedance		3.06V, 200 ohms	
Effective dynamic range		106dB	
Harmonic distortion	20kHz	1.0kHz	20kHz
Ref 0dB	-93dB	-92dB	-90dB
at -70dB encode + dither		-39.5dB	
Stereo separation	99dB	94dB	89dB
Stereo balance L/R	0.04dB	0.04dB	0dB
Frequency response (ref 1kHz) 20Hz to 20kHz		±0.5dB	
High frequency intermodulation		-103/98dB	
Electrical noise (CCIR/ARM, 1kHz)		-100dB	
Mechanical noise		low	
Ultrasonic noise		102dB	
Error correction		3mm gap	
Shock/vibration resistance		very good	
De-emphasis		±0.2dB to 16kHz	
Track finding speed (15, YEDS 2)		3.5 secs	
White noise overload test		OK	
Size (w x h x d)		43 x 8.9 x 31.0cms	
Typical price inc VAT		£399	



Philips CD-630

Recommended

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



Although Dutch multinational Philips has repeatedly scooped the Best Buy honours for sound quality, and has made a notable contribution to the feature roster with its FTS (favourite track selection) system, the company has also tended to lose out a little to its Japanese rivals in terms of presentation and 'feel'. This is not the case with the latest 'budget' range, exemplified by the £250 CD-630 covered here.

Following the well established marketing principal of joining what you can't beat, the 630 looks and feels like nothing less than a classy Japanese player. Asked to identify the brand with badgework removed, one might well have picked that epitome of design style, Sony.

The 630 is the top of three newish 600 series models, and as such has the heaviest feature complement. Amongst these is a truly remarkable display that flashes up various words to describe the state of operations at any particular time. These are much larger than the usual status flags, and so are legible from several feet away.

As if to prove that Philips can play the numbers game as well or better than anyone, the front panel legend: "27bit accumulating digital filter - four times oversampling" is enough to raise a smile. Heavily festooned with features and buttons, the fascia is nevertheless laid out well enough for simple day to day use, and a simple, sensibly designed handset duplicates the main functions and adds the convenience of (limited) volume adjustment.

The more enthusiastic can investigate the FTS (favourite track selection) feature. The machine can semi-permanently store a pre-programmed selection of tracks for each of a whole collection of discs, recognising the disc automatically on insertion for optional play mode selection.

There are all the usual convenience options such as repeats, random and edit play, plus a 'personal preset' button that remembers all settings in the manner of TV sets. The co-axial digital output socket on the rear is switched from the front panel too.

The unit is built up on a lattice-braced plastic tray, with metal top and fascia trim. It's a bit light in weight, but reasonably solid nonetheless. Inside there's a standard size power supply and the latest generation standard grade Philips boards and transport, with the odd bit of slightly messy wiring. The digital side uses the classic 16-bit 4X oversampling chip set which has now set performance standards for several years. The thick-film variable volume control provides seven 3dB steps, and Nichicon bi-polar capacitors are used in the output coupling.

Lab Report

It seems barely worth reporting on lab test findings which are almost all uniformly excellent or very good. Output level is slightly below the standard, so take a little care if trying to compare the 630 against the competition. Elsewhere, linearity is the watchword, with 15.7-bit resolution and fine harmonic and intermodulation distortion figures at all levels. Electrical and mechanical noise are both low, track access is quite rapid, error correction is very capable, and shock/vibration immunity is very good.

Sound Quality

Although the 630 lacks the subtlety and delicacy of more upmarket and more audiophile oriented machinery, it demonstrates yet again that the standard multi-bit Philips digital technology and swing-arm transport is still more than a match for its immediate competition.

The sound has all the usual lively pace and good sense of timing, though in this

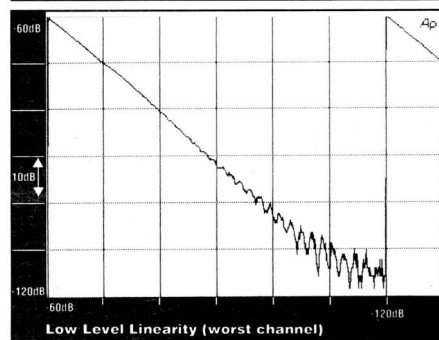
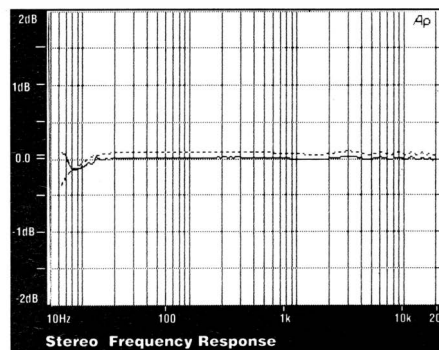
case there is also a little coarseness with it. Although the bass is quick and articulate and the midband crisp and clear, it is also slightly 'thin', while the treble has mild grain and 'edge' alongside good detail. The stereo soundstage is well focused with fine width and depth.

Conclusions

Providing positive proof that Philips can match the Far East competition in terms of build, feel and features while continuing to set the mass market benchmark for sound quality, the 630's manufacturing budget has clearly been directed more towards the former than the latter. More likely to appeal to the button pusher than the audiophile, it nevertheless deserves confident Recommendation.

TEST RESULTS

Test resolution (L/R av)	15.7 bits
Output level, source impedance	1.92V, -0.8dB, 200ohms
Effective dynamic range	107dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Ref 0dB	-94dB -86dB -86dB
at -70dB encode + dither	-38.5dB, 1.2%
Stereo separation	116dB 111dB 97dB
Stereo balance L/R	0.08dB 0.08dB 0.07dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.02dB
High frequency intermodulation	-106dB, 0.0005%
Electrical noise (CCIR/ARM, 1kHz)	-105dB
Mechanical noise	low
Ultrasonic noise	105dB
Error correction	2.4mm gap
Shock/vibration resistance	very good
De-emphasis	-0.1dB to 16kHz
Track finding speed (15, YEDS 2)	3 secs
White noise overload test	OK
Size (w x h x d)	42 x 10.3 x 28cms
Typical price inc VAT	£250



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Philips CD-840

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Initial inventor and subsequent co-developer of the CD format, Dutch-based multinational Philips has shown consummate mastery of the technology since the roll-out some seven years ago. Back in 1983 the company had no hi-fi credibility, following the ill-fated *Black Tulip* fiasco, but successive generations of CD players have done much to restore the brand image, even though Philips has been slow to capitalise on the fact in the upmarket hi-fi separates sector.

Having established and maintained industry performance benchmarks throughout the first seven years of CD's brief existence by means of its 14- and 16-bit 4X oversampling digital-to-analogue converters, Philips is seeking to establish a similar superiority with its 'bitstream' decoders amongst a new generation of 'low-bit' converters that is just starting to appear on the market.

This has been over-hyped for more than a year now, on a scale not seen since the original launch of Compact Disc itself, and a number of other 'low-bit' applications have appeared from other sources. However, the recent launch of the £350 CD840 provides the first opportunity to assess the new Philips technology in a formal Philips application.

From the outside, and from the point of view of operating features and facilities, the '840 is the spitting image of the £100 cheaper CD630 reviewed on the previous page. That means you get everything including the kitchen sink, not to mention a rather natty line in computer driven alphanumeric display technology, tied in with a demo disc you can play with in (but not nick from) the shop.

Extras on the 840 are a volume control for the headphone socket, gold plated phono sockets, an optical as well as an electrical digital output, but there's no remote volume control, limited or otherwise. This tends to confirm that this

machine is aimed more towards the audiophile sector than its cheaper and more conventional brother. Controls are extensive, though nicely laid out, while the neat, slim handset has some intelligent colour coding.

Inside the honeycomb plastic tray box there are a number of differences, and some surprising similarities too. There's a nearly standard 16-bit mother board, including the 7220P/B digital filter, and this is wire-connected to the bitstream board carrying dual SAA7321GP DACs in a separate compartment. There are signs of some post-production extra decoupling around the bitstream DAC, and other indications that it's more sound quality oriented than the 630.

Lab Report

One of the superiority claims made for bitstream concerns good low level linearity, so it is slightly ironic that our 840 review sample showed some inconsistency with another sample, and a poorer result than the multi-bit 630. In most other respects the bitstream variation gave a very similar though slightly inferior set of results. Noise (in and beyond the audio band) is significantly poorer, there was slight clip on high level white noise, and the unit also proved more susceptible to external shock and vibration.

Sound Quality

In happy contrast, the sound quality proved rather better than the 630, more than sufficiently so to justify the price premium. However, the bitstream DAC certainly creates a different overall character from the familiar Philips multi-bit sound. Whether this is perceived as better or otherwise is probably a matter of personal taste at this juncture.

The kernel of the difference seems to be that the bitstream decoding creates a more polite sound, with minimal treble

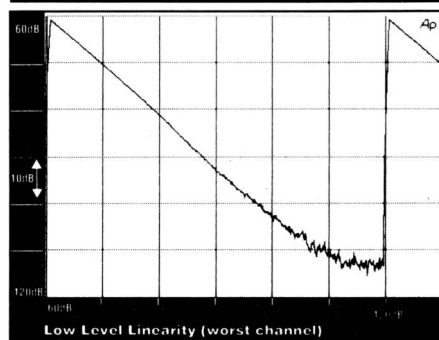
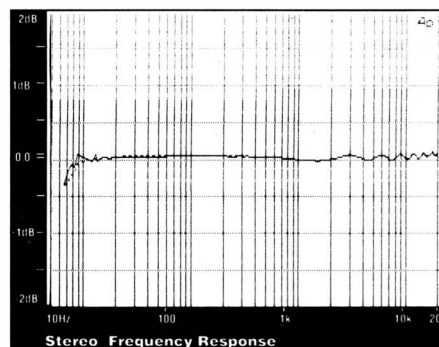
grain or edge and fine detail resolution, but at some expense in terms of pace, timing and excitement. The bass is solid and detailed enough, while the mid is convincingly pure and natural, if a shade thin and with slight glare. Stereo images are very stable, with strong focus.

Conclusions

Philips' first low-bit exposition is probably its best ever machine, and is priced competitively enough to deserve Best Buy status. It does sound different from the multi-bit machines, but not necessarily superior to similarly priced alternatives from Arcam and Marantz. Those contemplating buying a mid-priced CD player should certainly audition the 840, but also some of its rivals, before making up their own minds on the subject.

TEST RESULTS

Test resolution (L/R av)	15.4 bits
Output level, source impedance	1.81V, -0.87dB, 200ohms
Effective dynamic range	100dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Ref 0dB	-86dB -90dB -86dB
at -70dB encode + dither	-38.5dB, 1.2%
Stereo separation	97dB 96dB 97dB
Stereo balance L/R	0.01dB 0.01dB 0.02dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.1dB
High frequency intermodulation	-107/97dB, 0.001%
Electrical noise (CCIR/ARM, 1kHz)	-96dB
Mechanical noise	low
Ultrasonic noise	87dB
Error correction	2mm gap
Shock/vibration resistance	average
De-emphasis	±0.17dB to 16kHz
Track finding speed (15, YEDS 2)	3.5 secs
White noise overload test	slight clip
Size (w x h x d)	42 x 11 x 28cms
Typical price inc VAT	£350



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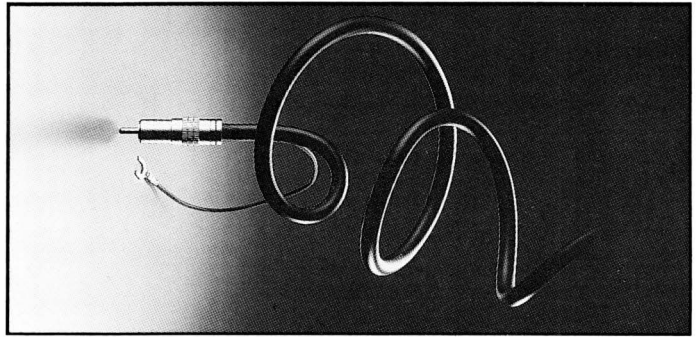
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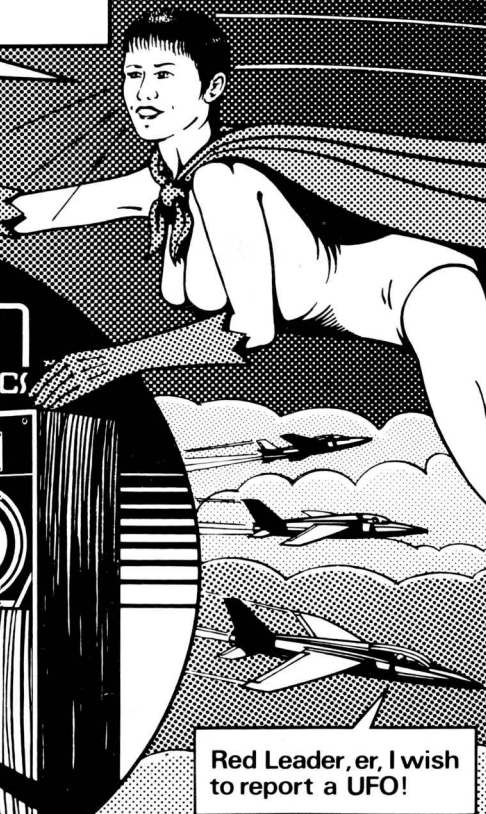
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Sansui CD-X711

Recommended

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Sansui was one of the very first Japanese hi-fi manufacturers to establish an important presence on the UK market, way back in the nineteen sixties. Like most audio specialists it struggled for survival in the early Eighties, and never really recovered from an unwise attempt to move downmarket into midi system territory. Financial headlines were then made in 1989, when this Japanese company became the subject of a takeover from the UK-based Polly Peck conglomerate, which has extensive interests in consumer electronics.

It's early days yet, but an efficient PR service suggests that Sansui's plans are ambitious. There are nearly thirty hi-fi components on the published price list, covering all low and medium price strata, plus a load of in-car gear besides. Some seven CD players range in price from £160 up to this luxury £549 CDX711 that came in for review.

Anyone doubting the 711's serious intent should try dropping it on a foot. This is a real heavyweight, with an almost nostalgic solidity and substance that will be immensely reassuring to those who remember when all serious hi-fi was engineered like ordinance armour. It is in fact one of Sansui's most recent designs, and features 'low-bit' digital-to-analogue decoding, in this instance alongside distinctly audiophile-oriented engineering and componentry.

One can't fail to admire the piano-finish solid metal fascia, the all-metal case and solid base, even if the top is a bit rattly. The ergonomic layout is pretty good, at least as far as differentiating the different functions, though the button count is pretty formidable, as is a feature roster which includes 'compuedit', music scan, track entry keypad, random, repeat, timer, headphones with volume and so on.

One evidence of audiophile intent is

the omission of any attempt to provide level adjustment on the output terminals; another is the 'display off' switch; a third is the comprehensive socketry on the rear panel. Balanced XLR output sockets duplicate the conventional phonos, supporting the balanced input feature on some Sansui amplifiers. Digital output is also provided, in both optical and electrical (co-axial) forms.

Internal examination shows these intentions extend well beneath the surface. Damping is widespread, and the linear motor transport is a sturdy, spring decoupled device. Generous power supplies with lots of heat-sinked regulators feed digital and analogue sections separately. The mother board carries eight vertical ancillary boards, and the wiring harness is a little messy and convoluted. Besides the 'low-bit' DAC which uses Sansui's own complex digital noise shaping technique, Sony chips cover control and digital filtering. The inside is liberally sprinkled with good quality polystyrene and Nichicon capacitors.

Lab Report

The 711 delivers a very respectable set of test results overall, but also serves to confirm some of the distinctions which are emerging between low- and multi-bit players. Once again a 'low-bit' player shows comparative signs of weakness in terms of in- and out-of-band noise, and also in error correction and shock/vibration rejection. The latter comes as something of a surprise considering the Sansui's engineering efforts, and the observation may of course be mere coincidence, but it bears watching.

Sound Quality

In overall ranking, the 711 matched the other highly regarded sub-£1,000 low-bit player, the Philips CD840, very closely indeed, though that's not to say that the two sounded particularly alike. The San-

sui's forte is a tight, clean, clear and well extended bottom end, that provides a solid and coherent foundation.

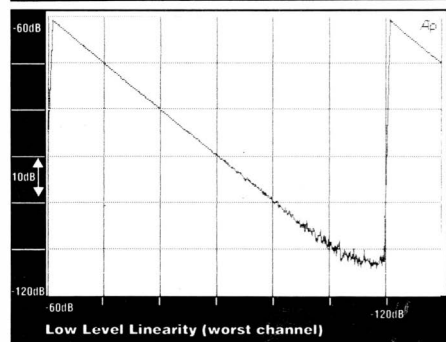
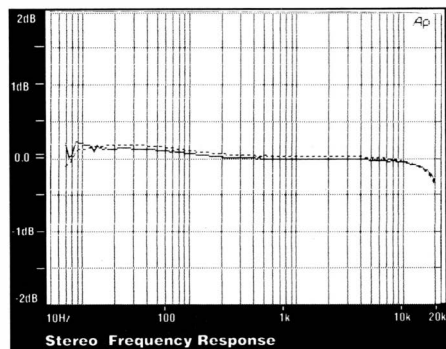
Pace is respectable, transients and dynamics likewise, while the stereo soundstage is generous in scale, with fine focus and good depth. The midband sounds particularly smooth and civilised, and tonally very neutral, while the treble is sweet, pure and airy, but with a slightly 'mushy' quality.

Conclusions

Certainly the best yet from Sansui, the highish price may take the 711 out of the leading value for money stakes, but the superb presentation and fine 'feel' is certainly worth a price premium, and the sound quality is definitely competitive enough to warrant Recommendation.

TEST RESULTS

Test resolution (L/R av)	15.9 bits
Output level, source impedance	2.055V, 0.24dB 130 ohms
Effective dynamic range	95dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Ref 0dB	-88dB -92dB -81dB
at -70dB encode + dither	-43/40dB, 0.71/1.0%
Stereo separation	92/102dB 92/102dB 91dB
Stereo balance L/R	0.04dB 0.05dB 0.04dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.3dB
High frequency intermodulation	-104dB, 0.00063%
Electrical noise (CCIR/ARM, 1kHz)	-92dB
Mechanical noise	low
Ultrasonic noise	-92dB
Error correction	1mm gap
Shock/vibration resistance	average
De-emphasis	-0.25dB to 16kHz
Track finding speed (15, YEDS 2)	3 secs
White noise overload test	OK
Size (w x h x d)	43 x 12.8 x 39.5cms
Typical price inc VAT	£550



Sony CDP-M47

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



Most stylish and innovative of the Japanese multinationals, Sony slipped out of the hi-fi limelight in the early Eighties, but was in at the ground floor of CD, alongside co-developer Philips, and has used this as a springboard to re-establish in hi-fi separates, alongside its major successes in midi systems and portable audio.

Although sold as a separate player, the £160 M47 is a light weight midi sized affair that bears very close similarity to the players supplied with three of the cheaper CD midi systems. The model which comes as part of a system is in fact designated M26, needs no separate handset, and effectively costs only £100 in the system total, so presumably its only superficially related.

Whatever the background, one very positive factor that does carry through from the midi system influence is the startlingly clear lines with softly radiused edges, and the elegant simplicity of the fascia layout. As a design statement it works very well, making conventional full size hi-fi separates look cluttered and clumsy in comparison. Even the lack of silly cosmetic feet is refreshing.

A less desirable midi system characteristic is extensive use of plastics and determinedly lightweight build. The former aids the clean fascia lines, but our presumably untypical sample was quite noticeably warped along the top edge, which is something unlikely to occur with metal.

It's simple, straightforward and easy to use, though by no means short of features. The display is comprehensive, if a bit small, the headphones socket comes complete with volume control, CD-to-cassette copying is facilitated by simple edit/fade facilities, and there are three play modes including random (shuffle). The only rear panel output is a conventional stereo audio pair. A com-

prehensive handset completes the package, with 16-key direct track entry, but no remote volume, though the fader could be handy if the phone rings.

Made in Japan, the plastic box section chassis is well braced with structural beams, with metal panels top and bottom. The internals are typically neat Sony construction, with the minimum of wiring, though rather prosaic from the point of view of current hi-fi separates technology and engineering. Components are standard commercial grade, and the transformer is small. The disc is held against a locked clamp, and the rubber mounted worm drive linear motor transport moves up to meet it. The digital devices are Sony's own, a 4X oversampling filter and 16-bit DAC.

Lab Report

The limited engineering aspirations are reflected in comparatively mediocre test results. These are not poor per se, but distortion in particular falls well short of the attainment of much of the competition. Channel balance, frequency response, noise, dynamic range and stereo separation are all fine, and track access is as fast as most.

Rather surprisingly in view of the distortion, low level linearity is very good too, though a 1MHz component at -76dB is seen on the ultrasonic output scan, there was some evidence of digital clipping, error correction is merely satisfactory and resistance to shock and vibration was below average - an apparently almost inevitable consequence of light weight.

Sound Quality

Perhaps reflecting the rather indifferent test results, the M47 generated a similar lack of enthusiasm amongst the listening panel. The overall impression was of a rather old-fashioned kind of sound, lacking the musicality of more recent genera-

tions of compact disc players.

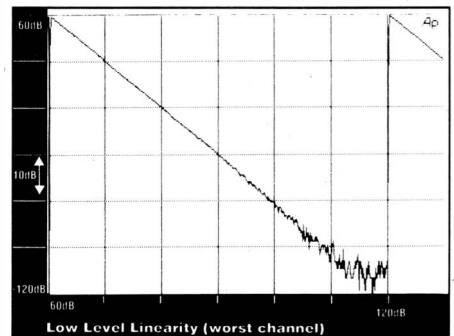
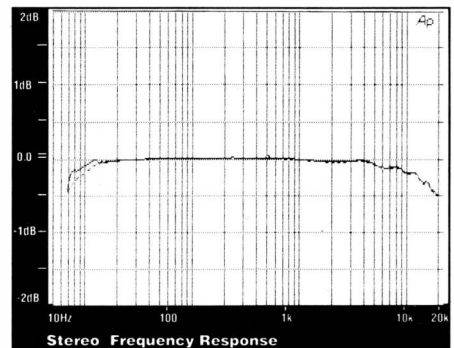
Pace is below average and timing sounds almost random, lacking poise and drive, while dynamics and transients are softened. The treble is sweet, if a bit mushy on fine detail, and the mid-band is pleasant enough, but the bass is somewhat below average and stereo images lack precision and transparency.

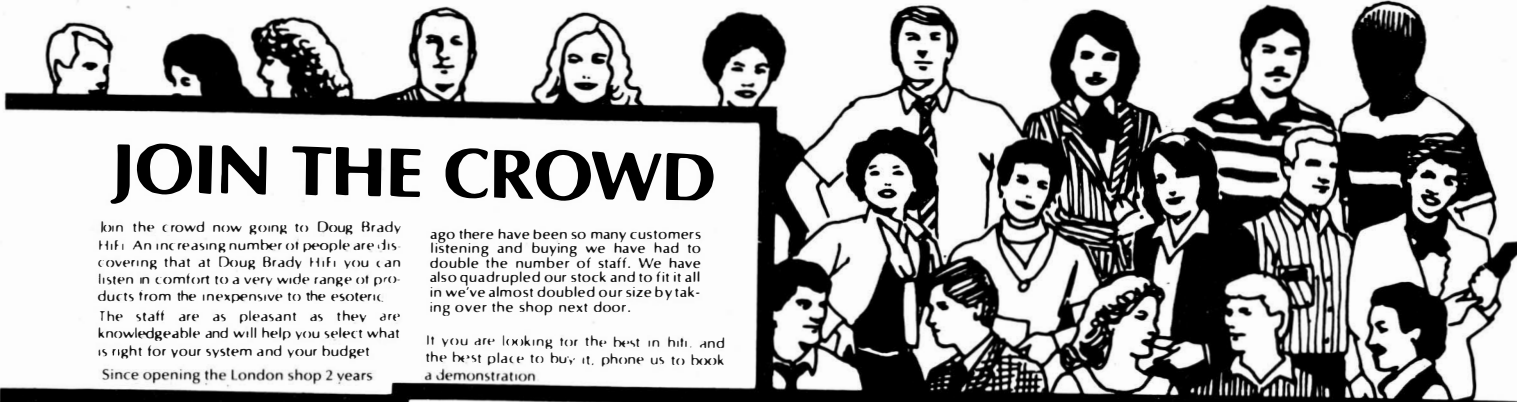
Conclusions

One cannot help admiring this midi size Sony for a fundamental design elegance that makes most full size players look clumsy by comparison. But the engineering and technology doesn't really stand up to close scrutiny in either lab or listening room, so recommendation would be inappropriate.

TEST RESULTS

Test resolution (L/R av)	15.8 bits
Output level, source impedance	2.13V, 0.56dB, 2.3kohms
Effective dynamic range	100dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Ref 0dB	-68dB -68dB -54dB
at -70dB encode + dither	-30dB, 3.3%
Stereo separation	108dB 102dB 76dB
Stereo balance L/R	0dB 0dB 0.01 dB
Frequency response (ref 1kHz) 20Hz to 20kHz	-0.5dB
High frequency intermodulation	-52dB or 0.3%
Electrical noise (CCIR/ARM, 1kHz)	-97dB
Mechanical noise	average
Ultrasonic noise	96dB
Error correction	0.75mm gap
Shock/vibration resistance	average
De-emphasis	±0.12dB to 16kHz
Track finding speed (15, YEDS 2)	3secs
White noise overload test	digital clip
Size (w x h x d)	35.3 x 8.1 x 26.5cms
Typical price inc VAT	£160





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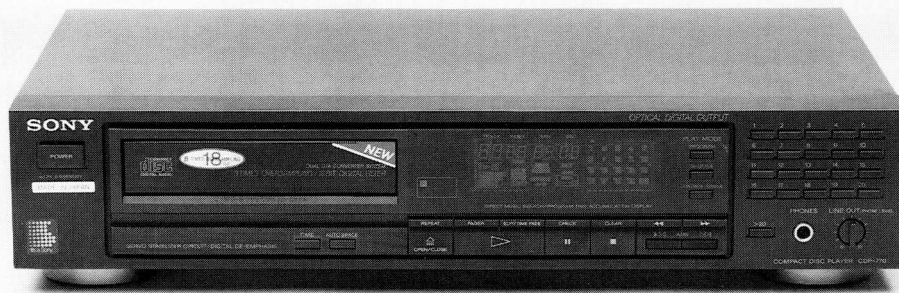
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Sony CDP-770

Recommended

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TEL: (0784) 467000.



A brand such as Sony needs little introduction. It's certainly the most creative but also the most individualistic of the Japanese electronics multinationals – and it's also rather more genuinely multinational than most of its more elderly rivals. Which is probably one reason why it got in on the original Philips CD act so early in the game – on the mezzanine floor so as to speak – helping its Dutch rival develop the original idea into something which was practical and marketable.

Neither company could have managed the trick entirely on its own, but together, aided and abetted by the other Japanese majors, CD was born and the rest is history. Except to point out that Sony has been even more successful than Philips in capitalising on its head start, and has grown rapidly in consequence, to challenge Panasonic/Technics as UK number one in audio products.

The CDP-770 is only one of an enormous range, many of which are on the threshold of an annual facelift and upgrade at the time of writing. But its particular combination of £200 price and full width presentation make it possibly the most important model of all as far as the hi-fi separates marketplace is concerned. Which probably explains – though doesn't excuse – the liberal dose of permanent and peel-off propaganda and point-of-sale that litters an otherwise nicely finished plastic fascia. The sticky blob that announces '18 bit 8 times oversampling' fails to point out that the technology referred to is that of the digital filter, not the DACs, which is the sort of practice that gives technohype a bad name.

What you do get here is a very nicely finished Japanese-built machine that is ergonomically straightforward and has rather more features than anyone is likely to need, all at a highly competitive price. The keypad is a little chunky but

nicely laid out for easy use. Both machine 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 potentiometer. The display is more than comprehensive, even though you can't program in your grandmother's birthday on this occasion. Editing and fading is facilitated, there are several different play modes, and digital data is available from an optical socket only.

Built within a plastic tray with steel top and base, inside all is neat and tidy, mostly on a single board and with minimal wiring. The small power supply is board mounted, while the plastic worm drive transport is decoupled. De-emphasis is undertaken in the digital domain, which is a nice touch, while the 8X oversampling Sony digital filter feeds a Burr Brown PCM56P dual 16-bit DAC.

Lab Report

One shouldn't anticipate state of the art measurements at this sort of price, but the '770 delivers a very respectable lab performance, let down a little by poor low level linearity, especially on one channel. The frequency response and de-emphasis are both very accurate; distortion, error correction and dynamic range are all fine, while shock/vibration rejection is good for a lightweight machine.

Sound Quality

Rather undistinguished and maybe a little bland too, the '770 nevertheless does as much as can be reasonably expected considering its modest price and taking into account the 'permanent' volume control. Comfortably showing the way to its cheaper midi-size brother, the bass packs a good thump, even if it does sound a shade artificial, and helps get the music bouncing along with fair

timing and pace.

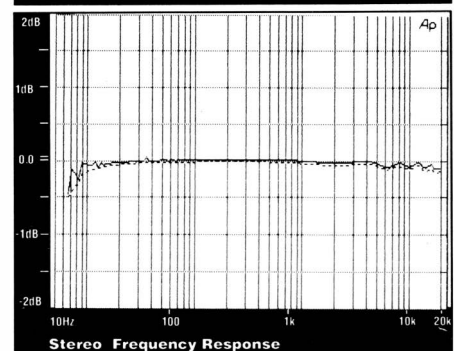
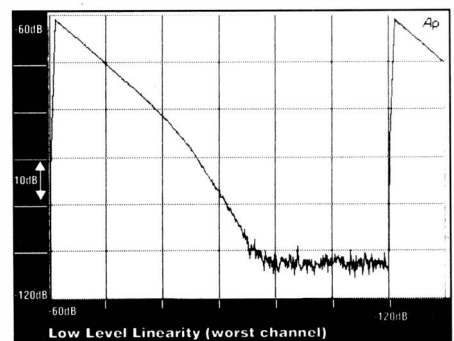
The stereo soundstage is unremarkable, though well enough formed, while the treble has a slightly old fashioned edgy quality, with mild grain. The midrange has slight nasality and wiriness that takes the edge off the transparency.

Conclusions

If the sound quality is maybe a shade ordinary, Sony design and manufacturing expertise plus a most impressive roster of features and facilities are quite sufficient grounds for Recommendation at the very reasonable price.

TEST RESULTS

Test resolution (L/R av)	14.9 bits
Output level, source impedance	1.96V, -0.14dB, variable ohms
Effective dynamic range	100dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Ref 0dB	-92dB -88dB -89dB
at -70dB encode + dither	-35dB, 0.4% (left)
Stereo separation	128dB 89dB 77dB
Stereo balance L/R	0.03dB 0.03dB 0.04dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.02dB
High frequency intermodulation	-90dB, 0.033%
Electrical noise (CCIR/ARM, 1kHz)	-99dB
Mechanical noise	low
Ultrasonic noise	110dB
Error correction	1.25mm gap
Shock/vibration resistance	good
De-emphasis	±0.05dB to 16kHz
Track finding speed (15, YEDS 2)	3 secs
White noise overload test	OK
Size (w x h x d)	43 x 10 x 28cms
Typical price inc VAT	£200

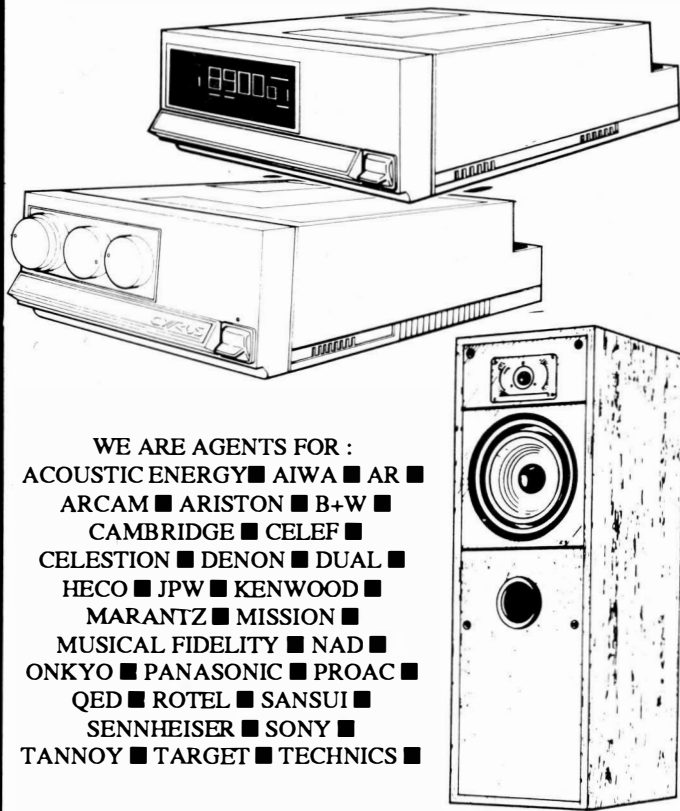


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Technics SL-P277A

Best Buy

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



Technics is the specialist hi-fi brand of Panasonic, itself the consumer electronics wing of the Matsushita empire, which must surely by now be the world's largest electrical engineering manufacturer. Although some rivals have been distracted by videorecorders and midi music centres, Technics has stayed true to hi-fi even during the doldrums of the pre-CD era, and has subsequently reaped the benefit with a healthy, market-leading share of hi-fi separates as a whole.

The 277 costs a modest £160, and so sits at the bottom of a long ladder of full width standalone players. The plastic fascia is the usual bronze/camouflage house colour, while the buttons, drawer and display are highlighted in black, giving a busy – almost fussy – overall impression. Legends are a bit small but the layout is logical, with sensible function grouping. This year's Technics technical buzzword MASH (multi-stage noise shaping) is given quite unnecessary prominence – in total contrast to the almost secretive way in which this technology was first introduced a year or so back.

Reflecting the increasingly multinational operations of the Japanese majors, the 277 is built at a recently opened facility in West Germany. Its light weight reflects the low price, but the machine nevertheless sports a full metal wrap case, and sits on the obligatory decorative feet.

Features too are quite generous for the price, especially the comprehensive remote control. This looks very smart and is nicely finished, though it's also a bit clumsy and square and not laid out for easy, intuitive use. The display is comprehensive, though the numbers are rather small. The back panel has detachable mains lead and a single pair of phono audio output sockets.

Four buttons plus a rear 'synchro edit'

socket are expressly designed to help dub variable length CDs onto fixed lengths of cassette tape for the best fit; you'll need a Technics cassette deck too of course, and should keep the manual handy as well if planning to unscramble the code. All the usual repeat, shuffle, time/display modes are available, and a headphone socket complete with volume control is also fitted.

Doubtless helping with EEC regulations regarding local sourcing, the transport here is a standard Philips CDM4 with Philips control circuitry, and these are neatly interfaced to the Technics main board. Five boards in all are neatly connected with the minimum of wiring, though there is no evidence of any special 'audiophile' componentry.

Lab Report

The low-bit MASH decoding via four DACs results in superb low level linearity and distortion results, –45dB harmonic distortion at –70dB is state-of-the-art stuff, which is highly impressive considering this player's very modest price. Intermodulation distortion is rather more average, and the frequency response shows a slight high frequency wiggle, amounting to a total variation of 0.6dB, though these do little to disturb what is an impressively clean bill of health.

Sound Quality

Less impressive in the listening room than in the lab, the '277 nevertheless produces a very competent and civilised sound which should be easy to live with. Certainly there's none of the harshness that is sometimes associated with players at the bottom end of the market, though there is some attendant softness and loss of drive.

Dynamics lack the excitement of some rivals, and the pace of music is a little slowed, but the treble is unusually sweet

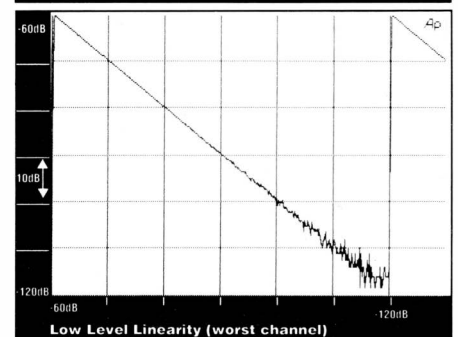
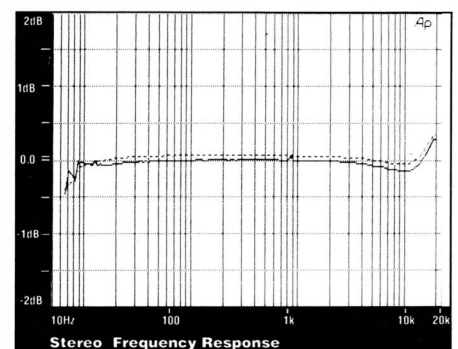
and pure for a budget player, while the midrange is neutral with a nicely rounded quality. Stereo images have quite good depth and focus in a generous enough soundstage.

Conclusions

Not perhaps the first choice for the hi-fi enthusiast, the '277 is nevertheless a very impressive proposition at the sharp end of the budget player market, well deserving its Best Buy rating. The feature count is generous, build, presentation and test results are very good indeed, while the sound may well prove to be better tailored to the characteristics of a budget system than many rivals.

TEST RESULTS

Test resolution (L/R av)	16 bits
Output level, source impedance	1.97V, 1kohm
Effective dynamic range	103dB
Harmonic distortion	20kHz 1.0kHz 20kHz
Ref 0dB	–84dB –92dB –88dB
at –70dB encode + dither	–45dB
Stereo separation	98dB 95dB 59dB
Stereo balance L/R	0.08dB 0.06dB 0.04dB
High frequency intermodulation	–77/85dB
Electrical noise (CCIR/ARM, 1 kHz)	–98dB
Mechanical noise	low
Ultrasonic noise	96dB
Error correction	2.5mm gap
Shock/vibration resistance	very good
De-emphasis	–0.5dB to 16kHz
Track finding speed (15, YEDS 2)	3 secs
White noise overload test	OK
Size (w x h x d)	43 x 9.1 x 28cms
Typical price inc VAT	£160





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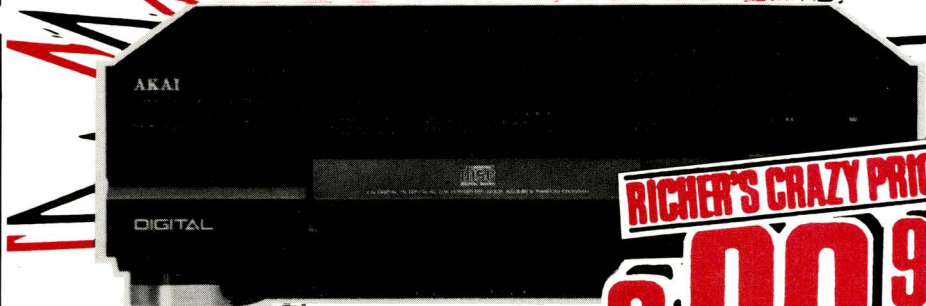
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Technics SL-PS50

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



Though rival brands are starting to threaten, Technics has been market leader in hi-fi separates for many years, partly through maintaining momentum and investment during the doldrums of the early Eighties, and partly through keeping the Technics name untainted by the cheap'n'cheerful excesses of midi stackers, portable audio and so on.

But clever marketing and brand building is only an effective strategy if the product fits the bill, and in this respect Technics models have always offered good perceived value for money, alongside a near-legendary reputation for reliability.

Perceived value is what the *PS50* is all about. It's a very imposing and impressive looking player to be carrying a £250 pricetag, though much of this is clearly a styling rather than an engineering exercise. The quite high fascia is attractively symmetrical in presentation, and the whole unit sits on a moulded, shaped plastic base with decorative feet. Despite the metal wrap, front and back, it doesn't weigh as much as expected, so clearly appearances are meant to be deceptive.

The loading drawer and comprehensive display take centre stage, while the various knobs and buttons have been designed and placed with plenty of thought. All are black against the traditional Technics dark bronze fascia, are sensibly structured, grouped, sized and shaped, though the smaller subsidiary legends are a little hard to distinguish. The handset is pretty too, if a bit chunky and inscrutable with it, providing a 10 x 2dB volume adjustment ladder.

Besides the usual range of operating features, 'synchro edit' decides how best to fit the contents of a compact disc onto standard length cassettes; three buttons are provided for this, while a special rear socket allows the player to talk and listen to a partnering Technics cassette deck. A

set of direct track entry keys are also fitted to the machine.

The only oddity is that the label MASH is given great prominence; it has nothing to do with potatoes nor the 4077th, and in fact is short for 'multi-stage noise shaping', just in case you're curious, a NTT/Matsushita variation on 'low-bit' digital-to-analogue conversion technology. A year ago it wasn't considered expedient to acknowledge its existence; now it's 1990's technobuzzword.

The rear panel carries a detachable 2-core mains, a single stereo phono pair of outputs, plus an optical only digital output. Headphones may be plugged into a conventional front jack socket, complete with volume control.

Built in Japan, the insides are rather empty, and the power supply transformer is small. The circuitry uses no fewer than eight boards, with surface-mounted main ICs, though wiring is kept to a minimum. The transport has a linear motor and magnetic disc clamp, while componentry is standard Technics grade throughout. Four MASH ICs - ie eight DACs - are used to ensure good signal/noise ratio in the digital-to-analogue conversion.

Lab Report

The test programme produced exemplary results in almost every respect. Distortion and noise are particularly low, track access times are ultra-rapid, low level linearity is very accurate, error correction and shock/vibration rejection is impressive, with just the out-of-band (ultrasonic) spuriae a little less than the best.

Sound Quality

Although the *PS50* makes presentable enough sounds, in fact its overall ranking was a shade below the cheaper '277 covered on the previous page. The two machines have much in common sound-

wise, perhaps reflecting their common DAC technology.

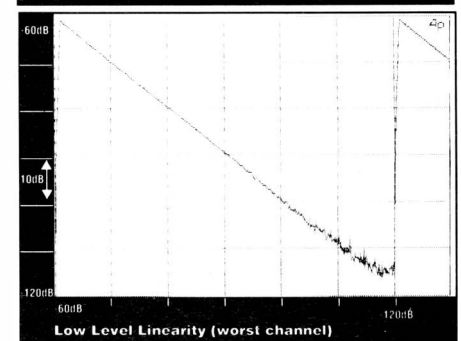
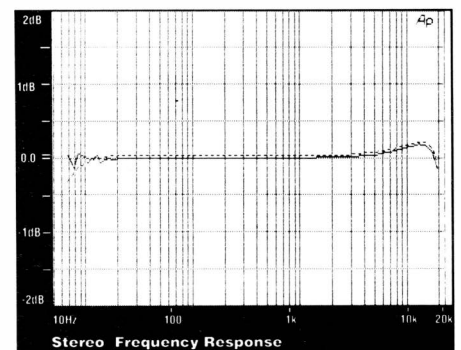
Clear and detailed, with the sweet and clean treble that is particularly enjoyable on classical music, the '50 lacks the pace, timing and 'boogie factor' to make the most of rock material. Dynamics and transients are somewhat slowed and softened, though stereo images are well formed with good focus, space and depth. Bass is extended but a bit soft.

Conclusions

To attain a broadly similar level of sound quality to its baby European-sourced brother at two thirds the price is not the stuff of which recommendations are made. But for those prepared to pay a handsome premium to impress friends and neighbours, the *PS50* is a very handsome looking piece of kit.

TEST RESULTS

Test resolution (L/R av)	16 bits		
Output level, source impedance	2.26V, 1.06dB, 1.2kohm		
Effective dynamic range	100dB		
Harmonic distortion	20kHz	1.0kHz	20kHz
Ref 0dB	-81dB	-91dB	-90dB
at -70dB encode + dither	-44dB		
Stereo separation	116dB	104/116dB	73/87dB
Stereo balance L/R	0.03dB	0.03dB	0.06dB
High frequency intermodulation	-100dB		
Electrical noise (CCIR/ARM, 1kHz)	-97dB		
Mechanical noise	low		
Ultrasonic noise	86dB		
Error correction	3mm gap		
Shock/vibration resistance	very good		
De-emphasis	±0.1dB to 16kHz		
Track finding speed (15, YEDS 2)	1.5 secs		
White noise overload test	OK		
Size (w x h x d)	43 x 12.5 x 33cms		
Typical price inc VAT	£250		



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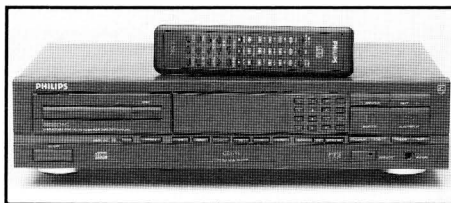
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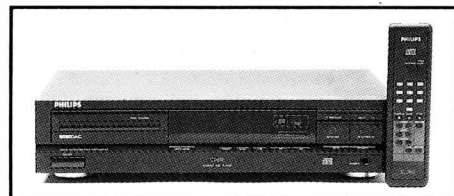
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Tech Talk

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 Spondor 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.

Conclusions, Best Buys and Recommendations

Martin Colloms sums up this month's group of compact disc players with a round-up of the recommended models.



For more than a year, the great digital debate in the hi-fi press has been firmly focused upon the arrival of new technology for converting the digital signal read from the disc into the analogue signal needed to drive loudspeakers.

Choice itself has referred to the matter on numerous occasions, most recently in the *Focus* feature (April 1990). But this is the first real opportunity that anyone has had to compare a wide range of machines that represent a number of different applications of the 'old' (multi-bit) and 'new' (low-bit, aka bitstream) techniques, and so get a real sense of perspective on the current state of play.

Until about eighteen months ago, all CD players used 'multi-bit' decoders, typically 16-bits, which directly convert the disc datastream into the 16-bit words that make up the PCM CD signal, and which are intrinsically tricky devices to manufacture with good consistency. Taking

advantage of the higher speeds available with the latest semiconductor devices, the new 'low-bit/high oversampling' approach uses various techniques to process the datastream into a form which can then be decoded by a much simpler analogue-to-digital decoder, albeit one operating at a much higher speed.

Of the twenty two models covered on this occasion, no fewer than eight use a 'low-bit' DAC approach, in a variety of different approaches and applications. Thus far it is fair to say that early implementations of the Philips 'bitstream' (PDM) technology already show some subjective advantage over other low-bit (PWM) applications – rather in the way that the Philips multi-bit chipset has tended to feature prominently in the best sounding multi-bit machines.

On balance the 'low-bit' models have done well – in some cases very well indeed – and that in turn is impressive considering the technology has only just been

introduced.

However, it is not yet by any means clear that 'low-bit' decoding is intrinsically superior to the multi-bit approach. Thus far it appears that each has its own strengths and weaknesses, and that the influence of the particular application is usually greater than the technological distinctions per se.

Stereotyping is risky, but the evidence so far points towards 'low-bit' tending to win on the midrange and treble delicacy and sweetness roundabouts what it loses to multi-bit on the dynamic, pace and timing swings. (By the same token, CD still loses out to the very best vinyl replay in all these specifics, while gaining in terms of background noise and convenience.)

Broad trend differences may also be seen in the results of the lab tests, low-bit models tending to show better low level linearity but less good noise figures in- and out-of-band. There is also some indication that

low-bit error correction/concealment may not yet be quite as advanced as that used in multi-bit machines.

What is abundantly clear is that 'low-bit' has been excessively and prematurely hyped, in rather the same way that CD itself was oversold in its early days. Low-bit conversion clearly has great potential, but to suggest that its introduction automatically renders multi-bit redundant is naivety on a grand scale.

Philips itself sees the two technologies coexisting for the foreseeable future, and has no intention of abandoning multi-bit. Indeed, in some respects the 'bitstream' CD840 design itself looks a bit like an adapted multi-bit machine, put into production rather hastily (if not tardily) in order to satisfy pent-up audiophile demand for the new technology.

It's impressive enough that low-bit conversion is already broadly competitive with multi-bit, but it should not be forgotten that CD player technology is still in its infancy and is continuing to advance at a rapid pace. The latest audiophile machinery of whatever DAC persuasion is creating a level of sound quality that is comfortably and demonstrably better than that available a year ago, and there is every reason to expect this impressive rate of progress to continue.

Best Buys and Recommendations

The twenty two review models produced an impressive number of noteworthy examples of the CD player manufacturer's art. No fewer than five receive Best Buy ratings, providing first and foremost fine sound quality for the price. A further eight fall into the Recommended category, either because they are priced above the BB maximum, or

because they combine good sound with other important attributes such as build quality, ergonomics, presentation, feature roster and so on.

The CD player market changes so rapidly, on a model improvement cycle that is sometimes as short as twelve months, that the actual availability of some of the older models listed in the *Directory* may be limited. In order to provide the most useful and up to date consumer advice, the following summary highlights the cream of the latest crop, but also including a number of worthy designs from previous group tests (eg November 1989), plus references to some unreviewed but related current models which are also worth checking out.

Best Buys

Beginning with the least expensive, the £160 **Technics SL-P277** is a clever blend of European and Japanese technology and manufacturing skills. Build, finish and equipment is all to a high standard, the MASH system giving a smooth and accomplished sound quality by budget standards.

Its main multi-bit competitor is the £160 **Philips CD610**, which has much of the inherently good character of the breed in a beer budget application which lacks the refinement of the more expensive variants. Look out too for the as yet unreviewed

£200 **Philips CD620** and £200 **Marantz CD40**, both rather more refined versions of a similar basic package.

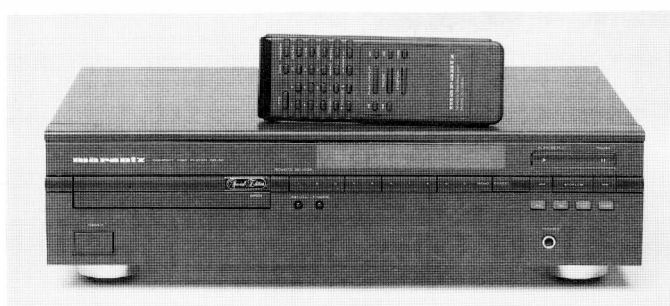
An outstanding Best Buy from Nov '89 is the £250 **Rotel RCD 855**, which is very much a 'budget audiophile' machine, with most of the best qualities of the Philips multi-bit chip set and little compromise through convenience features.

The remaining Best Buys are all over £300, but each is accomplished enough to outperform a great many significantly more expensive models. The £320 **Marantz CD50SE** and £380 **Marantz CD60SE** are both excellent examples of the multi-bit-with-knobs-on approach.

Their dynamic and lively sound provides an interesting contrast with the smoother, sweeter yet somehow also more pedestrian bitstream-with-knobs-on £350 **Philips CD840**.

Pick of the whole bunch on sound quality grounds is the neat and straightforward £400 **Arcam Alpha**, which establishes the current yardstick for affordable multi-bit CD, whilst at the same time tending to undermine Arcam's more expensive players.

The £300 **Arcam Black Box** is also a BB in the value sense, this 'budget' multi-bit digital-to-analogue converter box providing a cost-effective technology update for owners of older CD players with digital outputs.



Marantz CD50SE: a good example of multi-bit technology.

Recommendations

The recommendations between £200 and £300 tend to concentrate on stuffing as many features into the package as possible, though the £200 **Sony CDP-770**, £250 **Philips CD630** and £280 **Aiwa XC-005** also make a decent enough job of the sound side as well.

Those seeking autochanger convenience should examine the £350 **Pioneer PDM710**, which is probably the best example of the breed, albeit less capable than many cheaper single play machines.

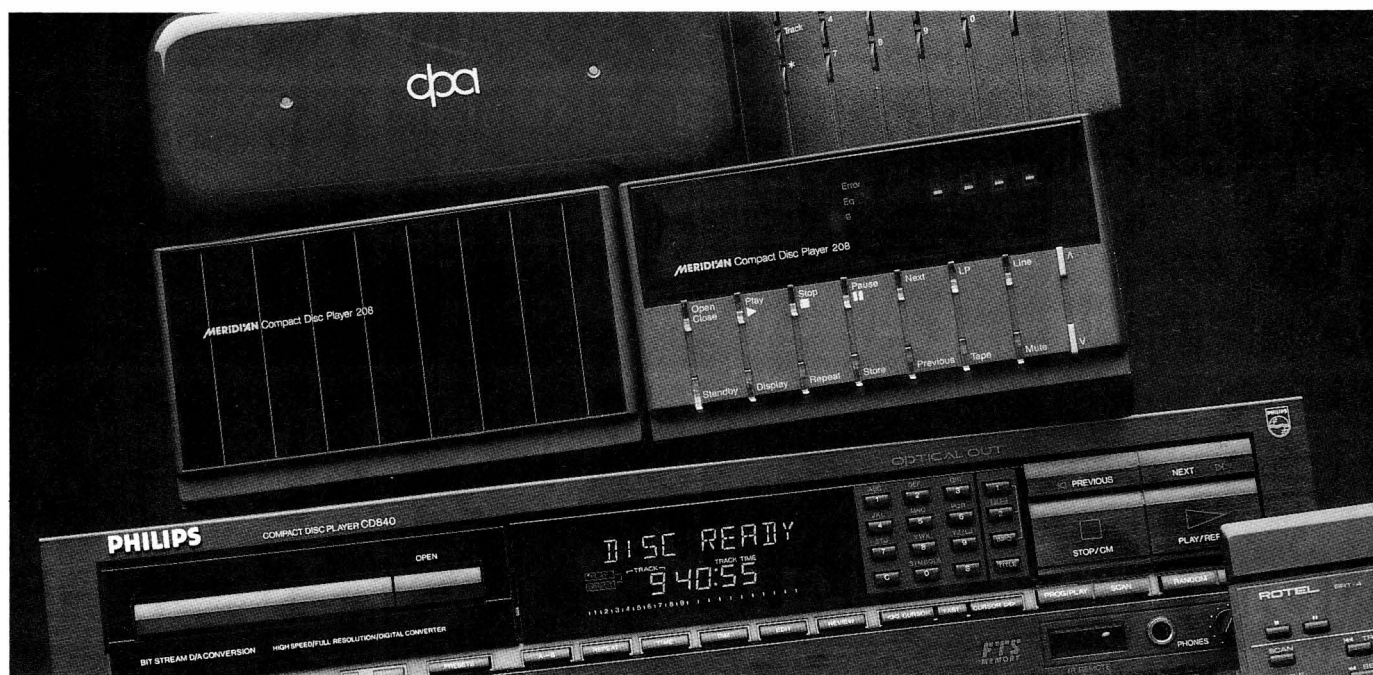
Quite an evergreen by CD player standards, at its new low price the £400 **Mission PCMII** is still competitive, especially for those requiring full remote volume control.

A rather quirkier British entry is the £500 **Deltec PDM One**. Note that this is not a player but an outboard decoder, based on the Philips PDM 1-bit DAC chipset and capable of genuine audiophile sound quality when used with a good quality CD transport.

Traditional Japanese build quality is becoming an increasingly expensive feature these multinational days, but remains an impressive attribute for its own sake. The £400 **Sony CDP-228ESD**, £499 **Kenwood DP-8200**, £500 **Denon DCD-1520** and £550 **Sansui CD-X711** have contrasting styles of presentation, but all four classy middleweights stand out in the £400-£600 price range by delivering solid, above average sound quality to match the build and feature count.

At £600 the **Arcam Delta 70II** (two-box player) and **Delta 170** (transport only) are the luxury end of the Arcam range, though in value terms both are outclassed by the two Arcam Best Buys.

The multi-bit £800 **Meridian 206** and low-bit £1,490 **Meridian 208** both set impressive standards in their own distinct ways against all comers, and should definitely be shortlisted by those seeking the current state of CD sound quality art, of either DAC persuasion.



A gaggle of 1-bit PDM devices from Deltec, Meridian and Philips.

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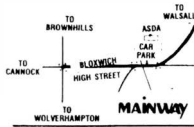
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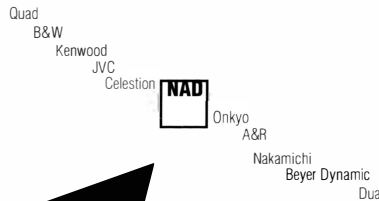
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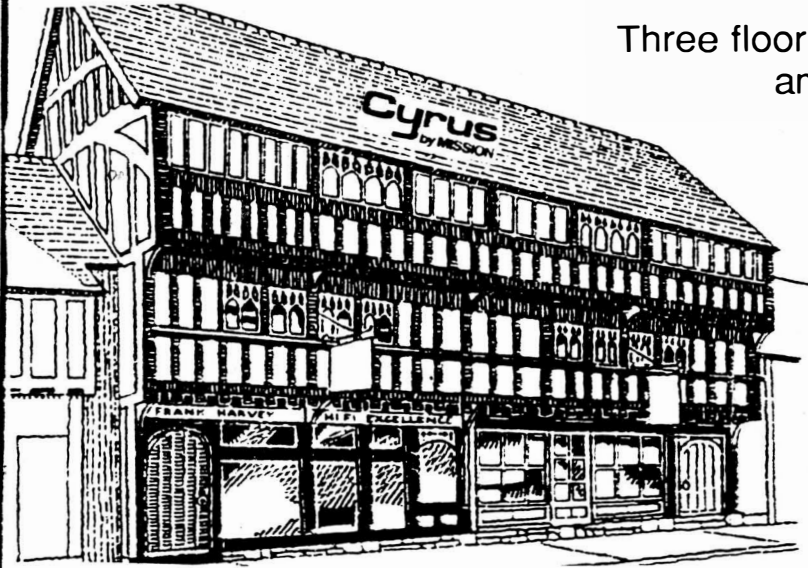
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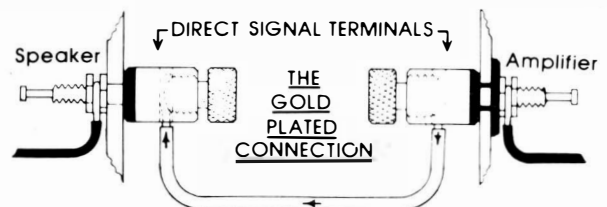
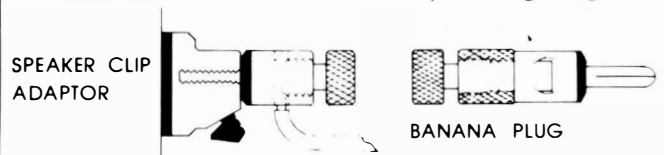
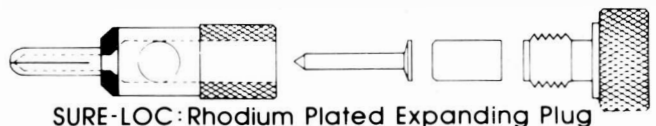
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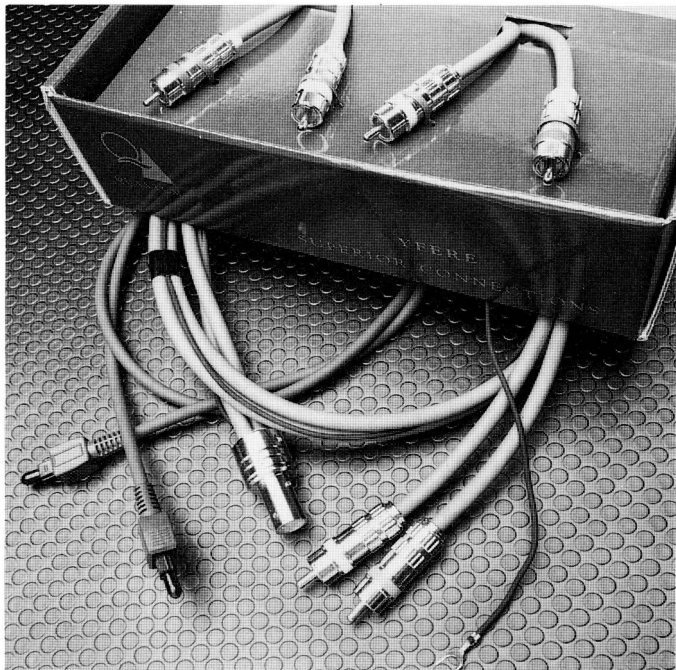
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Hi-Fi Choice is always recommending that readers buy their hi-fi systems primarily for sound quality rather than features such as flashing lights and go-faster stripes. But what about the very shape of audio equipment, its feel and compatibility with your home style? Should it be heard but not seen . . . or should we demand greater use of colour and visual appeal from audio designers?

The style of hi-fi is arguably derived from a military environment where function trod all over form. Enthusiasts in the Fifties (or even earlier) bought second hand army rack equipment in the Tottenham Court Road to pursue their hobby. But earlier than this the radio, or radiogramophone, had been specifically styled for the home. Many feel the late Twenties and Thirties were the only era when sound reproduction equipment suited the home. Led by Anorak hobbyists, hi-fi became ever more complex, and with the introduction of new media like the cassette deck, separate boxes again led to function dictating form.

In the early Eighties the industry attempted to minimise the impact of solid state equipment in the home – it painted everything black and raised the hemline on its stacking separates, offering the Midi system to those who couldn't give domestic space to a sound-stage. However, the rise of high-end equipment in the UK – with exotic looks exciting audiophiles almost as much as sound quality – together with a more flexible design approach in the cheaper 'Walkman' market, has led companies such as Yamaha to break the 'oblong and black' design barrier here.

After a decade in which audio companies could be accused of gadgeteering as much as pioneering is it time to turn the spotlight on style? Who better to ask than Sir Terence Conran, a style guru (albeit under pine rather than carob) who pioneered the synergistic 'home look' in the Seventies via his Habitat stores. Now chairman of The Storehouse Group, made up of Habitat, Heals, Mothercare and BHS among other concerns, Sir Terence has also set up The Design Museum on Butler's Wharf by London's Tower Bridge – a stone's throw from his office. He's off over there after our interview to talk to some students. Design is in the ascendant; 58 per cent of schoolchildren want a career in design, he proudly tells me.

The Design Museum is a retrospective



Hi-Fi in the habitat

As Chairman of this year's BBC Design Awards for Products, Sir Terence Conran finds hi-fi to be of little visual pleasure. Dan Houston finds out why.

and contemporary, if somewhat whimsical, reflection of some of the best industrial design products. A classic 'stand-up-and-beg' Safety bicycle is hung next to the fad victim's orange Chopper and thief's favourite Mountain Bike, opposite a glass-cased collection of typewriters, cutlery and other household goods. Examples from Philips' *Moving Sound* range of personal stereos are featured alongside the cult Sony *Walkman* but home systems are limited to

examples from the Brion Vega and Braun stables as well as a B&O system. While certainly stylish, none of these products is renowned for its sound quality. Is form superior to function in matters of design?

"The sound quality of hi-fi must be the most important thing," consents Sir Terence, "it's like eating in a restaurant – if the food is no good there is no point going, no matter how lavish the decor." For him any industrially designed product has to be designed to perform its function 'excellently': "If it also happens to excite you as an object that gives you pleasure to look at or touch then that is the added dimension which makes it remarkable." The comment puts everything else, including most audio equipment, firmly in the unremarkable camp. He thinks it highly unlikely that a piece of hi-fi will make it through to the finals in the BBC Design Awards this summer although he does find some audio design attractive. The Yamaha *Tiffany* system, or *Astarte* as it is known in the UK, was singled out for praise as being interesting, making a visual and tactile statement with a use of colour which was likely to be much more appealing to a non-audiophile than most equipment. And Paul Thompson, the Design Museum's Review Manager, who was present at the interview, confirmed that he was still planning to incorporate the much-vaunted *Emphasis* loudspeakers in

the museum. These were designed by Morten Villiers-Warren and are due for production at around £3,500 a pair by B&W Loudspeakers later this year. The sonic credentials of the *Emphasis* – the fact that B&W will launch it at all – are based in solid audio engineering principles but Morten comes from a furniture design background and has made it his quest to educate the public away from the accepted black box norm.

Furniture design

Perhaps engineers and industrial designers should team up with more creatively aware designers to produce sound systems which are more attractive. Sir Terence doesn't think it is necessary: "An industrial designer who has no aesthetic sense will not produce products that people want.

"But these things are part of the furniture," he agrees, "and they have improved vastly; they do work well and at least they don't offend. At my home (in Berkshire) I use a Sonab system which is some 15 years old; it's very simple and, yes, I bought it partly for its visual appeal." Sir Terence also uses hi-fi – Sony and Denon equipment respectively – at his other homes in London and France. "But none of them gives me the sort of thrill I mentioned earlier – black stacking boxes are very boring."

Anyone familiar with the design ethos behind Habitat or Heals will not be surprised to hear Sir Terence extolling the virtue of simplicity. "I don't see that complexity for complexity's sake can

come under the heading of good design. That's like a washing machine with 80 different programmes; research has shown that people don't want that. And you don't need a lot of knobs when one will do. My ears are not insensitive but I've never been able to use this graphic equaliser thing . . ."

I asked Sir Terence whether audio designers should embrace a 'less is more' ideal. "Less is more in the miscian meaning of the word – it's extremely sophisticated. It seems that man has gone through the the whole business of bits

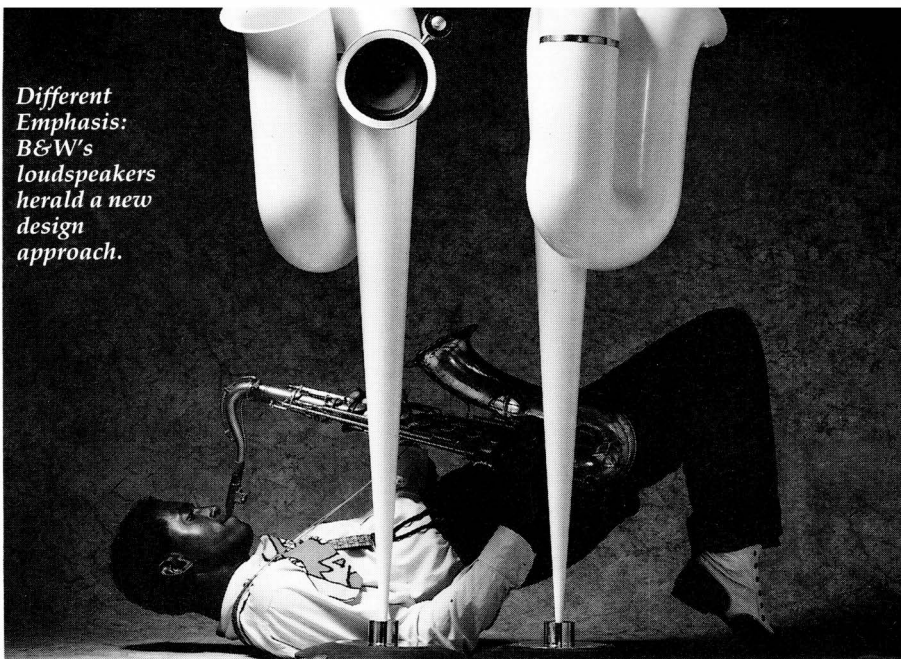
'The sound quality of hi-fi must be the most important thing . . . it's like eating in a restaurant – if the food is no good there is no point going, no matter how lavish the decor.'

and pieces and has managed to get through this and back to clarity and serenity. It's not simple like Simon, but sophisticated like an extremely intelligent solution which allows the important things in life to be concentrated upon. I think that people were a bit breathless at the end of the decade and this year could see a period of them taking stock. It's not so much low design as calming down and maybe doing some undesign."

Take a softer look

One area where design is seen as being of paramount importance is in the portable and personal stereo markets. "It's really interesting that the cheaper end of the market is prepared to do things which are visually more exciting than the more expensive area. The Philips *Moving Sound* range is very innovative – they're bringing out new styles every year whereas it used to be just new features."

Indeed Philips' approach, which relies on intense research in the young markets across Europe, has apparently won the electronics giant a higher market share than Sony – which pioneered the personal. Nick Thomas, of Matthieu Thomas, which handles PR for Philips, believes that while designing for the fashions of a constantly evolving youth market was a crucial concern – and had taken the brand away from its staid and MOR image – it was impossible to do the same for separates. "We spend an awful lot of effort making systems more acceptable in the home. But design depends on your criteria – I sometimes wonder what criteria people use when they judge these things. Philips covers the middle ground selling to people aged between 18 and 45 years through Surrey and Essex who want something to stick in a corner. You can't sell to that market and be like B&O – they only sell to two or three per cent of the mass market. Styling is much better than two or three



Different Emphasis: B&W's loudspeakers herald a new design approach.



The Yamaha Astarte system gets points for trying, and sounds OK for a midi.

years ago and there is a softer look, though it isn't perfect yet. We need to push the frontiers occasionally but we have to respond to what people want."

It seems Sir Terence knows the response of the giant manufacturers; he offers little guidance other than extolling the design virtues of the new Yamaha system, for instance.

DIY design

The conversation moves on to concentrate on how to deal with existing designs of hi-fi equipment, making them visually more acceptable. "Speakers require treatment," he opines. "In my house in France the speakers are so horrible – although the sound is very good – they look like great black coffins in the middle of the room. And so I have hung a white screen (sound permeable) to make them disappear." He's also all for hanging small loudspeakers on a wall, painting them to match the room decor and disguising their box-shape with pyramidal shaped drapes hanging underneath. "Part of the problem is the appalling spaghetti of wiring that spews from the back of all this stuff . . . we now have videos, televisions, satellite receivers, the hi-fi or whatever and the result is quite disastrous . . ." He gets up and fetches a glossy hard-backed copy of (surprise, surprise) his own book on DIY in the home, leafs through and points out the solution. "One of the ways round that is to build a hollow shelf with the wires travelling through the middle. I think wire management is an up and coming area but nobody seems to be thinking about it."

This is all very well for those not interested in getting the best possible performance from their systems. For the audiophile wishing to recreate the musical experience in his home, placement of loudspeakers, stands and isolating equipment supports are all vital to the sound quality. "If you happen to be an audiophile then of course you will buy a different piece of equipment than simple human beings like ourselves," he offers, recognising that the handcrafted aspect of much esoteric hi-fi is enough to appeal to the owner's visual tastes if his ears are also telling him that it sounds great.

Most of the industry looks set to continue with black stacking boxes for the immediate future, assuring itself with market research that these are the designs people want to buy. But if Sir Terence is right, and more young people want to work in design than any other career, then the black box will have to leave the living room and return to an aircraft control panel where it belongs.

'Speakers require treatment . . . In my house in France the speakers are so horrible – although the sound is very good – they look like great black coffins in the middle of the room.'



"Never been able to use this graphic equaliser thing . . ." Sir Terence advocates clarity (of sound and design).

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A.T.LABS, 190 West End Lane, London NW6. (071) 794 7848. Mon-Sat 10-6. Two dem rooms. Access/Visa. Sony Hi-Fi News Best Dealer '86 & '88 (National). **BADA MEMBER**

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WATTS RADIO - the engineers, Jim Badman, 1 West Street, Somerton. (0458) 72440. Castle, Dual, Denon, KEF, Mordaunt-Short, Ortofon, Quad, Rogers, Thorens, Yamaha. Dem and home trial facilities. Mon-Sat 9-1, 2-5.30, Wed 9-1. Free installation. Credit to £1,000. Access, Visa. Service dept.


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TRU-FI SOUND AND VISION, 2 Central Parade, Redhill, Surrey. (0737) 767404/766128. Aiwa, Audio Technica, B&W, Nakamichi, Mission, Mordaunt-Short, Nakoaka, Sony, Technics. Dem. facilities. Free installation. Service dept. 0% finance. Access, Visa. Mon-Sat 9.30-6.
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JEFFRIES HI-FI, 69 London Rd, Brighton, East Sussex. (0273) 609431. 2 dem rooms, closed Mon, late night Wed Parking, bus route. Credit facilities: BADA MEMBER 

JEFFRIES HI-FI, 4 Albert Parade, Green St, Eastbourne, East Sussex. (0323) 31336. 2 dem rooms, closed Mon. Late night Wed. Parking, bus route. Credit facilities.

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LASER SOUND & VISION, 72 Terminus Road, Eastbourne, East Sussex BN21 3LX. (0323) 640911. Marantz, Cambridge, Kenwood, Denon, Rotel, Infinity, Tannoy, Michell, KEF, Heco etc. Dem room. Home trial. Free installation. Service dept. Visa, Access. 9am-6pm Mon-Sat.

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ALTERNATIVE SOUNDS, 10 Eastgate Square, Chichester PO19 1JM. (0243) 784710. Rotel, Musical Fidelity, Nakamichi, Marantz, JPW, Yamaha, Tannoy, Cambridge Audio, JBL, Kef. One hi-fi dem room, one surround sound dem room. Home trial. Free installation. Service dept. Credit available. Access, Visa. 9.30-5.30 Mon-Thurs, 9.30-6.00 Fri/Sat.

BOWERS AND WILKINS Ltd, 1 Becket Buildings, Littlehampton Rd, Worthing. (0903) 64141. B&W, Nakamichi, Castle, Denon, Dual, JVC, Mordaunt-Short, Philips, Quad, Sony, Technics. 3 dem rooms. Mon-Sat 9-5.30, Weds 9-1. Home trial facilities, free installation, credit to £1,000. Access, Visa. Service dept.
CHICHESTER HI-FI, 7 St Pancras, Chichester, W. Sussex PO19 1SJ. Tel: (0243) 776402. Linn, Naim, Rega, Creek, Nakamichi, A&R, Denon, Roksan etc. Tues-Sat, 10-1, 2-5.15 (closed Mon). BADA MEMBER 


TYNE & WEAR

RED RADIO SHOP AND HI-FI CENTRE, 11 Olive St, (Off Park Lane) Sunderland. (091) 56772087. Castle, Denon, Bose, JVC, Kenwood, Mordaunt-Short, Michell, Teac, Tannoy, Shure. Demonstration room, large with comparator facility. Free installation. Service dept. Interest free credit and no deposit interest free credit. 9am-5.30pm daily.

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AUDIO PROJECTS, 45 Headingley Lane, Leeds. (0532) 304565. A&R, Audiolab, Creek, Heybrook, Linn, Musical Fidelity, Naim, Quad, Rega, etc. Tues-Fri 9.30-6, Sat 2.30-5.30. BADA MEMBER 
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Audiophile Recordings

In conjunction with hi-fi distributor Audiofreaks, Hi-Fi Choice can now offer its readers a selection of hard-to-find audiophile records and CDs.

Thanks to an exclusive deal with Audiofreaks, *Choice* has now sourced a variety of high quality Norwegian jazz recordings which are superb hi-fi demonstration records – plus the fabulous *Paganiniana* recording by Water Lily Acoustics of America, sponsored by Conrad-Johnson. As we find more good discs, we hope to add them to the list.

You might stumble across one or two of these records in some specialist hi-fi shops, but for the most part these albums are not readily available in the UK. You certainly won't find them in your local record store! So we are delighted to be able to make them available to *Choice* readers by mail order. We're sure you will enjoy them.

Please note: two of the discs – the Gemini and Odin samplers – are available only on Compact Disc.

RADKA TONEFF: *Fairytales*

CD: Odin CD03
LP: Odin LP03
The well known audiophile (digital) recording of female voice and piano. An international best seller, despite having been only sporadically available in this country. Enchanting songs.

ODIN SAMPLER

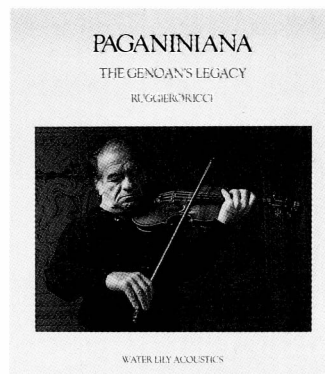
CD: NJ-4028-2
The Odin record label was established by the Norwegian Jazz Federation in 1981. This 75-minute compilation on CD provides a comprehensive taster from the label's catalogue. Not available on vinyl.

GEMINI/TAURUS SAMPLER

CD: GMCD 6239
A pure jazz label, Gemini Records was formed by producer Bjorn Petersen to record Norwegian jazz musicians who deserve wider recognition. Taurus is a subsidiary label presenting less mainstream music. This 15-track sampler is available only on CD.

SMITH/RICCI: *Paganiniana*

CD: CJCD
LP: CJLP
Breathtaking, purist analogue audiophile recording of classical works performed on piano and violin. On the Water Lily Acoustics label, sponsored by Conrad-Johnson and imported from America. An essential addition to any audiophile's record collection.



TOTTI BERGH: *I Hear A Rhapsody*

CD: GMCD 48
LP: GMLP 48
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."

LAILA DALSETH: *A Time For Love*

CD: GMCD 51
LP: GMLP 51
Another recording from the Gemini catalogue, this time featuring the golden voice of Laila Dalseth – with Red Mitchell on string bass.

FLIP PHILIPS/KENNY DAVERN/BJARNE NEREM: *Mood Indigo*

CD: GMCD 59
LP: GMLP 59
Excellent mainstream playing by three great gentlemen of jazz. Recorded during the 1987 Oslo jazz festival.

BJORN JOHANSEN: *Take One*

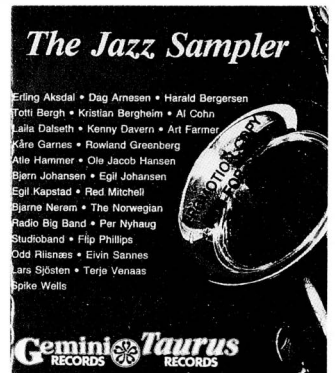
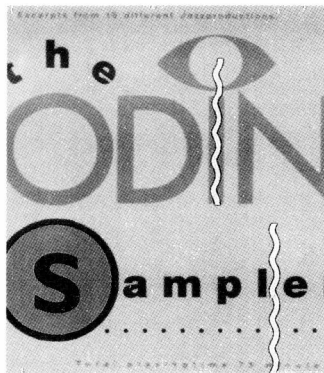
CD: NJ4021-2
LP: NJ4021-1
Norway's top tenor sax player and his dream band, recorded in a one-night session at Rainbow studios in Oslo. Featuring Cedar Walton, David Williams and Billy Higgins.

JON EBERSON: *Stash*

CD: Odin CD19
LP: Odin LP19
An exciting trio session with one of Norway's top guitarists. Featuring Terje Rypdal's rhythm section Bjorn Kjellemyr (bass) and Audun Kleive (drums).

CALEDONIA JAZZBAND: *Walkin'*

CD: HCRCD 38
LP: HCRLP 38
Genuine New Orleans jazz/calypso/R&B/marching band with Wendell Brunious in the frontline on trumpet.



TO ORDER YOUR LPs AND CDs

(Tick selections)

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Totti Bergh: *I Hear A Rhapsody*

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Caledonia Jazzband: *Walkin'*

9 CD HCRCD 38 (£14.95)

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Smith/Ricci: *Paganiniana*

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GLOSSARY

The Hi-Fi Choice dictionary of audio terminology, explaining all the weird and wonderful adjectives used by our reviewers, as well as technical abbreviations.

AM: Amplitude modulated; see 'Medium Wave'.

ACOUSTIC BREAKTHROUGH: Sound that gets into the turntable and hence the cartridge from the air and thereby creates a risk of acoustic feedback.

ACOUSTIC FEEDBACK: If any sound in the room can find its way through the body of the record deck to the cartridge stylus, then that sound will be reproduced from the loudspeakers, along with the wanted programme material. If too much of this sound from the loudspeakers is picked up by the cartridge in this way then a vicious circle of acoustic feedback will be created.

ACTIVE: Speaker systems which contain electronic crossovers and where the drive units are connected directly to power amplifiers.

ALIGNMENT PROTRACTOR: A device used to minimise the lateral tracking error of a cartridge/arm combination.

AMPLITUDE: Size or magnitude; hence the amplitude/frequency response, known normally simply as the frequency response, which describes the relative loudness of the system at different frequencies with a constant input voltage.

ANECHOIC: Without echo; a special room or 'chamber' with thick sound absorbing materials on all surfaces to prevent reflections.

ARM MASS: More accurately called *effective* arm mass, because it is *not* the weight of the arm on a pair of scales. It is the mass of the arm and cartridge combination that appears to be concentrated at, and thus felt by, the stylus tip which is tracking a record groove. There is nothing inherently good or bad about arms with light or heavy effective mass; what matters is the manner and choice of their combination with cartridges of different compliance and the low frequency resonance produced by such combination.

AZIMUTH: With reference to tape and cassette recorders, the alignment of head gap to tape path.

BALANCE: 1) The overall relative loudness perceived at different frequencies (eg bass, treble); 2) the accuracy of the match between the two channels of a stereo transducer (eg cartridge or pair of loudspeakers).

BANDWIDTH: A range of frequencies with presumed defined upper and lower limits.

BASS: Lower part of the frequency spectrum.

BELT DRIVE: The motor has its rotational speed geared down to the required platter speed (33 $\frac{1}{3}$ rpm for LP discs) by a rubber or similar resilient belt which runs round a small pulley on the motor shaft and a large pulley attached to or part of the platter.

BEXTRENE: A plastics material frequently used for bass and mid-range cones.

BIAS: (*turntable/arms*) Because the cartridge on a pivotal arm is being drawn across the record surface by the stylus tracking at an angle offset from the pivots, groove friction produces an imbalance of lateral force. Bias is the application of a compensatory lateral force acting in the opposite direction.

BIAS: (*tape*) This refers to a high frequency current passing through the record head which allows the audio current also passing through the head to produce reasonably linear magnetisation of the tape at all levels permitted by the combina-

tion of each machine with the tape. The lowest level of bias is required for ferric cassettes, a slightly higher one for ferrichrome, an even higher one for chrome or pseudochrome, and the highest for metal.

BOTTOMING: The stylus scraping on the distorted rounded bottom of the groove due to incorrect stylus geometry.

CANTILEVER: The thin rod or tube that connects the stylus to the armature and hence the cartridge body.

CAPACITANCE: An element of electrical impedance that is particularly important when matching pickup cartridge, arm leads and amplifier input characteristics to achieve a flat frequency response from discs.

CLIPPING: This is reached when a circuit is overloaded and overdriven, resulting in bad waveform distortion and audibly unpleasant effects.

COLORATION: A general term used to describe the audible effects of distortions, particularly in loudspeakers and record players. These are usually caused by frequency response irregularities and/or resonances.

COMPATIBILITY: The selection of interdependent components to achieve optimum system performance; notably arm/cartridge mass/compliance matching, cartridge electrical loading, or loudspeaker compatibility with amplifiers.

COMPLIANCE: A measure of the springiness of the cantilever/armature seen from the stylus, expressed in compliance units (Cu), where 1 cu = 10⁻⁶ cm/dyne.

CROSSOVER: An electrical circuit which uses combinations of inductors, capacitors and resistors to divide the signal from the power amp into the required frequency bands and with any necessary equalisation for feeding to the individual drive-units of the speaker system.

CROSSTALK: The leakage from one channel to the other in a two channel stereo system.

CUTTER: Mechanism used to cut recorded signal onto lacquer master; consists of turntable, lathe, cutting head, cutting and servo amps.

DIN: German standards body, responsible amongst other things for a popular range of standard plugs and socket specifications.

DAMPING: A means of controlling resonances by means of a resistive medium (electrical, mechanical, or acoustic depending on situation).

DECIBEL (dB): A logarithmic unit that is convenient for expressing ratios that span a wide range on a linear scale. For simplicity it can be regarded as a measure of relative loudness.

DISTORTION: Literally this can mean any deviation from the original, but usually refers to harmonic rather than intermodulation distortions when not specified.

DOLBY: Covers various signal processing/deprocessing systems, but normally refers to the B & C noise reduction systems used in cassette record/replay, and the B system used for music-cassette replay.

DOPING: A technique involving the application of damping to a loudspeaker driver cone in order to assist in controlling resonances.

DOWNFORCE: The weight, measured at the stylus, which holds it down in the groove.

DRIVE UNIT (DRIVER): The term used to distinguish the loudspeaker unit itself, be it bass, midrange, treble or fullrange in application, from the complete loudspeaker system which combines drive units, cabinet and crossover into a total design.

DROPOUTS: Momentary reductions of programme level due to inadequate head/tape contact caused by oxide particles shedding off the tape onto the head gap, or inadequacies in tape transport or tape.

DYNAMIC RANGE: The ratio in dBs between the quietest sound that can be successfully recorded and the loudest which can be accepted without serious distortion on an average programme.

EFFECTIVE MASS: The inertia, or mass-controlled resistance to movement, of a device, particularly important with regard to tonearms.

EFFICIENCY: The amount of acoustic power delivered for a given electrical input power.

ELECTROSTATIC: A principle employed in some loudspeaker transducers using static electricity effects to set up a polarising field within which the modulated transducer medium moves.

ELLIPTICAL STYLUS: A specially shaped stylus profile that makes the 'plan view' radius along the length of the groove smaller than the 'elevation view' contact radius viewed from the front.

EQUALISATION: (*general*) The deliberate modification of frequency response, usually in response to some engineering limitation or deficiency.

EQUALISATION: (*tape*) This refers to the necessary change in frequency response required of an amplifier so that overall flat frequency response is obtained from a tape medium. Equalisation is required both on record and replay. Any tape recorded on a good cassette recorder should have the same inherent response when played back on another correctly set up machine, since all playback equalisations should have been standardised. These standards are normally specified by the time constants of the circuits involved, eg 79 μ s or 120 μ s (see 'Microseconds').

FARAD: Measure of capacitance.

FM: Frequency modulated; often used to describe radio transmissions of high fidelity potential on the VHF band.

FARAD: Measure of capacitance.

FERRITE ROD: A short rod type aerial used for AM reception; may be fitted internally or externally to a tuner or receiver.

FERRO-FLUID: A magnetic fluid which is introduced into the voice-coil gap to provide damping and/or improved cooling.

FILTER: A circuit (normally) used to restrict the bandwidth of a system; may be fixed or switchable.

FREQUENCY RANGE OF SPECTRUM: Can refer to any particular group of frequencies, but commonly applied to the audible band from 20 to 20,000 cycles per second (Hz), extending from the deepest bass to the highest audible harmonics.

FREQUENCY RESPONSE: The variation in output over a frequency range, particularly of a transducer; can be expressed as a range with decibel limits, or depicted graphically.

Hz (HERTZ): 1 Hz = 1 cycle per second and is a measure of frequency which corresponds to musi-

cal pitch (the higher the frequency the higher the pitch).

HF: High frequency.

HARMONIC: Harmonics are the whole number multiples of a base frequency called the *fundamental*.

HARMONIC DISTORTION: The addition of unwanted harmonics to a signal.

HUM: A low frequency interfering sound produced by break-through or interference from mains wiring or circuitry.

IHF: American Institute of High Fidelity, an important standards body.

IEC: An international standards body.

IMPEDANCE: Measure of resistance (and reactance) in alternating (ie audio) signals; this is of some importance in the compatibility of both cartridges and headphones with amplifiers. For convenience sake is measured in ohms.

INTEGRATION: Used to describe the success with which the output from two drive units combine to give smooth output through the crossover region.

INTERMODULATION (IM): A form of distortion arising from two or more signals producing non-harmonic signals that correspond to the sum or difference of the two frequencies.

KILO (k): prefix meaning one thousand.

LED: Light Emitting Diode; an indicator light.

LF: Low frequency.

LATERAL FRICTION: The resistance to movement of an arm and cartridge combination in the horizontal plane (ie across a record), caused by friction in its bearings.

LINEAR: A transducer that produces an output that exactly portrays its input over the required operating range is described as linear, and is hence distortion free. Hence also nonlinearities (distortions).

LINE-CONTACT: A special stylus profile that extends the ellipse, increasing contact length up and down the sides of the groove.

LOAD OR LOADING: The impedance (including resistive and reactive components, ie ohms, mH, pF) seen by one component looking back to its interconnected component; of importance in compatibility of cartridge/amp, and amp/headphone.

'LOUDNESS': An equalisation circuit frequency switchable on amplifiers which is designed to compensate for presumed hearing characteristics at low listening levels by boosting bass and treble.

MOL: Maximum operating level of tape normally referring to 5% distortion of 315Hz or 3.15kHz.

MEDIUM WAVE: An AM transmission band incapable of high fidelity signals.

MICRO-(μ): Prefix for units meaning one millionth of.

MICROSECONDS (μ s): The time constant of a resistor capacitor combination involving a frequency response change (equalisation).

MIDRANGE, MIDBAND: The central part of the audible frequency range where the ear is most sensitive.

MILLI-(m): Prefix for units meaning one thousandth of.

MODULATION: The audio signal is 'stored' by means of modulations within a medium, eg the 'wiggles' in the groove of a plastic disc, or the

magnetic coding on a tape.

MODULATION NOISE: An additional noise added to tape noise, which increases with the degree of modulation of the tape, caused by the properties of the magnetic coating. This noise has most of its energy near the modulation frequency (causatory tone).

MOVING COIL: A transducer (eg cartridge or headphone) where the signal is generated by the movement of a coil within a magnetic field.

MOVING MAGNET: The most common form of cartridge transduction, where the magnet moves while the coils are held relatively stationary.

MULTIPLEX FILTER (MPX): A circuit which introduces severe attenuation at supersonic frequencies to decrease interference encountered with the output from some stereo FM tuners.

NANO (n): Prefix meaning a thousandth of a millionth of.

NOISE: Random unwanted low level signals.

NOISE MODULATION: An unwelcome breathing effect that can be heard on some programme material, produced by poor noise reduction systems, or circuits.

OCTAVE: Two-to-one ratio of pitch or frequency.

OFFSET ANGLE: The angle measured between the centre line of the pickup cartridge and the line which joins stylus and arm pivot point.

OHM: Unit of electrical impedance (including reactance) or resistance; also kohm, where 1 kohm = 1,000 ohms.

OVERHANG: The extent to which the cartridge stylus extends beyond the centre of the platter is critical, and controlled by fore and aft adjustment of the cartridge on the arm.

PASSIVE: The most common type of system, where drivers and crossover are driven from a single power amplifier.

PEAK RECORDING LEVEL: A level above which distortion becomes apparent. This distortion is introduced when the oxide particles almost reach magnetic saturation, and thus will accept no more level.

PHONO: The most commonly used plug/socket combination in audio components.

PICO (p): Prefix meaning one millionth of a millionth of.

PORT: An opening in a cabinet which is tuned to characteristics of the bass driver and the enclosure volume to provide reflex type bass-loading.

POWER AMPLIFIER: The part of an amplifier that provides power to drive the loudspeakers: usually integrated, it is sometimes a separate component.

PREAMPLIFIER: The part of an amplifier that accepts the input signals, sorts them, applies any necessary equalisation, and then passes the signal to the (normally integral) power amplifiers.

PRESENCE: A quality of forwardness or immediacy in a sound balance, generally related to an upper-middle frequency response boost.

PRINT-THROUGH: A pre- or post-echo of a loud signal created by magnetisation occurring from one layer to an adjacent layer after the tape has spooled or been recorded.

Q: A measure of the magnitude and shape of a resonance; the higher the Q, the sharper and more severe in amplitude the resonance.

REFLEX: a system of bass loading (using port or ABR) which offers improved efficiency and bass power handling at the expense of subsonic control compared to a sealed box.

RUMBLE: The low or medium frequency sound produced mechanically by any moving parts in a turntable, mainly the motor and platter bearings.

SENSITIVITY: The volume of sound output for a specific electrical voltage input.

SEPARATION: As between the two channels of a stereo pickup; see *crosstalk*.

SHIBATA: A special stylus extending the elliptical to a 'line-contact' type of profile.

SIDE-THRUST: A force acting on cartridges in pivoted (ie not parallel tracking) arms, due to the stylus/vinyl 'friction' acting along the line of the offset angle; hence bias or side-thrust compensation.

SIGNAL-TO-NOISE, SIGNAL/NOISE, S/N: The difference in total output when an applied signal is removed.

STYLUS: The specially shaped piece of diamond in contact with the groove and connected to the cantilever.

SUBSONIC: Below the audible range, ie below 20Hz.

SQUARE WAVE: A signal which consists of a fundamental plus a (theoretically infinite) series of odd (3rd, 5th etc) harmonics in a precise phase and amplitude relationship. It is useful for examining transient performance, symmetry, resonance control and 'ringing'.

THD: Total harmonic distortion.

TRACING: The following of the groove modulations by the stylus; hence for example tracing distortion, caused by the inability of a spherical stylus to trace the high frequency inner grooves on a disc.

TRACKABILITY: The ability of cartridge to cope with large amplitude modulations (or of the arm and cartridge to follow the groove itself properly).

TRACKING ERROR: The discrepancy between the truly tangential angle at which a record is cut and the slightly off-tangential angle at which it is tracked by a stylus on a pivoted arm during some parts of the arm's travel.

TRANSIENT: Signal of very short duration.

TREBLE: Upper part of frequency spectrum, typically above about 3kHz.

TWEETER: A small drive unit designed to operate over the high frequency range.

ULTRASONIC: Frequencies above audibility, ie greater than 20kHz; also *supersonic*.

VERTICAL TRACKING ANGLE (VTA): The angle at which the plane of motivation of the stylus is set with respect to the vertical when viewed from a side elevation of the cartridge. Should match the 20° cutter standard.

WEIGHTING: A factor or function that is applied to a measurement to increase its relevance and usefulness.

WOOFER: A drive unit that operates over the bass portion of the audio range.

WOW AND FLUTTER: Low and high frequency pitch variations (from poor tape transport or turntable platters with speed drift).

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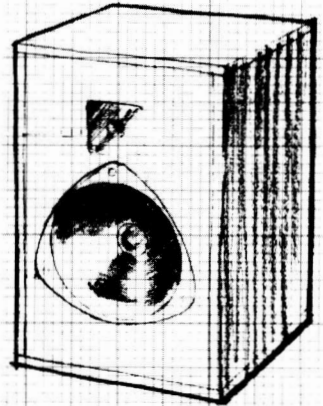
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THE DIRECTORY

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 *RD90 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 *R*s and *B*s denoting the Recommended and Best Buy ratings that are appended to products we consider meritorious. The Best Buy tag means that a product not only offers good sound quality but is reasonably priced as well. With source components a price limit of approximately £300 is usually used as a

guide. Recommended means that either the performance of a product is particularly good irrespective of price or, alternatively that a good value standard is achieved but overall attainment falls short of Best Buy classification. An ideal situation would be to choose suitably priced Best Buy or Recommended products from relevant categories and create a Best Buy system, but, due to the variety in tonal balance that exists in much audio equipment (especially the 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 ahead of other criteria.

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. Furthermore the vinyl repertoire is still the cheapest, largest and most varied.

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. It is worth remembering that though such opportunities are rarely possible or practical, a live recording onto cassette using good quality microphones can be the hi-fi equal of any other source.

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, even though these are used all the time whatever the source.

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.

There is some debate about the best form of fixing, however, adjustable spikes through to the

floor proper or seated into the tops of cross-head screws are generally regarded as the best solution in most circumstances. There is no need for paranoia about using spikes through normal pile carpets because the holes will be almost impossible to find when the stands are removed.

Most decent quality turntables are fairly immune to feedback from loudspeakers, so it should not matter too much if these items are sited fairly close to each other. Indeed it is debatable whether any advantages gained from keeping the turntable well away are not lost through the need to use longer connecting cables.

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, without trying to cram his own particular prejudices down your throat. To some extent the customer's task must be to discover for himself whether the dealer in question is competent or not. Membership of trade organisations like BADA can be a worthwhile pointer to a degree of professionalism, but the bottom line is whether the dealer in question can create a good sound in his own shop. If he can't, there is precious little chance of him doing so in your home. The best dealers should lay on demonstrations so you can hear the differences between components for yourself, and hear the sort of improvements which can be had at different price strata. You can then establish the sort of performance you are prepared to accept within whatever budgetary constraints you have set.

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 arm/tube/weight, 9g	BB	67
Omega Point Silver/Black £895/£295	Good Good+	An avowedly stripped down turntable that lacks even an on/off switch, the Omega Point Silver offers fine midrange clarity and good stereo, but some HF compression and a lack of 'wellie'	Manual, solid, belt drive, unipivot, 11g		55
Opus 3 Continuo/Decca London International (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, £495, £595	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

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 16

THE DIRECTORY

INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
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
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

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



WHY CLEARTONE KNOWS MORE ABOUT CHOOSING HI-FI THAN HI-FI CHOICE

The best matched systems housed in totally unsuitable environments can often sound worse than your average rack system.

Consider a typical customer who's read the latest rave reviews, knows more or less what he wants, but has simply to consider the practicalities.

A young toddler for instance who has just learned that a hammer is for hitting things, or a student in a bedsit where the only sensible place to put a hi-fi system is between the oven and the washbasin.

You may laugh, we do sometimes, but these are precisely the problems that

we get asked to solve every day of the week at our Cleartone stores. That's why you have to know more about Hi-Fi than how it will perform in a normal domestic environment. And that takes years of practice.

At Cleartone we have a reputation for precisely that.

Come to us with your ideal system, explain the problems if there are any, and we'll take it from there.

Almost certainly we'll ask you to make an appointment. And on your return a highly skilled expert will escort you to one of our single speaker

demo rooms.

There you will probably find the system of your choice and a Cleartone devised alternative built to your specifications. All set up ready for an A-B comparison.

Invariably the customer goes away satisfied. We'll most likely want to set up the system ourselves, so that when you've sited the speakers and the pre and power amps, you don't suddenly discover there's nowhere to put your Linn.

CLEARTONE
Controversial but true

THE DIRECTORY

TONEARMS

NAME PRICE	LAB SOUND	COMMENTS	ARM EFF. MAS	VALUE	BACK ISSUE FULL REVIEW
Audio Technica AT1130 £186	Good Good	Well suited to most cartridges including high compliance ones, the AT is smooth and tonally neutral, if slightly lacking in 'balls'	8.5g	R	67
Decca London International £49	Average + Average +	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48/Summary
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
Grace G707 £299	Good Good +	This venerable is still capable, if not competitive with modern alternatives	7g		48
Helius Orion 2 £490	Very Good Very Good	Excellent engineering with rigid bearings, free from slack. It remains expensive but the level of performance deserves Recommendation	12g	R	48
Kuzma Stogi Reference £699	Very Good Very Good	A large, solid and well-made arm that holds the cartridge firmly, giving exceptionally clear sound with just a hint of brightness	12g	R	79
Linn Ekos £895	Very Good Very Good	Superb, state of the art design which builds significantly on Lttok'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 £495	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 £165	Good Average +	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009 Series III £229	Good Average +	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009R £291	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 £1206	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
Souther Tri-Quartz £895	Average Good	A unique parallel tracking arm that makes up for what it lacks sonically in its unusual appearance	3-4g		48

* 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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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
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
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 welly. 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
B&O MMC5 £24	Average+ Average	Cheapest in the family - smooth treble and good focus, but the bass was left in the wings	5-15g Normal, MM		38 (Summary)
B&O MMC4 £43	Good Average+	Solid and well balanced in the midrange, the '4 lacks bass impact	5-15g Normal, MM		48
B&O MMC3 £57	Good Average	Slightly "laid back" sound quality but a good performer for the price. Best suited to B&O equipment	5-15g Normal, MM		48
B&O MMC2 £87	Good Average+	Only a modest improvement on its cheaper brothers (and sisters)	5-15g Normal, MM		48
B&O MMC1 £112	Very Good Good	Great clarity and detail at high frequencies but a slightly plodding bass. It may appeal more to the classical enthusiast	5-13g Normal, MM		48
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
Clear Audio Gamma £295	Average Average+	Brimming over with enthusiasm, the unusual-looking Gamma is more than an audio oddity, but it lacks a little subtlety at times	4-11g Low, MC		54
Clear Audio Delta £450	Average+ Good	Midway between the Gamma and exotic Pradikat, the Delta sounds like neither! Nevertheless, it delivers the goods	6-17g Low, MC	R	54
Clear Audio Signature £995	Average+ Good	This latest MC to emerge from Clearaudio features yet another graded version of its proprietary generator. Its sound strikes a balance between the Delta and Prad	4-11g Low, MC		72
Clear Audio Pradikat £1225	Average+ Very Good	Sounded absolutely glorious, creating a full sense of scale and a large well-focused soundstage - but watch for record wear	8-18g MC	Coll	
Clear Audio Accurate £2,000	Good Excellent	A remarkable cartridge, not only by virtue of its effortless and highly neutral sound quality but also because this has been achieved with the same basic design as Clearaudio's cheapest MCs	4-11g Low, MC	R	60
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
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 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 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 L £115	Average Average+	Open and relaxed sounding, the L version is just that bit more refined than its high output brother	7-18g Low, MC	R*	54
Goldring Excel £500	Average+ Good	Goldring's most expensive cartridge to date. ers 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

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 16

THE DIRECTORY

CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
Grace F9E II £240	Good Good	For lively presentation, excellent separation and generally satisfactory sonic delivery – consider this model	5-10g Normal, MM		48
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
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
Highphonic MCA3 £360	Very Good Good +	Exquisitely crafted by a group of ex-Denon engineers, this superb tracker had a sweet and seductive (if rather bright) treble	5-12g Low, MC		43
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 £299	Average – Good +	Sometimes a bit fierce in emphasising record surface faults, it is perhaps best at revealing the excitement and tension in music	8-20g + damping Normal, MM	R*	48/Coll
Militek 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
Militek Olympia £349	Average + Good +	Warm and detailed sound – packs the punch of the best MCs with high output as a bonus	12-20g (damping) Normal, MC	R	54
Nagaoka MM4 £9	Average – Average –	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal, MM	R	54
Nagaoka MP10 £18	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal, MM	R	48
Nagaoka MP11 Boron £40	Average Average +	Responding well overall in PM's equipment and listening room, this model was mildly criticised for low level and dynamic limitations	5-13g Normal, MM	BB	48
Nagaoka MP11 Gold £47	Average – Average +	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal, MM	R	48
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 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 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 uninvolving	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 MC3000 II* £850	Good Excellent	Quite simply, the most accurate transcription device yet created – not one for the faint hearted, Mark I version tested	6-16g V. Low, MC	R*	60
RATA RP20 £22	Average – Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g Normal, MM	R	48
RATA RP40 £44	Average Average +	The '40 did a good job of sorting out the layers and complexity of the mix, with good focus, excellent stereo spread and fine scale	6-15g Normal, MM	R	48
RATA RP70 £77*	Average Average +	Clearer and sweeter than the '40 this also seemed heavier and less lively. For £99 you can have a van den Hul stylus	6-14g Normal, MM		43
RATA RP70vdH £99	Average + Good	Able to retrieve bags of musical detail (thanks to the vdH stylus), RATA's top cartridge ranks as one of the most articulate MM's available	11-18g Normal, MM	R	67
Rega Bias £34	Average Average +	Difficult to mount in some arms due to its shallow build, the bias offers a gentele, refined SQ that certainly makes it worthy of audition	4-10g Normal, MM		67
Rega Elys £74	Good Good	Clearly superior to the Bias, despite their common heritage, the Elys is both more detailed, accurate and musically convincing	8-15g Normal, MM	R	67
Revolver £20	Average + Average	This modified AT-95E enjoys a very lively mid and treble even if the bass is somewhat "slower" in protection. A firm budget buy	8-16g Normal, MM	BB	67

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

THE DIRECTORY

CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
Shure M92E £17	Average— Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal, MM		43
Shure M99E £29	Average— Average—	Sister to the 92E this is a solid but not particularly exciting cartridge	5-10g Normal, MM		38 (Summary)
Shure ME75ED £26.50	Average Average—	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal, MM		38
Shure M104E £36	Average— Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal, MM		38
Shure ME97HE £49	Average Average+	It won't turn a sow's ear of a turntable into a silk purse, but will at least keep going and produce an acceptable result	8-20g Normal, MM	R	48
Shure M105E £49	Average Average—	A slightly 'spitty' sound lacking deep bass and dynamic contrast, but can be used in virtually every system where it will perform "unobtrusively"	5-12g Normal, MM		38 (Summary)
Shure M110HE £60	Average Average	Sound quality was thought eminently presentable, but not exciting; smooth clear high frequencies, but a loss of bass definition	5-10g Normal, MM		38 (Summary)
Shure M111HE £72	Average Average	Early reviews of this cartridge complained principally of the price – which has since come down	5-10g Normal, MM		38 (Summary)
Shure ML120HE £95	Average+ Average+	Quite decent sound quality and a generally fine balanced performance	6-18g Normal, MM		48
Shure ML140HE £120	Average+ Good	Qualitatively the treble of this well-balanced moving magnet model was a match for many moving coil cartridges	6-16g Normal, MM		43
Shure V15 VMR £215	Good Average+	Initial listening gave promising results, but extended familiarity gave the feeling of a lack of energy and a "shut-in" sound	5-12g Normal, MM		38
Shure Ultra 500 £499	Good Good	There was no doubting the accomplishments of what could well be the finest moving magnet cartridge around	6-14g Normal, MM		48
Stilton/AT-F3 £110	Good+ Good+	At a premium of some £40 this modified AT-F3 offers a startlingly refined performance and is strongly recommended	8-18g Low, MC	R	67
van den Hul MC10 £499	Good Good+	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass. Gosh!	5-10g Low, MC	R	60
van den Hul MC One £699	Good Very Good	This extended all the positive qualities of the '10 but added greater authority and scale – worth it for the extra money	6-12g Low, MC	R	60
van den Hul MC Two £899	Good Very Good	Connected directly to any standard MM input the vdH MC Two rewards with a highly detailed yet fluid and musically convincing portrayal	6-13g Normal, MC	R	72

* 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
Acoustic Research A03 £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
Acoustic Research A07 £299	Very Good Average+	Relatively smooth but ineffective sound quality that lacks some weight and impetus at very low frequencies	75W, 4 line, 2AV and MM/mc inputs		68
ADC A-2080E £400	Good+ Average+	Clean and neutral sound but one that lacked depth and spaciousness; MM input favoured above MC or CD	108W, logic sw. for 5 line and MM/mc inputs		68
Aiwa XA-005 £130	Good+ Average—	A technically competent amp with big, friendly but not overly engrossing sound quality	61W, MM 5 line inputs, source-direct		80
Akai AM-52 £230	Average+ Average—	Basically equipped, this amplifier offers a comfortable but hardly over-detailed sound	95W, MM/mc disc, 5 line inputs, loudness		74
Akai AM-65B £299	Good Average	On-board 18-Bit DAC's actually give better sound than standard CD inputs! Punchy via MM disc	101W, MM, 6 line, digital inputs		80
Akai AM-93 £550	Average Average—	Unfortunately Akai's on-board D/a converters were less successful than its conventional analogue CD input.	112W, coax and optical dig inputs MM/mc		68
Amadeus Silver £270	Average— Good	Limited headroom via disc but still offers a sweet, lush sound. Limited current delivery	37W, MM/mc, 3 line inputs	R	80
Amadeus Gold £360	Average— Good	There is some indication of instability but otherwise sounds very rich, warm and musical High-ish IMD.	56W, MM/mc plug-in cards, 3 line inputs	R	74
Aragon 4004 £1795	Good Good	Despite its imposing bulk the Aragon is something of a softy at heart. It can deliver oodles of power but its musical presentation is more laid-back	231W power amp		72
Arcam Alpha II £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
Arcam Delta 60 £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
Arcam Delta 90.2 £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
Ariston Amp £219	Average Average+	Slightly veiled and thin sound but proved suitably attractive in the listening tests	32W, full logic control, MM and 4 line inputs	R	68

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AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Audio Innovations Series 200 £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
Audio Innovations Series 300 £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
Audio Innovations Series 400 £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
Audio Innovations Series 1000/2nd Audio Amplifier £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
Audiolab 8000C £325	Excellent Good	A well established preamp with a highly controlled sound, though it could do with more life and depth	MM/mc, 5 inputs, hdph, tone controls	R	62
Audiolab 8000A £350	Very Good Good+	Exceptionally detailed, tactile and transparent via CD but slightly more clouded via disc. A stalwart design	72W, MM/mc, 4 line and full record out selection	R	74
Audiolab 8000P £495	Excellent Good+	A dynamic powerhouse, load tolerant and sonically reliable	100W	R	62
Audion CD-1 £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
Aura VA-40 £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
Beard Audio CA35/P35mkII £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
Beard 506 £1195	Good+ Good+	A versatile valve preamp - the bass sounded lively if a touch softened while the treble was detailed but lacked a little sparkle and air.	4 inputs MM/mc	*	50
Beard M70 £1995 pair	Good Good+	A substantial British monoblok power amplifier, but not a great deal more impressive than the P35 at half the price	70W	*	50
Bryston 0.5B/2B £595/£695	Very Good Good	Very rugged Canadian pre/power combo that sounds cool confident and punchy. Headamp available to suit MC cartridges	65W, MM and 4 line sources, overload LEDs on power amp	R	74
Bryston 12B/4B £995/£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
Cello Audio Suite £4300	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
Concordant Excelsior £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
Conrad Johnson PV10 £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
Conrad Johnson MV50 £1995	Good+ Good+	Coupled with the PV5, this CJ power amp performed well on audition	50W		Collection
Conrad Johnson Motif MC-8 £1995	Very Good Very Good	A cheaper alternative to the '7, this preamp is an undoubted success in maintaining the Motif sound but does not compare on sound quality	MM/mc	R	50
Conrad-Johnson Premier Seven £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
Creek CAS 4040 S2 £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
Creek CAS 4140S2 £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
Creek CAS-5050 £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
Croft Super Micro A £549	Average+ Very Good	The looks are somewhat improved, while this 'hot rod' version with tuned components performed very well indeed. There is still no gain on the line inputs	4 inputs, MM, straight line	R	57
Croft Series IV(S) £850	Good Good	The original IV is still available now supplemented by the higher price and power (S); both are fine performers	40(60)W channel	R	57
Croft Series IVSA £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
Cyclone Catalyst £1995	Good+ Very Good	Exceptionally load tolerant and very refined in delivery. Extra options available in future	74W, external MM or MC stages, 3 line inputs	R	80
Deltec DSP-50S DPA-50S Pre/Power £675/£825	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
Deltec DPA 100S £2200	Very Good Very Good	A top-quality transistor power amp, sounding fast, articulate and well controlled, though maybe a touch clinical for some tastes	80W	R	50
Denon PMA-250II £140	Good Good+	Spacious yet tactile and gutsy sound via all inputs. Worthwhile upgrade over original PMA-250	53W, MM 3 line inputs, source-direct	R	80
Denon DAP-2500 POA-4400A Pre/Power £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
Denon POA-6600 £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
DNM 3A From £1000	Good+ Very Good	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art preamp	5 inputs MM/mc twin vol controls	R*	44
E.A.R. 802/509mkII £1098/£1868	Average Very Good	Extremely well made and combining the sonic strengths of both transistors and valves this EAR combo warrants attention	100W, MM, 6 inputs, monobloks	R	63
E.A.R. 549 £3,298/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
Exposure VII/viii £430/£470	Very Good Good	Supplied as a combination without the separate preamp power supply, this pre power combination performed satisfactorily especially on the moving coil input	50W, MM/mc, 3 inputs, straight line		62
Exposure VI/vii dual*/VIII Pre/Power £320/£500	Good Very Good	An established company like Exposure could do more to improve the 'look' of these amps which, nevertheless, sounded confident, dry and musical. Dual version no longer available	63W, Super mod. 4 line and 2 disc inputs with full rec-out switching	R*	68
Exposure XI/xii/viii super £1600	Good Very Good	New preamp and improved power amp led to a smooth and refined sound, MM/mc less transparent than CD	61W, MM/mc, 5 line inputs	R	80
Grant 660AMS £948 pr	Good Very Good	This neat and compact 60W valve monoblok gave good sound on the 8ohm tap, better still on 4ohms. The midrange was particularly natural	60W monobloks 8ohms	R	57

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

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AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Hafler DH120 kit form £295	n/a Fair	We didn't build one; see below	60W		44
Hafler DH-110/XL-600 £360/£1,145	Very Good Very Good	Preamp is available in kit form. Both sound remarkably open, transparent and inherently 'musical'. XL-600 is tremendously powerful and very compatible	426W in stereo mode, 1.5kW in bridge, 2mm, tone + processor loop	R	74
Hafler DH120 assembled £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
Harmon Kardon HK6100 £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
Harman Kardon Citation 25/22 £599/£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
Jadis JP30/JA30 £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
Jeff Rowland Coherence One/Model 7 £3750/£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
Kelvin Labs Absolute Zero/M30 £395 + £295/£595pr. £395	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
Kelvin Integrated £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
Kenwood KA-5500 £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
Kenwood KA-4010 £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
Kenwood KA-5010 £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
Kenwood KA-7010 £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
Klyne SK5a £2590	Very Good Very Good	Beautifully made and presented this American thoroughbred has a good lab performance, but although versatile, is rather expensive for the quality of sound offered	Balanced output, versatile cartridge loading		72
LFD £2,995+	Very Good Excellent	Can set the subjective standards that others merely aspire to, but this outstanding if unconventional multi-box preamp needs careful matching to ancillary components	MC (with care), passive line extra	R	60
Lectron JH50 £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
Linn LK1/LK280 Pre/Power £495/£645	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
Marantz PM-50 £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
Marantz PM-75 £500	Good Average	More successful than most amps with on-board DACs but still not as balanced as other Marantz products	136W, opt/coax dig inputs, 6 line + MM/mc		68
Marantz PM94 £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
Marantz PM-95 £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
Meridian 201/205 £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
Mission Cyrus One £200	Very Good Good	A red hot class winner, which caused the whole issue to be re-rated! It's even well built — however, the headphone socket will only take a 3.5mm jack	30W, MM/mc, 5 inputs, hdph, straight line	BB*	62
Mission Cyrus PSX £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
Mission Cyrus Two £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
Mordaunt Short MS-A5000 £350	Very Good Good	With a recognisable pedigree, Mordaunt Short engineers have made a good job of this one. A musical all-rounder	50W, MM/mc, 6 inputs, hdph, tone controls	R	62
Musical Fidelity B1 £200	Average+ Good+	The subject of much controversy, this 50W wonder offers a very deep, solid and powerful sound	50W, MM/mc, 5 line inputs, tape monitor	R	80
Musical Fidelity A1 £269	Good Good++	Fine-ranking in terms of overall sound quality for money, the excessive heat output could be hazardous to your vinyl if you're careless	20W MM/mc 4 inputs straight line	BB	56
Musical Fidelity B200* £349	Very Good Good+	Running cooler than other MFs, the B200 delivered fine musical and dynamic sounds with plenty of power	80W MM/mc 4 line inputs straight line	BB	62
Musical Fidelity A100 £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
Musical Fidelity MA-50 £875 pair	Good Excellent	An audiophile bargain. One of the best sounding power amplifiers made	50W, monoblok	R	62
Musical Fidelity P270 £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
Musical Fidelity MVX/a370 £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
NAD 3020e £130	Good Fair	A little light in balance and "weight" but superior to run-of-the-mill budget amplifiers	20W MM/mc 4 inputs	R	50
NAD 3225PE £150	Average+ Average+	Light and detailed if not as rich or weighty sounding as others. MM input sounds warmer than CD	42W + 70W dyn. headroom; soft-clipping, MM only	R	68
Naim NAIT 2 £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
Naim Separates £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
NVA P70MC/a60 £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
Oakley S £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 (£100 more) is really fabulous	MM plus 3 line inputs	R	78

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AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Orell SA-040 £359	Good Good+	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/mc, 4 line inputs, straight line	R	56
Philips FA-880 £200	Good Average	A new and cheaper design from Philips that sounds best via MM disc. Can appear soft and unbalanced via CD	108W, MM/mc source-direct tone		74
Philips FA960 MkII £300	Good+ Average	The MkII '960 still failed to grasp our listeners' attention but it remains a competent amp nonetheless	122W, 6 line & 2 disc inputs + tone controls		68
Philips DFA-888 £300	Good Average	As above but including a modified disc input and onboard DAC. Sounds tight but also slightly thin	107W, as above + opt and coax digital inputs		74
Pink Triangle PIP £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
Proton 520 £115	Average Average	Very well equipped budget amp with a slightly flat and undynamic sound – acceptable at the price though	31W, MM/mc with variable MC gain, 4 line inputs	R	74
Proton AP-1000/AA-1150 £250/£395	Good+ Average+	Bags of headroom available from this pre/power combo, but can seem bloated or unrefined via MM	67W, MM/mc, adjustable MC gain, 5 line inputs		80
QED A240 CD II £179	Good+ Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	62
QED A240 SA II £239	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
QED A270 £349	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
Quad 34 £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
Quad 405 £389	Very Good Fair	Not an impressive power amp but easy on the ear if not pushed and very reliable	100W		44
Ray Lumley Model 75 £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
Revox B150 £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
Revox B250 £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
Rose RV-23 £395	Good Very Good	Beautifully built classy British 'hybrid' preamplifier. You can spend more to get a more transparent sound – but it's hard to criticise the Rose given the competitive price	MM plus 3 line inputs	R	77
Rotel RA810A £119	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, hdhp, tone controls	BB	62
Rotel RA-820AX £150	Very Good Very Good	The spacious, detailed and very musical performance of this budget amp is almost too good!	47W, MM, 4 line inputs	BB	80
Rotel RA-840BX4 £249	Good Good+	Very sedate and controlled in presentation but must check phasing for optimum stereo effect	63W, MM/mc, 4 line inputs, passive tone	R	80
Rotel RA870BX £329	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
Rotel RB/rc850 £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
Rotel RC-870BX/rb-870BX 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
SAE P102/A202 £499/£599	Average+ Average+	Microprocessor-controlled pre and power amp that sounds much better at low rather than high volume levels. Pro-oriented aesthetics	151W, MM/mc + CD tuner and 2 tape tone memory, spk switching		74
Solen Tiger B50 £870	Average— Good+	Stylish French hybrid with a very rich, melodic and beguiling sound. Not so hot with complex recordings	45W, optional disc, 5 line inputs		80
Sony TA-F200 £130	Average— Average	Over-ambitious protection circuit is hardly in keeping with modern amp design. Lean but 'dead' sound quality.	74W, 2 tape, 3 line and MM/mc inputs		68
Sony TA-F400 £200	Good Average+	Some lack of integration across the frequency range but still offers a more open and detailed sound than the 'F200	76W, 2 tape, 3 line and MM/mc inputs. Rec-out		68
Sony TA-F530ES £300	Good Average+	Chunky UK-oriented design that offers a rich, smooth and full sound. Slight loss of focus via MM/ mc disc	120W, MM/mc, 4 line sources + record out + tone	R	74
Sony TAF 500ES £349	Good+ Fair	Not too hot at the price, lacking in bass action, rating poorly on vinyl, and only marginally improving on CD	75W hdhp tone controls MM/mc		50
Sony TA-F630ESD £350	Good Average	Based on the '530 but equipped with PDM D/a convertor. Amp is competent but DAC sounds truly magnificent!	130W, as above + opt. and coax digital inputs	R	74
Sony TA-F730ES £450	Very Good Good	A very stable and coherent amp but one that lacks a crucial sense of involvement	133W, MM/mc, 3 tape, 2 line, full rec-out		80
Sony TAF 700ES £500	Good+ + Fair	Scoring higher than the 500 but still not offering the sort of standards set by the competition. But many buttons to push	100W MM/mc tone controls		50
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
Sumo Nine+ £1200	Very Good Excellent	Macho styling of this class A stereo power amp conceals a sonic subtlety that is exceptional for the price, limited by lots of waste heat and a noisy fan on our sample (being improved)	65W	R	60
Sumo Andromeda £1585	Very Good Very Good	Well made with lots of power from a sensibly sized box. It was good in the lab and demonstrated a sound which offers a fine blend of performance at an almost reasonable price	200W, balanced input	R	72
Tannoy SR-840 £1713	Very Good Good	A "muscle" power amp, capable of impressive levels into difficult loads while remaining quite subtle and revealing	250W		50
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		74
Technics SE-M100 £550	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 ar.1 direct CD no MM or MC disc	R	74
Vacuum State FVP £999	Good Very Good	This well thought out valve preamplifier is designed for optimum musicality and transparency, a goal which is handsomely achieved	5 inputs, MM, straight line	R	57
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		80
YBA Model 3 pre/power £995/£995	Good Good	Suited to high 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		72

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AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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 AE4 £1800 (stands £352)	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		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		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		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		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)		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)		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)		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
Arcam Three +* £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
Arcam Alpha £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
Arcam Two +* £280	Good Average	Most things to most men this compact is unlikely to disappoint with its lively "ballys" character though lacking weight... a bit	38 x 23 x 28cm near wall shelf or 40cm stands	88dB/w 55Hz		59
Arcam One + £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
Ariston Image £180	Average - Average -	Despite a sweet treble character, the Image fails to impress with a 'lumpy' over-rich balance that has room integration problems	42 x 22 x 27.5cm stands in free space	89dB/W 28Hz (in room)		82
Audio Electronics TC10 II £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&W Vision DS1 £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&W DM550 £149	Good + Average -	Beautifully presented, well engineered near-miniature with precise sound but a distinct lack of 'wellie'. Ideal for considerate flat dwellers	35 x 20.5 x 22.5cm stands in free space	86dB/w 70Hz		71
B&W OM560 £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&W CM1 £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&W Matrix 801 £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
BLQ Q2 £275	Average - Average	Nearly a good loudspeaker, the basic balance is good, but the midband is very uneven and there are severe losses of resolution, 'space' and dynamics	43 x 25.1 x 24.5 semi open on stands	87.5dB/w 70Hz		59

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THE DIRECTORY

LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Bose Interaudio 3000XL £150	Average Average—	Lots of perceived value and well enough balanced, but low cost cabinet and driver engineering results in a crude and unsubtle sound	46.5 x 29 x 23cm stands in free space	89dB/w 45Hz		71
Bose 305 £350	Average Good—	A bit of an oddball, fine dynamic liveliness and a good room match more than make up for the strange stereo imaging and treble	28 x 45 x 23cm high stands near wall	88dB/w 40Hz (in room)	R	78
Boston A4011 £120	Average Average—	Competent performance for size and price but below average relative to the UK competition	34 x 21 x 20cm on stands near wall	88.5dB/w 63Hz		41
Boston Acoustics T830 £399	Good Good	A lot of speaker for the money, the T830 is a smooth and accomplished performer with a big and easy – or alternatively a lazy and laid back – sound	82.5 x 25.5 x 24cm floor, away from walls	91dB/W 28Hz (in room)	R	82
Castle Clyde £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
Castle Warwick £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
Castle Durham £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	R	46
Castle Pembroke £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
Celef Cirrus £180	Average Good	It's nice to see Celef back in the UK, with this decent sounding small reflex box that seems unusually tolerant of siting	39 x 20.5 x 23cm stands in free space	84dB/w 60Hz	R	66
Celef CF2 Nimbus £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
Celestion 3 £109	Average + Average	This attractive little wall-mount gives good balance and stereo imagery, with a character which leans more towards inoffensiveness than excitement	31 x 18.5 x 21cm high stands against wall	86dB/w 55Hz (in room)	R	78
Celestion DL6 Series Two £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
Celestion DL8 Series Two £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open, stands	87.5dB/w 60Hz	R	59
Celestion SL12Si £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
Celestion SL600Si £799	Good + Good	This Aerolam high tech miniature has certain remarkable qualities that some will find irresistible, but needs careful system and room matching.	27 x 20 x 23cm matching stands in free space	82dB/w 52Hz		68
Celestion SL700 £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
Celestion 6000 £1470	Very Good Very Good	A genuine fullrange audiophile quality speaker system – with Star Wars styling to suit a high tech environment	Complex, on floor in free space	82.5dB/w	R	60
Doxa 5 – 2 £900	Average Good	The high sensitivity and seductive midband makes an obvious partner for valve amplifiers, though obtaining a good room match may prove a little tricky	98 x 21 x 28cm floor well away from walls	91dB/W 30Hz (in room)	R	82
Duntech PCL500 Marquis £3998	n/a Very Good	Better value for money than the Crown Prince – and arguably more dynamic, with real bass 'slam' – but a little less refined in the higher registers	147.5 x 27 x 40 free standing away from walls	92dB/w 48Hz	R	65
Duntech PCL1000 Crown Prince £6120	n/a Very Good +	Immensely 'listenable', refined sounding speaker capable of creating lifelike 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
Energy 22 Pro Monitor £600	Good Good	Presentation is a bit rough for the price, but this Canadian entrant is an impressive sonic allrounder that will appeal to most listeners	62.5 x 27 x 30cm stands in free space	87dB/w 40Hz	R	66
Goodmans Maxim Two £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
Goodmans B-Max/Maxim Two £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	85dB/w 55Hz (in room)		78
Goodmans M300 £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
Harbeth LS3/5A £343	Good Average	Still a classic miniature, though not to every taste, and none the better for the recent update under our listening conditions. Limited dynamic range	30.5 x 19 x 16cm stands in free space	81dB/w 60Hz		66
Harbeth HL Compact From £539	Very Good Average	The clean and neutral sound lacks resolution and gives rather unsubtle though well differentiated stereo. Can be bi-wired to advantage	52 x 27.2 x 28.1cm open space, on high stands	87.5dB/w 65Hz		59
Heco Interior 90S £159	Good Average—	Neatly finished and engineered miniature, but the disappointingly 'lifeless' sound left the listening panel decidedly underwhelmed	27 x 18 x 16cm on high stands	87.5dB/w 90Hz		74
Heco Interior 120 £169	Good Average	Drab appearance belies a lively enough character, though the balance is altogether a bit bright for UK tastes	32 x 23 x 23cm high stands against wall	88dB/w 50Hz (in room)		78
Heco Interior 430s £429	Good Good—	This tall floorstanding enclosure delivers an impressively even sound balance with good bass extension, if not the lively dynamics to satisfy enthusiasts	85 x 24 x 27.5cm free space	88dB/w 43Hz	R	71
Heco Superior 740 £599	Good Good—	A similar sonic package to the cheaper Interior 530, these Superior clothes are very pretty indeed, though spikes are still awaited	84.5 x 22 x 25cm on floor in free space	88dB/w 30Hz (in room)		78
Heybrook Point 5 £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
Heybrook Point 7 £185	Average Average	Physically an attractive package, but not entirely convincing in lab or listening panel test; interesting for all that	40.5 x 23 x 23cm stands against rear wall	85dB/w 60Hz		68
Heybrook HB1 £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
Heybrook HB100 £255	Average + Good	Well matched for wall siting, the HB100 is a lively and informative performer in the tradition of the popular HB1	47 x 26 x 28cm stands near rear wall	86dB/w 50Hz	BB	66
Heybrook HB150 £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
Heybrook HB200 £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
Infinity RS2001 £180	Average Average +	A little coloured and unruly in the treble, the 2001 nevertheless retains the lively dynamic bounce of its predecessor, pity the price has gone up	36.5 x 22.5 x 20cm lightweight stands	87dB/w 50Hz (in room)	R	78
Infinity Kappa 6 £795	Good Good	Interestingly styled US loudspeaker has unusual high tech drivers and good neutrality, but the sound seriously lacks excitement	63 x 38 x 24cm stands, free space	85dB/w 35Hz		66
Infinity Kappa 8 £1850	n/a 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
Jamo Concert 2 £230	Good Average—	A thoroughly respectable 'bookshelf' performer that needs free space siting but includes attractive cabinetwork and a neat grille	41 x 24 x 25cm stands in free space	85dB/w 48Hz		66

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
JBL TLX12 £149	Good— Average	This smart near-miniature has a 'boppy', lively bottom end, but beware of the fizz in its top	37 x 23 x 23cm stands 0.5m from rear wall	87dB/w 55Hz	R	71
JBL LX33 £259	Average+ Good	A bit of a cheat, but a lot of speaker for the money, which manages a better room balance than many 'large bookshelf' rivals, and delivers a fine acoustic performance	80 x 25 x 21cm floor, 1ft from wall	89dB/W 48Hz	R	82
JBL LX44 £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
JPW Minim £79	Average+ Average—	Very civilised but dynamically limited, the Minim is well suited to the smaller room and where limited loudness is acceptable	27.5 x 18 x 19.5cm stands against wall	85dB/W 28Hz (in room)	R	82
JPW Sonata £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
JPW P1 £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
JPW AP2 £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
JPW AP3 £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
KEF C15 £99	Good Average	One of the tiniest around delivers a surprisingly 'big' and well balanced sound, with excellent stereo from free space siting	26.5 x 18 x 14cm stands in free space	85dB/w 60Hz	R	71
KEF C25 £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
KEF C55 £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
KEF C75 £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
KEF R102 £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 55Hz	R	59
KEF C95 £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
KEF 103/3 £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
KEF 104/2 (inc KUBE equaliser) £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
KEF 107 £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
Linn Helix £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
Linn Kan 2 £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
Linn Nexus £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
Linn Kaber £989	Average Good+	Discreet wall-mount package trades sensitivity for fine bass extension and midbass performance; can be a little relentless but has prodigious dynamic capabilities	93 x 19 x 28cm floor against rear wall	86dB/W 28Hz (in room)	R	82
Magneplanar SMGa £675	Average— Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB/w 56Hz		46
Magneplanar MG1.4 £1190	Good+ Good+	Replaces the stalwart MG1c with a revised panel layout. Offers a very crisp and articulate sound, particularly revealing of upper mid vocal details	155 x 8 x 57cm open space	88dB 40Hz	R	72
Magneplanar MG2.5R £1998	Good Good	Offers the low coloration and profound musical insight of better electrostatic loudspeakers but without loss of low frequency extension	183 x 56 x 4.5cm Open space	83-85dB/w 35Hz	R	60
Magneplanar MGIIIa £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
Marantz LD20 DMS £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
Marantz LD50DMS £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
Martin Logan CLS II £3998	n/a Very Good	Much improved high resolution design, fussy about system set-up and demanding of ancillaries and software alike. It rewards the efforts though	60 x 28 x 7.5cm open space	86dB/w 45Hz	R	72
MB Quart 220 £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
MB Quart 280 £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
MB Quart 390 £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
Meridian M30 £775	Average+ Average	Pricy but easy on the ears and worth considering especially where space is at a premium	38.5 x 18 x 32cm free space on stands	Active 40Hz		46
Mission 761 £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
Mission 762 £200	Average Average—	Mission's 'bookshelf middleweight' offers high sensitivity and loudness capability, but at the expense of a somewhat untidy and rather 'heavy' sound	50 x 25 x 27cm stand, experiment advised	91dB/w 55Hz		66
Mission Cyrus 781 £250	Average+ Average+	Superb build, finish, presentation and engineering for the price, this romantic sounding Cyrus needs careful system matching to achieve good results	43 x 22.5 x 28cm medium stands near wall	88dB/w 40Hz (in room)		78
Mission 763 £300	Average+ Average+	A very artful combination of generous volume and good bass extension at a modest price. Works well in the listening room despite a few rough edges	77 x 25 x 32cm near rear wall	86dB 40Hz	BB	68
Mission Cyrus 782 £350 (stands £80)	Good— Good—	Lively, articulate and beautifully finished, this compact wall-mount model with twin main drivers has good integration but a rather rich, 'Loudness' balance	50 x 25 x 32.5cm Cyrus stands near wall	90dB/w 50Hz		71
Mission 764 £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
Mission 767 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
Monitor Audio Monitor 7 £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

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Monitor Audio Monitor 9 £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
Monitor Audio R300/MD £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
Monitor Audio R352/MD £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
Monitor Audio MA700/Gold £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
Monitor Audio R852/Gold MD £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
Monitor Audio 1200 Gold MD £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
Monitor Audio MA1800/Gold £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
Mordaunt-Short 3.10 £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
Mordaunt-Short MS 3.20 £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
Mordaunt-Short 3.30 £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
Mordaunt-Short MS100 £189	Average+ Average+	A 'mid forward' tonal balance is its main drawback but other aspects such as ambience, transparency and stereo depth compensate	32.5 x 22.5 x 21.5cm stands near wall	85dB/w 80Hz	R	46
Mordaunt-Short MS300 £319	Average+ Average+	Not considered particularly competitive in its class, though it has good power handling and stereo focus	54 x 22.5 x 25cm on stands near wall	89dB/w 65Hz		46
Mordaunt-Short 442 £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
Musical Fidelity Reference 2 £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
Musical Fidelity MC-2 £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
Musical Fidelity MC-4 £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
NVA Cube 2 £380	Average Good	A rude but exciting miniature, with unusually accomplished bass capabilities for its size	28.5 x 27 x 28.5cm NVA stands against wall	85dB/W 48Hz (in room)	R	82
NVA Cube 1 £600 (stands £200)	Good— Good+	Attractive, cube-shaped semi-omni is very sturdily built, and gives an idiosyncratic but unusually open, spacious and informative sound	33 x 32 x 32cm own stands 0.5m from wall	85dB/w 52Hz	R	71
NVA Cubix £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
Opus 3 Credo £399	Average Average	Credo's odd-shaped silicate-based cabinet confers good box and bass performance, but the sound could be more neutral for the price	32 x 28 x 32cm stands in free space	88dB/w 65Hz		74
Opus 3 Capella £599	Good Good	The sound of this Scandinavian curiosity certainly benefits from the crushed marble enclosure, though presentation is strictly DIY	32 x 40.5 x 26(ave)cm amongst books in bookcase	86.5dB/w 45Hz		66
Pearl & Oakley Victoria 200 £1099	Average— Average—	Extraordinary – and to many very attractive – 'ginger jar' presentation in Staffordshire ceramics, but let down by need for further acoustic and mechanical development	93 x 33 x 33cm on floor in free space	87dB/w 30Hz (in room)		78
QLN Model One £700	Good Average	Similar to Signature at two thirds the price, Model One exaggerates the latter's rich and heavy midbass and lacks its velvet smoothness	35 x (16-25) x (21-27)cm pillar stands, free space	85dB/W 28Hz (in room)		82
QLN Signature £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
Quad ESL-63 £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
Richard Allan CD5 £184	Average— Average—	This neatly presented small reflex design can sound engagingly communicative, but is flawed sonically and technically and quite expensive too	38 x 19 x 23cm on rigid stands	88dB/w 80Hz		68
Rogers LS2a £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
Rogers LS4A £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
Rogers LS7t £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
Rogers Studio 1a £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
Rotel RL850 II £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
Royd A7 Series 11 £115	Average+ Average	Lively clear sound; good upper bass and dynamics, but treble "ramp" made vocals sound shut in. Try before you buy	31 x 20 x 17cm shelf or 50cm stands near wall	86dB/w 75Hz	R	53
Royd Eden £235	Average Average+	Delightful mid/treble speed and transparency but determinedly bass light, this oddball miniature threatens cult status but could use a sweeter tweeter	31 x 20.5 x 18.5cm stands close to rear wall	87dB/w 85Hz	R	66
Royd Apex £485	Average+ Good	Not the smoothest sound around, it more than compensates with an impressively communicative and informative musical presentation	85.5 x 20 x 30cm on floor close to wall	87dB/w 33Hz (in room)	R	78
Ruark Swordsman £219	Good Average	Very attractively styled and finished, the Swordsman is a well built 'small bookshelf' model that delivered better test than listening results	38.5 x 20 x 27.5cm stands 0.5m from wall	84dB/w 50Hz		71
SD Acoustics OBS £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
SD Acoustics SD1 £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

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THE DIRECTORY

LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
SD Acoustics Ribbon £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
Shan Shimna £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
Snell Type C £2350	n/a Very Good	Pricy, 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
Sony APM-101ES £100	Good Average	Big hearted sound from small bookshelf successor to BB '10ES, sounds a little untidy at frequency extremes, so suits CD better than vinyl	39.5 x 22.5 x 23.5 stands in open space	86dB/w 52Hz	R	71
Sony APM-141ES £200	Average Average	A great deal of loudspeaker for the money, the rich-sounding '141 needs a big room and still shows significant 'loudness' (boom'n'tizz) tendencies	61.5 x 26 x 32cm large room, free space	88dB/w 30Hz (in room)	R	78
Sony APM-181ES £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
Sony APM 66ES £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
Spendor SP2/2* £500	Very Good Good+	Conceding little to the SP1, this 30 litre model displayed good tonal balance with a highly articulate midrange, only slightly marred at frequency extremes	50 x 25 x 30cm free space, stands	87dB/w 45Hz	R*	59
Spendor SP1 £800	Very Good Good	A very subtle and musical performer that works particularly well with digital material. An exceptional allrounder	63.5 x 29.5 x 30.5cm stands in open space	87dB/w 41Hz	R	60
Spica TC50 £599	Good— Good	This triangular-profile 'grown up' miniature is a shade boxy and laid back but has good rhythmic and musical integrity	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
Spica TC50SE £799	Good— Good	A heavily UK-modified TC50, the SE sounds less boxy and more spacious, but lacks some of the urgency of the standard model	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
Spica Angelus £1295	Good Average	A little bass shy and soft in the bass and lower mid, the free standing Angelus is otherwise tidy, extremely lively and fluid, if uneven overall	116.8 x 53.3 x 26cm away from walls	86.5dB/w 50Hz		60
Studio Power Sapphire £120	Poor Average—	Balance difficulties are improving, though still prevent the potential of this interesting metal-cone new miniature from being fully realised	30 x 20 x 19.5cm stands near rear wall	85dB/w 70Hz		66
Studio Power OMS100 £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
Sugden CL £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
Tannoy E11 £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
Tannoy M15 £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
Tannoy DC1000 £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
Tannoy DC2000 £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
Tannoy DC3000 £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
Tannoy Westminster £3600	n/a Good+	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few pockets and rooms	Huge, flat against rear wall, away from corners	96dB/w (manuf.)	R	Coll
TDL Studio 1 £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
TDL Monitor £1799	Very Good Very Good	Fine solidity and good accuracy, with enough bass extension to satisfy even organ freaks. Needs a big room and can sound a bit lazy and a shade tinkly	118.5 x 30 x 47cm 0.5m from walls	85dB/w 28Hz	R	66
Technics SBC 250 £140	Average+ Average—	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character	36.5 x 23.5 x 20.5cm free space, stands	86dB/w 60Hz		46
Technics SB-RX50 £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
Toshiba SS33-M £100	Average Average	Providing a benchmark for budget loudspeakers; this Toshiba-inspired but UK designed and manufactured model is a lot of loudspeaker for the money, if a shade on the cheap	40 x 26 x 21.5cm stands in free space	86dB/w 55Hz	BB	68
Townshend Glastonbury IIS* £1700	n/a Very Good	What? No bass? Actually, like the KEF 107, Glastonbury II goes down so low you might not notice how good it is. A truly remarkable performer. Superb soundstaging	91.5 x 28 x 46 free standing in room corners	88dB 27Hz	R*	65
Videotone Minimax 2 £80	Poor Average—	Cheap in build and QC as well as price, but cheerful (if coarse) with it – if a little too cheerful after extended listening . . .	27.5 x 17 x 20cm near rear wall	84dB/w 90Hz	R	74
Visonik David 6001 £173	Average— Poor	Sharp styling a classy looking miniature makes, but the complex grillework worsens a sound which starts off with too much top and not enough bottom	20 x 12 x 13cm against rear wall	87dB/w 130Hz		74
Wharfedale Delta 30 £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
Wharfedale Delta 50 £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
Wharfedale Diamond III £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
Wharfedale Super Diamond £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
Wharfedale 504/2 £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
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 get 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.

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THE DIRECTORY

CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal – at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes.)

There is no problem in connecting a cassette deck to any normal amplifier, but some care needs

to be taken in choosing the best tapes for a specific machine. (Trial and error is one effective technique, but many decks have manual bias adjustment and some match up to the tape automatically.) Lab performance and sound quality often go hand in hand, and are frequently somewhat dependent upon factory alignment. The mechanical integrity of the mechanism itself is another crucial factor, that is often reflected in the asking price.

All modern hi-fi decks have Dolby B and the majority have Dolby C besides; the very worthwhile

HX Pro system is becoming steadily more widespread. Remote control remains rare, though sometimes it is available as a system option. Three-head recorders allow simultaneous checking of the recording being made. Auto-reverse is a useful convenience feature, but usually with some mechanical compromise, while double-mechanism 'dubbing' decks of dubious quality are fashionable at the bottom end of the market. The welter of different 'music search' systems available is some indication of their frequent ineffectiveness.

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 £299	Poor Poor	Uneven sounding deck with poor bass reproduction and dynamics. A pity this, because the deck looks and feels good	3-head, Dolby B/C/HX Pro, optional remote		81
Akai GX-6 £330	Good Good	There is a strong sense that someone has really thought this one through; it has an indefinable 'specialness'	Real-time counter, track search, Dolby B, C, bias adjust	R	52
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	Sloppily 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
Goodmans GSW-5200 £90	Poor Poor	Musically unimpressive but at least it's cheap!	Dolby B, twin, one records		69
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—	Transistor 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

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CASSETTE DECKS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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
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 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
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-225 £100	Average+ Average-	At last – a cheap Pioneer with auto-tape select! Well specified ultra cheapie, but poorly set up, especially for commercially recorded material	Dolby B/C, track search		81
Pioneer CT-335 £150	Average Average	Mostly satisfactory mainstream deck, at its worst with prerecorded material which sounded edgy. It made very good Type II recordings	Dolby B/C/HX Pro, track search		81
Pioneer CT-445 £180	Good Good	Exactly engineered and fine sounding deck with a strict emphasis on function. Best with good Type IIs	Dolby B/C/HX Pro, electronic counter	BB	81
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-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-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
Rotel RD-865 £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
SAE C102 £549	Average+ Good	Looking most unlike a cassette deck designed in the States and proving competitive in its price group. Not sonically that outstanding, however	Real-time counter, track search, Dolby B & C		52
Sansui D-X301i £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
Sansui D-X501 £230	Poor Poor	Unhappy mixture of good looks, excellent ergonomics and mediocre, sometimes poor sound	Dolby B/C, random track search		81
Sansui D-X701 £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
Sony TC-FX110B £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
Sony TC-TX55 £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
Sony (WMD6C) ProWalkman £249	Good+ Very Good	"One of the finest sounding cassette decks on the market today. A mandatory Best Buy, which also fits in your pocket"	Dolby B, & C	BB	60
Sony TC-RX60ES £250	Average Average	For once a stable sounding auto-reverse deck but sound quality is rather 'dirty' and compressed, especially with Dolby C	Auto-reverse, Dolby B/C/HX Pro, auto tape recognition		63
Sony TC-K630ES £300	Average- Average	Acceptable-to-good sounding deck despite some measured shortcomings. At its best with metals; lacks vitality with lower bias tapes	3-head, Dolby B/C/HX Pro, bias adjust		81
Sony TC-RX80ES £350	Average+ Good	Clean, powerful and detailed sound, especially without Dolby C. Stable pitch – but prerecorded cassettes sounded disappointing	Auto reverse, Dolby B/C/HX Pro, bias/level adjust	R	63
Sony TC-K730ES £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
Teac V-270C £89	Average- Average-	Not quite cheap enough to compete solely on price, the V-270C is a rather messy and unstable sounding deck	Dolby B & C, bias adjust		63
Teac V-480 £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
Teac W-470 £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

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CASSETTE DECKS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Teac V-870 £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
Teac V-970X £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
Teac W-990RX £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 & dbx, dual auto-reverse/record, parallel & sequential recording, remote	R	69
Teac R-919X £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
Technics RS-B555 £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
Technics RS-TR255 £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
Technics RS-B655 £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
Technics RS-TR355 £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
Technics RS-TR555 £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
Technics RS-B905 £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
Yamaha KX-230 £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
Yamaha KX-300 £160	Average+ Average-	Uncommonly well equipped and adequately made and presented, this model turned out to be a disappointingly uncertain proposition on audition	Track search, Dolby B, C, HX Pro with 'play trim', bias adjust, remote control		57
Yamaha KX-500 £210	Very Good Very Good	An accomplished performer, strongest in the areas of pitch and spatial stability, but slightly rough around the edges	Real-time counter, track search, Dolby B/C/HX Pro with play trim, bias adjust, remote control	R	57
Yamaha KX-630 £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
Yamaha KX-800 £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
Yamaha KX-1200 £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

DAT RECORDERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa Excelia XD-001 £1300	Very Good Very Good	Clear and very listenable recorder roughly comparable to but slightly sweeter sounding than the Sony DCT-1000ES – but with an inferior front panel design	Track ID and search, remote	R	63
Grundig Fine Arts DAT-9000 n/a (system component)	Good Good	Conventional DAT recorder offering standard facilities. The deck is well made and equipped, and is engineered to a satisfactory quality standard. It performs to an acceptable standard, though it is not state of the art	2/4 hour recording, mic inputs, digital in/out		69
Luxman KD-117 £1499	Good Good	Slightly soggy, earth-bound sound quality, this model trails the other DAT decks tested so far	Two analogue inputs, remote twin address		63
Sony OTC-M100 £799	Very Good Very Good	Clean, clear sounding 2nd generation model with most of the features and sound of the DTC-1000ES	Mid-width, alpha-numeric display, remote, optical interfaces	R	63
Sony DTC-1000ES £1299	Very Good Very Good	Fine, consistent performer with accomplished tape handling and good build quality	Standard track ID and search, remote	R	63

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
ADC CO 2000E £330	Good+ Fair+	One of the slimmest players in the business but nothing special inside. Nice ergonomics but overpriced	Remote, timeshared 16 bit		64
Aiwa DX-M45 £149	Fair Fair	Cutdown Philips technology, but results are quite good for this British made machine	Manual	R	64
Aiwa XC-005 £280	Average Average+	Very comprehensively equipped including double digital and audio outputs. The average performance was still sufficient for recommendation at this price	Power vol, edit-dubbing, shuffle 2 digital op	R	76
Aiwa CD-001 £300	Good Good	Pretty close to Recommendation, delivering a respectable sound quality and lab performance from an ergonomically attractive package, but ultimately failed to excel in any particular respect.	Track entry/volume remote, direct recorder connection etc.		58
Aiwa XC-007 £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
Akai CD-52 £249	Good Good	A nice surprise from Akai, genuinely good sound from this mid-priced model. Better linearity will help further	Remote, digital output, headphone socket	BB	64

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Akai CD-62 £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
Akai CD-73 £450	Good Average	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imagery. Worth auditioning	Track entry keypad remote, menu display (switchable)		62
Akai CD93 £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
Arcam Delta Black Box £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
Arcam Black Box II £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
Arcam Delta 70 II £600	Very Good Good	Now in Mk II form a further improvement is seen in features, performance and sound quality. Solidly built and British	Now adds simple remote vol + std features; also display off	R	76
Arcam Delta 170 Transport £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
Cambridge Audio CD2 £650	Fair Very Good	The finest midrange in digital audio is sufficient grounds for Recommendation, though there remains a tinge of disappointment that the CD2 didn't get closer to big brother elsewhere, notably in the bass.	16x oversampling, remote control	R	58
Carver TL 3100 £340	Average Average—	The sound quality did not live up to the excellent fascia. Carver's DTL did not aid the indifferent sound	DTL sound shaping, usual facilities, remote, memory		76
conrad johnson DFI £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
dbx DX5 £640	Good Poor	Sound quality proved a single disappointment, though it's refreshingly unique in providing semi-pro post-production facilities that some users will undoubtedly relish.	Track entry/volume remote, compression, impact recovery, ambience etc.		58
Denon DCD820 £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
Denon DCD1420 £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
Denon DCD-1520 £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
Denon DCD 3520 £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
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
Goodmans GCD300 £129	Average Average	It may be adequately made, but with cheap good sounding players available this particular Goodmans isn't quite good enough	Programmable, skip, search, repeat		70
Goodmans GCD550 £199	Average+ Fair+	A slow autochanger with a weakish lab performance but the sound is fair enough, the features good and the price is low	Remote, 6 disc autochanger, 2x 0/s	BB	64
Goodmans GCD555 £219	Average Average—	Scores approval on grounds of low price. You must pay more for better sound and a faster mechanism	6 disc changer, 32 track memory, remote etc	R	76
Grundig CD9000 £1000	Good Good	Aimed at a market which puts external styling above sound quality. Although this player is of slightly above average competence in most departments it is expensive	Remote, programme, hdph socket, calendar display etc		70
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
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, hdph socket, comprehensive display, balanced output etc	R	70
Meridian CD207 £1050	Very Good Excellent	The 207 matures with age and in its present form it offers one of the best sounds around plus great packaging and versatility through its preamp options	On-board preamp, options, two box, coax digital output, remote	R	72
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 hermia 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 PCM2 £500	Good+ Good	A matured design with good features it is the best sounding power volume player available, it even tests well. It deceptively the £200 PSX power supply option	Remote volume, display and phase invert	R	64
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
NAD 5220 £230	Average— Poor	Conforms sonically to a stereotype of the medium that most players have grown out of. Hard, thin and raw sound with poor stereo and resolution.	Time/track display, memory		62
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 CDP-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, hdph, remote track entry, digital output		70
Nakamichi OMS-4E £1200	Very Good Very Good	Solidly controlled and comparatively simple this clearly represents one of the major benchmarks for CD sound quality, though the midrange sounded a touch thin	Skip and scan, headphone socket		51
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, hdph, 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, hdph, programming etc	BB	76

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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, hdph, memory, shuffle		76
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 R etc		76
Philips CD880 £500	Very Good Very Good	The '880 is an impressive blend of luxury build quality and features at a far from extravagant price, and also delivers the subjective goods.	Volume remote, FTS, menu display etc. R		60
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, hdph		76
Revox B126 £649	Very Good Good	Made in Switzerland so the build quality and technical performance is high but then so is the price and the sound quality is only good	Programming, Revox 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, hdph, 19 track memory, digital op		76
Rotel RC0855 £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
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
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
Shure Ultra D6000 £495	Average + Fair	Ergonomically well thought out with full function remote control, but not really scoring sonically considering its price	Remote control (full function inc volume)		51
Sonographe S01 (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 557ESD £1000	Excellent Good +	Superbly built flagship model that produced excellent lab results and very good sound. Many luxury features though not that good value	Full remote, disc directory, digital output, power volume, 8x 0/s, 18 bit		64
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 COP-R1/OAS-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

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 Goodmans 5000 system but with greater power and marginally superior sound	One-piece, semi-remote		77
Goodmans 5500 £320	Poor Poor	It offers the basic features (but no Dolby or magnetic cartridge) and rough and ready sound	One-piece, remote		77
Goodmans 5300CDM £400	Average - Average +	Crisply styled system with gutsy amplifier and sophisticated speakers. CD player works well, other sources are variously mediocre	Combined cassette/tuner/amp, plus T/T and CD with remote R		65
Goodmans Maxim-Midi System £520	Average Average +	De-luxe version of 5200 system - very good value for money and readily upgradeable. Sonics rough but OK and speakers good; CD crude	All separates with twin cassette R		54
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

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CD MIDI SYSTEMS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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-W91COM £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
Marantz MX493AVCO £549 with LD20 speakers, £449 without	Average Mixed	Good source components (ex cassette) let down by poor amplifier. Flexibility is strong point, and the system may prove attractive where the A/V possibilities can be fully utilised	Twin auto reverse, opt speakers, surround processor etc	R (with LD20)	77
Marantz MX583 £750	Average— Poor	The system has potential in an A/V context, but is patently lacking in a purely audio one. Only the CD excels	Component system with A/V amp, no speakers		65
Marantz MX673CD System £900	Average+ Average	Tremendously flexible audio/visual system. Sound quality is satisfactory at best and ergonomics a mess	Various A/V inputs, remote, speakers optional		54
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 £550	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
Sony Compact 301CD £400	Average— Average	Mainly crisp, articulate sound and excellent ergonomics offset by modest FM results and lack of pitch integrity on cassette	Twin unidirectional cassette, equaliser, 30 preset tuner etc		77
Sony 501CD £500	Average Average	Fair all round performance except noisy FM. Ergonomics and visuals good, but no auto source select, tuner stereo defeat	Twin auto-reverse, 3-band tuner, equaliser etc	R	77
Sony Compact 701CD/711CD £700/£800	Average+ Good	Sound quality good all round, though cassette pitch accuracy is below par. Features average but system control is weak	Twin auto-reverse, graphic equaliser (711 only), 30 preset tuner	R (701CD)	77
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 £600	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
Kenwood KT-660L £130	Fairly Good Fairly Good	You get your money's worth of gadgets and the radio's basically sound although programming is complicated. AM – fairly good	Timer, clock, all bands	R	65
Kenwood KT-1100D £300	Good+ Good+	Behind a gaudy and rather useless display the radio is much better than you might first think. AM – good	Firework display. FM/mw bands only	R	65
Linx Theta £400	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

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TUNERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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
NAD 4020 £139	Good Average+	Not the quietest or most sensitive tuner tested, it still provided good sound for the money, being "musical and ambient"	Analogue FM/am	BB	50
Naim NAT 01 £1098	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 £289	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 £918	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
Sony ST-S300L/ ST-S100L £140/£100	Good Good	A reasonable entry point, not for difficult areas. AM - poor	All bands	R	65
Sony ST 500ES £200	Good++ Average-	Disappointing sound quality but good lab performance. (Includes long wave)	10 AM/fm presets, auto scan digital		55
Sony ST-S 700ES £299	Very Good Very Good	First class in every respect including FM sound quality. Even AM was well above average	FM/am, 10 presets, digital scan	BB	60
Yamaha TX-L400 £130	Good++ Good+	Good FM sound, let down by poor AM but otherwise good value	16 presets, auto scan, digital, FM, MW, LW	BB	55
Yamaha TX-500 £150	Average+ Average	Under a gaudy coat, this sensitive tuner gave reasonable stereo results. However, the AM had again been thrown down a well	20 presets (10 buttons) digital		50

Rating refers to original, tested model

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 *v/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
Aiwa HP-X30 £30	Good Good-	A flashy personal stereo phone which alternatively could be used at home. A slight LF tonal preference slightly colours the response, but it ain't a bad can	Supra-aural, closed-back, dynamic		75
Aiwa HP-V99 £50	Good- Average+	Horn loaded in-ear miniatures with plenty of guts but not enough transparency or bass to compete with the headbanded competition	Intra-aural, closed-back, dynamic		75
Aiwa HP-X80 £50	Good Good	A headphone that's highly suited to non acoustic music and portable sources, nicely made and slickly finished. Sound quality doesn't quite match the price	Supra-aural, closed-back, dynamic		75
Aiwa HPEX-200 £90	Good Good	Modern looking and well finished the Excelsias, as they are dubbed, had meaty bass and sounded reasonably open for the type	Circumaural, closed-back, dynamic		63
AKG K135 £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
AKG K145/S £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
AKG K240 Monitor £60	Very Good Good	Something of a classic these AKGs are very user friendly in all respects; sonically on the warm side of neutral	Circumaural, semi-open, dynamic	R	63
AKG K280 Parabolic £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
AKG K340 £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
Audio Technica ATH 909 £55	Average Average	Quite impressive in the treble though a bit bass shy, the 909s worked well at high levels	Circumaural, semi-open, dynamic		55
Audio Technica ATH 910 £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
Audio Technica ATH-911 £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
Beyer DT 325 £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
Beyer DT330 Mk II £45	Good Poor	Not the most revealing phones encountered, the 330s were nevertheless enjoyable and rarely offended	Circumaural, semi-open, dynamic		55
Beyer DT550 £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

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NAME PRICE	COMFORT SOUND	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
Beyer DT880 £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
Beyer OT990 £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
Beyer IRS690 £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
Jecklin Float Model One £79	Good Very Good	Whilst very unusual in appearance the Floats give remarkable sound quality and openness at a reasonable price	Circumaural-ish, open-back, dynamic	BB	55
Jecklin Float Model Two £99	Good Very Good	Helmet shaped and pretty unflattering but open sounding and comfortable in the long term. Note lack of adjustment means you should try before you buy	Circumaural-ish, open-backed, dynamic	R	63
Jecklin Float Electrostatic £399	Good Excellent	One version of the state-of-the-art, these electrostatics have an openness of sound rarely found in the breed, with good dynamic range to boot	Circumaural-ish, open-back, electrostatic	R	55
JVC HA-D990 £65	Good+ Good+	Good looking well made cans that offer good sound quality for the money. Sonic nature is of the easy-going, laid-back variety	Supra-aural, closed-back, dynamic	R	75
Koss TD/60 £20	Good Average	Although they're devoid of channel identification and have a decidedly Stateside approach to sound, these are very listenable phones for the price	Supra-aural, closed-back, dynamic		75
Koss K/6X Plus £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
Pioneer SE-72 £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
Quart Phone 30 £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
Quart PMB 25II £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
Quart Phone 70 £70	Good Good	Competent performers that were hard to criticise but lacked the life and sparkle of which some of the competition are capable	Circumaural, closed-back, dynamic		63
Quart PMB 65 £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
Quart PMB 85 £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
Realistic Pro-X £25	Poor Average-	Robust, unanimously uncomfortable and heavily veiled in sonic terms - not a great success	Supra-aural, closed-back, dynamic		75
Ross RE2530 CD £20	Average Average	Rather an 'average' £20 phone that some found uncomfortable due to high pressure on the ears. Sonic balance is on the bright side	Supra-aural, closed-back, dynamic		75
Ross RE2560 CD £25	Good Average+	If you're not too fussy about quality of finish and don't have an elfin head then these British phones warrant attention. Sound could be smoother	Supra-aural, semi-open, dynamic		75
Ross RE-2760 £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
Sennheiser HD40 £20	Very Good Good-	Very light and comfortable headphones with an even sonic balance that will suit most sources, but jack is 6.3mm and not suited to personals	Supra-aural, semi-open, dynamic	BB	75
Sennheiser HD450 £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
Sennheiser HD480 £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
Sennheiser HD520 £65	Good+ Good+	A very comfortable and musically capable headphone. If you've got this sort of bread to blow on cans, give 'em a blast	Circumaural, semi-open, dynamic	R	75
Sennheiser HD530 £75	Very Good Good+	One of the better dynamics in its group, the 530s create a sense of space that eludes most sub £100 cans, and they're dead comfy to boot	Circumaural, semi-open, dynamic	R	75
Sennheiser HD540 Ref Gold £160	Good Very Good	The 540 Golds prove that dynamic headphones can be subtle, informative and capable of creating a remarkable sense of space	Circumaural, open-back, dynamic	R	55
Sony A21L £20	Good- Good-	Forward facing in-ear drivers on a folding plastic band provide exceptional clarity for such an inexpensive phone. However, no bass, and fit isn't to everyone's taste.	Intra-aural, semi-open, dynamic	BB	75
Sony MDR V3 £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
Sony MDR-V5 £50	Very Good Average+	A nicely made comfortable headphone let down by a limited ability to reproduce music in a natural fashion	Supra-aural, semi-open, dynamic		75
Sony MDR V7 £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
Sony MDR-CD999 £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
Sony MDR-R10 £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
Stax SR34 £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
Stax SR84 £210	Very Good Very Good	The stepping stone between dynamics and full electrostatics, these electret phones are revealing, open and highly enjoyable	Supra-aural, open-backed, electret	R	63
Stax Gamma pro/SRD-X pro £296/£230	Very Good Excellent	The Gamma pros are like a stethoscope for your hi-fi, revealing subtleties that many loudspeakers fail to resolve	Circumaural, open-backed, electrostatic	R	63
Stax SR Gamma £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
Stax SR Lambda Pro £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
Stax SR Lambda Pro SRM-1 energiser £360/£635	Very Good Excellent	This combination extracts layers of information that other headphones only hint at. The SRM-1 has more edge than the SRM-T1, but it's good	Circumaural, open-back, electrostatic	R	75
Stax Lambda Signature/SRM-T1 £470/£895	Very Good Excellent	The Signature when combined with the SRM-T1 valve driver must be the most transparent headphone available	Circumaural, open-backed, electrostatic	R	72
Yamaha YHL-006 £30	Average Average	Unusual personal stereo oriented phones that curl up when not in use. Earphones are like golf balls and balance is well suited to Walkmans	Supra-aural, open-back, dynamic		75

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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
Aiwa HS-PL300 £110	N/A Average	Good looking, simply laid out player with a sensible selection of features and reasonable sound quality for a small player of this price	Dolby NR, chrome/metal eq, remote		78
Aiwa HS-PX303 £150	N/A Good	Chunky and macho styling combines with comprehensive features and a half decent transport to make a powerful personal	Dolby B & C, chrome/metal eq, remote	R	78
Panasonic RQ-P505 £100	N/A Poor	Very attractive and neat little player with nicely designed controls and XBS bass boost, but sonically it's limited by distinct wow and flutter	Dolby, chrome/metal eq, remote		78
Panasonic RQ-P525 £120	N/A Average+	Fitted with what is effectively a bass only tone control and harbouring all the necessary features the 525 also has a knack with tape replay	Dolby B & C, chrome/metal eq, remote	R	78
Philips D6658 £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
Saisho PS90R £40	Poor Poor	A bit of a jumble of features and gadgets, the PS90R has on-board speakers, an extending aerial and even records, but sound quality is dubious	Graphic EQ, types I, II & IV, AM/FM, recorder		56
Sharp JC-270E £130	N/A Average-	Slightly old fashioned design combines with a basic feature count and mediocre sound quality to make an apparently uncompetitive player	Dolby, chrome/metal eq, remote		78
Sony WM-BF65 £90	N/A Average+	Regular size radio/clock/cassette player with a bright even open balance and Sony's forward facing phones. Not as glamorous as slightly more expensive models but sonically not bad	Dolby, chrome/metal eq, radio, alarm clock	R	78
Sony WM-701C £150	N/A Good-	Beautiful little machine with all the necessary buttons'n'switches and a fundamentally exceptional sound quality, marred unfortunately by wow and flutter	Dolby B & C, chrome/metal eq, remote, folding phones		78
Sony Walkman Pro £249-£289	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 BB in/out, varispeed		52/56
Toshiba KT-4549 £80	N/A Poor	Fully equipped with 10 preset radio and alarm clock the KT-4549 is a bit aggressive on the sonic side and the bass boost system lacks balls	Dolby, chrome/metal eq, radio, alarm clock		78

PERSONAL CDs

MODEL 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

PERSONAL CDs

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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
Sony D-20 £150	Average+ Fair	Not bad for a machine at this price, it's nicely designed and reasonably robust, with reasonable sound quality	13.8 x 3.8 x 15cm, 450g, mains adaptor	R	66
Sony D-88 £300	Average- Fair+	A stylish and 'cultish' object, the D-88 is very small and has an adjustable disc drive for three and five inch discs. Sound quality doesn't quite match appearance	9.4 x 3 x 9.8cm, 300g, 3" ready, mains adaptor, no line out		66
Sony D-150 £300	Fair+ Very Good	One of the most enjoyable machines encountered, sounding informative and sweet and looking very tasty to boot. Comes complete with a tough carrying case	12.6 x 2.1 x 13.5cm, 420g, 3" ready, 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 CSD-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

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CD PORTABLES

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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
Foundation Fred £70	2 leg Average	With sand filling the Freds made speakers sound tight and coherent with a more even balance.	19 x 19cm 36/43/59cm		58
Foundation Maggi £159 to order	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
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
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
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
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
Audioquest Sorbothane Feet £40 for four	Feet Good	These large gumdrops are very useful for damping vibrations in amplifiers and especially CD players.	6.5 x 2.5cm (circular)	R	57
Cornflake TCS6 £60	Shelf Good	A squat and rigid frame supports a Medite top board with four adjustable spikes, better suited to suspended sub-chassis turntables.	43 x 23 x 33cm		57
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
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

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THE DIRECTORY

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 grainy 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 grainy 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
Audionote Copper ANC £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
Audionote Flexible Silver ANS £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
Audionote Silver ANV £154	Poor Excellent	Far weightier-sounding than the flexible ANS, ANV interconnect also possesses a fair degree of treble clarity and sparkle.	21 strand silver Litz		59
Budget Patch Cords: 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
Budget OFC circa £7	Fair Fair	Subjectively, this cable did lift much of the aural fog experienced with scrawny standard hook-up leads.	OFC		59
Deltec Slink £32	Good Very Good	Ideally used in lengths of under 4 metres, it errs on the lean side of neutral but has an uncommon transparency in the midrange.	4 silver plated OFC strands PTFE dielectric	BB	59
Deltec Black Slink £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
Denon LC-OFC 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
DNM Solid-core £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
Kimber Kable PSB £41.40	Very Good Very Good	An exceedingly transparent midband but slightly 'clanky' treble. It always managed to sound remarkably uncluttered and open.	OFC, PTFE dielectric	BB	59
Kimber Kable KC-1 £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
Kimber Kable KC-AC £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
Monster Interlink 4J0 £32	Good Good	Bass is solid and punchy, counterpointed by a slightly overblown midband which tends to make vocalists sound larger-than-life.	Multi-gauge	R	59
Origin Live Soli-Core Super £60	Good 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
QED Incon P1-Gold £15.95	Good Good	A lively open presentation that just borders on the lean side of neutral, the quick and lucid delivery affording considerable musical insight.	OFHC, gold plated Deltron plugs	BB	59
QED Incon Graphite GP1 Gold £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
Sterling £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
Thorens SAC 100 £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
van den Hul MC-D310II £45	Poor Good	It tended to highlight some upper mid detail, but a generally open and spacious acoustic proved its saving grace. Slightly soft at LF.	Silver plated single strand VdH plugs	R	59
van den Hul MCD-1021II £69	Good Good	Possessing the same endearing qualities as the D300 it presented open and transparent soundstages and improved timbral resolution	Twin axial silver plated copper	R*	59
van den Hul Thunderline £150	Good 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
van den Hul MC-Gold £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
van den Hul MC-Silver £750	Good Good	Although remarkably transparent for an asymmetric design this costly cable was not considered to be of 'state-of-the-art' standard, and is bettered by cheaper models.	19 silver plated copper strands		59
Vecteur 8045 £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

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LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Absolute Wire Force 4 £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
Audio Innovations OR-200 £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
Audionote AN-SP £100 per metre	Average— Excellent	A clean and open sounding cable that offered a deep and pleasantly detailed perspective. Bass was slightly restricted, but seemed tight and coherent nonetheless	15 silver strands, polyethylene dielectric		64
Audiquest Livewire Black £15 per metre	Good Good	It proved clear and punchy but with some grain across the treble. Nevertheless Black remains an interesting concept and proved better than Livewire Green	OFHC, surface only – foam core construction	R	64
Audio Technica AT6120 £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
Bellwire 12p per metre	Poor Average—	Broadly speaking it delivered a bright and tizzy sounding treble with a fairly open and detailed mid with little or no bass resolution	0.5mm single strand, PVC dielectric		64
Deltac 8S £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
Deltac Black Sixteen £648 – 4.5m pair	Very Good Excellent	Bass was deep and rhythmically secure, the mid tonally pure and free of additional sibilance while the treble was both relaxed, sweet and highly detailed	16 silver plated OF copper strands, PTFE dielectric	R	64
DNM Solid core £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
Exposure £2.50 per metre	Good Good	It could sound a trifle matter of fact but this emotive flattening was also somewhat dependent on the music program. It is also highly suited to long runs	56 OFC strands, webbed PVC dielectric	R	64
Kimber Kable 4PR £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
Kimber Kable 4TC £17.65 per metre	Good Good+	4TC made a great impression in the listening tests with an open midband, a smooth and unfatiguing treble with slightly rich but suitably weighty bass	OF copper, PTFE dielectric	R	64
Linn K20 £2.20 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
Marantz ML-55S £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
Mission Cyrus £2.50 per metre	Average+ Good	Because of its impedance characteristic this cable will deliver a smooth and unfatiguing treble balance with loudspeakers offering an easy load	0.8mm single strand, PVC dielectric	BB	64
Monitor PC Silverline PC4 £5.75 per metre	Good Average	Sonically it laboured under a heavy and claustrophobic balance, lacking the see through transparency and lucidity of the better solid core cables	2072 x 0.07mm silver plated copper strands		64
Monster Original £4 per metre	Good Fair+	Original sounded relatively congested and murky at higher frequencies but possessed weight and conviction in the bass	Multistrand		64
NVA LSI £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
Origin Live Soli-Core Ordinary £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
QED 79-Strand £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
QED Incon Graphite £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
QED Flat 200 £2.20 per metre	Good Good	I detected a degree of confusion at low frequencies but this did not stifle the acoustic atmosphere which remained open and positive	200 strands, flat webbed PVC dielectric	R	64
Rotel Supra 4 £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
Rotel Supra 10 £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
Sony RK-S5ES £60 – 5m	Fair+ Fair+	The sound of this cable was also somewhat controlled and over damped. The treble was relatively free and airy but lower octaves, including the midband, were constrained	350 x 0.08mm OFC strands, heat shrink dielectric		64

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LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Solid core mains cable 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
Sterling £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
Townshend Isolda £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
van den Hul CS-122 £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
van den Hul CS-352 £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
van den Hul SCS-12 £29.95 per linear metre	Good + Good +	SCS-12 set a high standard with a tight and well focused soundstage populated with tactile stereo images. Bass wasn't as extended or resolved as some other cables	19 silver plated strands of 12 different gauges, PTFE dielectric	R	64
van den Hul SCS-2 £99.95 per linear metre	Good + Good +	Overall it was commendably neutral and transparent but nothing less would be acceptable bearing in mind the tremendous cost of a stereo pair	665 silver plated matched crystal copper strands, PTFE dielectric	R	64
Vecteur R-CV30 £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-0FC PTFE insulated strands	BB	64
Vecteur S-CV90 £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-0FC strands		64

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
Alpine 7282L £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
Alpine 7905M/3539 £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
Blaupunkt Windsor SQR 38 £275	Good Average	Not very enthralling sonically, the Windsor is rather low powered but does have a reasonably stable tape transport	5 FM, 10 AM presets, 3.1W		62
Clarion 916HP £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
Clarion 946HP £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
Clarion CDC7000/10028HA £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
Goodmans GCE229 £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
Hitachi CSK-402E £250	Good Good	An attractively designed little player that for once doesn't disappoint when it comes to playing music, and it even has a security system	Bass/treble controls, 6 FM, 12 AM presets, Dolby, chrome eq., music search, 7.4W	R	62
Nakamichi TD-400E/PA-300 II £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
Nakamichi TD-700E/PA-300II £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
Panasonic CQ-497 £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
Philips DC680 £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
Pioneer DEX-M300/CDX-M100/ GM-3000 £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
Proton 214CD/D275 £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
Sharp RG-F816E £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
Sharp RG-F882E £220	Average Average	Again a glitzy full feature machine with a flip out control panel and plenty of lights. However, sound quality is a bit disappointing	Seven band graphic, 5 FM, 10 AM presets, ASP, chrome eq., Dolby, 8.5W		62

TO ORDER BACK ISSUES OF
HI-FI CHOICE SEE PAGE 16

THE DIRECTORY

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
Harman Kardon HK330Vi £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
Harman Kardon HK440Vxi £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
JVC RX-777VL £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
JVC RX-1001V £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
Revox B285 £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
Rotel RX-850AL £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
SAE R102 £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

VIDEO RECORDERS

For some time there's been a move to improve both the video and the audio quality of video recorders and TV sets alike as a necessary prelude to a proper integration between the two. Hi-fi video is obviously an important element in the story, and so is Dolby Stereo, the ambient 'surround sound'

system. The weak link of course is on the broadcast side. Although TV sound is well up to normal hi-fi standards, it has always been in mono and unjustly or otherwise has rarely attracted much audiophile interest. But TV sound is – or shortly will be – freed of the shackles of mono by the introduction of NICAM

stereo. NICAM – an acronym for Near Instantaneous Companding and Modulating – is the missing link that will help facilitate the much feted integration of video with audio. And then we have S-VHS, a system which does for picture quality what the other developments promise to do for the sound...

NAME PRICE	LAB SOUND & PICTURE	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Akai VS-75EK £550	Average Good	Excellent performance and a slick set of controls make this recorder a pleasure to use. Good price is a bonus	Hi-fi, NICAM, programmable remote	BB	71
Akai VS-77EK £700	Average Good	Another fine and carefully designed model from the impressive Akai video stable. The Dolby installation, whilst flawed, is certain to increase interest in the system	Hi-fi, NICAM, Dolby Surround decoder & stereo amp	R	71
Ferguson FV33H £500	Very Good Below Average	Beer budget NICAM has excellent tape search facilities and an intelligent remote control. Neither picture nor sound quality however are state of the art, and ergonomics are poor	Hi-fi, NICAM, transmitter LCD remote control		71
JVC HR-D750EK £500	Good Average+	Well sorted and relatively affordable NICAM recorder with LP sound only. It is pleasing to use and helpfully equipped, especially when trying to find individual recordings buried in long tapes. Performance is good in relation to price	Hi-fi, NICAM, transmitter LCD remote control	BB	71
JVC HR-S5000EK £1000	Good Very Good	This is the first domestic S-VHS recorder on the market, and it's an unusually well designed one with a wide range of well sorted features and controls. Sound and picture quality are close to state of the art, and miles ahead of any non-S-VHS recorder	S-VHS, Hi-fi, NICAM, LCD remote	R	71
Mitsubishi HS-B70 £1000	Very Good Very Good+	Superb model, and true state of the art picture quality, though you'll need a high grade S-VHS compatible monitor to reap full advantage. The facilities are also wide ranging and generally helpful	S-VHS, Hi-fi, NICAM, LP & SP, programmable remote	R	71
Nordmende V4405K £799	Good Good	Fine basic sound and picture quality, but the RF convertor introduced significant losses. An excellent model, but configured for German home market. VPS compatibility is of no practical use here, and the recorder lacks NICAM	Hi-fi, transmitter handset, digital FX		71
Panasonic NV-FS1 £1000	Poor Good	The control system is poorly organised, with cramped legends and some strange machine logic. Bar code programming is hardly a great achievement either. Picture and sound quality are good, but not state of the art	S-VHS, Hi-fi, NICAM, bar code programming		71
Sanyo VHR-D4710E £900	Very Good Good	Fine colour and moderate detail make for a basically good video section to match a fine sound section. Some of the facilities are a little disappointing however and the deck looks expensive	Hi-fi, NICAM, infra-red headphone remote, digital FX		71

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

THE DIRECTORY

COLOUR TELEVISIONS

The standalone television set is rapidly evolving into a key component in integrated home entertainment systems. NICAM digital stereo sound is now being broadcast for several hours a week from London and Yorkshire transmitters, so stereo CTVs are now becoming available equipped with NICAM decoding and with rather more attention paid to the built-in amplifier and speakers. NICAM is also available on Hi-fi stereo

videorecorders (see above), and this is usually the more practical route for hi-fi system integration, as well as allowing favourite musical events to be saved on tape. To both watch and record with stereo sound will require NICAM on each of course, but the decision to update one or the other first will probably have as much to do with the age of the respective components than the convenience of the interconnections.

The ten CTVs tested so far are all luxury stereo models with 'flatter squarer' 59cms tubes of various kinds. Best suited to a viewing distance of about 7ft, these are one size up from the most popular 51cms size sets and take about 23 per cent of the top 30 per cent of the market. All have remote control, Fastext (enhanced teletext), and many have on-screen graphics and flexible in/out socketry

NAME PRICE	SOUND PICTURE	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ferguson 59K5Q £599	Average— Good	Attractive and compact design highlights unusual (and rather nice) matt finish Super Planar-tube. Picture and ergonomics are pretty good but on-board audio is a bit of an afterthought, lacking sufficient welly for music programming; socketry adequate	59cm SP FST, NICAM, Fastext, o/s graphics	R	76
Grundig ST-63-460T £649	Average— Average+	Bulky set's shape resembles a square-rigged sail; screen tilts back slightly, so might suit floor mounting, though beware room reflections. Picture quality is good, if a touch bland, but ergonomics are fairly impenetrable — no on-screen graphics either. Halfway respectable sound quality is over-enriched by cabinet drone.	59cm FST, NICAM, Fastext		76
Hitachi C25-P759 £699	Average— Average—	Visually very compact and neat, with excellent handset ergonomics and good on-screen graphics and features. Picture quality 'hyped' and compromised by 'peaked' luma response; on-board sound has muscle but not subtlety, and NICAM (SCART) output lacks muting.	59cm FST, NICAM, Fastext, o/s graphics		76
ITT Nokia £629	Average+ Average—	Bulky square-rigged shape helps deliver a respectable standalone sound quality at a modest enough price. A versatile set with good handset but no on-screen graphics, the picture quality of our sample lacked fine detail resolution, lending a 'soft focus' effect	59cm FST, NICAM, Fastext		76
JVC AVS250 £550	Average+ Average—	This compact and delightfully versatile non-NICAM set has respectable on-board stereo sound and lovely screen graphics, along with an infernal handset. Our sample suffered a tuner problem which marred a picture quality which was pretty good when monitoring baseband signals off tape.	59cm FST, Fastext, o/s graphics		76
Mitsubishi CT-2553 STX £649	Average Good	Arguably the best all-rounder in the group, this compact monitor-style set suffers from exasperating ergonomics but the picture is detailed if a shade untidy, the sound lusty if crude. NICAM (SCART) output lacks muting, and colour rendition a shade individual	59cm FST, NICAM, Fastext, o/s graphics	R	76
Panasonic Prism TK-24 W1 £699	Average+ Average—	Handsome but bulky set delivers serious standalone sound quality. Lovely ergonomics but off-air picture quality marred by tuner section noise on our sample (works fine as picture monitor). Good NICAM (SCART) output.	59cm FST, NICAM, Fastext, o/s graphics		76
Philips 5574 £599	Average Average+	Neat and compact for a front-speaker set, this competitively priced allrounder lacks on screen graphics and remote white level (contrast) but is otherwise well equipped, if a shade undistinguished and conservative	59cm FST, NICAM, Fastext	R	76
Sanyo CBP2559 £579	Poor Good+	Lovely subtle and detailed picture quality totally justifies strong recommendation, though handset is obtuse (lacking white level) and on-board sound is dire. NICAM £50 update due early 1990	59cm FST, Fastext, o/s graphics, picture-in-picture	R	76
Sony D2512U £699	Average+ Average	Beautifully styled around the unique Trinitron tube, the sound benefits substantially from the odd looking detachable loudspeakers. Nice ergonomics with good on-screen graphics, the otherwise detailed picture is a little 'hyped'.	59cm Trinitron, NICAM, Fastext, o/s graphics	R	76

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Personal Messages

The Mana Acoustics table, Chapter Two: Paul Messenger disappears into the maze of applied experimental psychology!

Last month I finished Chapter One in what is destined to become The Mana *Sound Table* Saga. I had already established that the Mana *Reference* table was something very special indeed, but quite how special was going to take a little more time and experiment. The re-installation of my own active *Isobariks* after three months spent reviewing other loudspeakers put me back on familiar ground.

Two weeks on it's been a harrowing, a humiliating but also an enlightening experience – and I'm enjoying myself immensely. . . Devoting (at least) two complete pages to an item of hi-fi furniture is inviting revival of the long established 'Messenger has finally lost his *Márbles Movement*'. But this is no simple *Subjective Sounds*; it's applied experimental psychology, and I'm the poor rat running round the maze rediscovering my record collection and bumping into all sorts of obstacles along the way.

The start of Chapter Two has less to do with the Mana than with the supports for the loudspeakers at the other end of the chain. I had already decided to re-site my '*Barbariks*', and wanted to experiment with the acoustic and soundstage effects of moving them laterally. This isn't practical with floor-keyed, spiked stands, but is easy as pie using Michell cones.

Although siting any loudspeakers ten inches closer to the floor is bound to change the bass balance, the cones certainly seemed to support the speakers as rigidly as any stand. However, the sound seemed lacking in speed and 'magic', and decidedly coloured besides. That's because *Isobariks* are coloured, is an obvious conclusion. Certainly their measured frequency balance shows the distinct 'three-humped' character that now seemed audible as serious coloration, but which

I never normally find unduly intrusive.

Was the problem the return to '*bariks* after three months with the more conventional and/or less coloured? Was it the effect of the Mana table? Neither of these. The cones turned out to be the villains sabotaging the sound. Which isn't to imply that they may not work perfectly well under other circumstances, but which does mean that they shouldn't be taken for granted.

The return to the purpose designed Sound Factory stands was revelatory, not to say gob-smacking (*not again!* – JK). All the speed, timing and bounce came back into the system, to a degree I had never experienced before – and by the same token all the coloration seemed to have evaporated. Just like that.

The implications of this observation are far-reaching, though I can't pretend to have quite figured them all out yet. First and most obvious is that if the speed and timing of a system are good enough, then the colorations introduced by amplitude/frequency variations become relatively unimportant. It's a relationship I'm sure many are quite aware of, but I have never before experienced such a convincing demonstration – for which much credit is due to the remarkable speed and low coloration of the Mana.

Precisely what this 'speed factor' is, and why it should be so dramatically affected by the loudspeaker supports I cannot say. I suspect it may be tied more to phase/frequency than amplitude/frequency relationships, though the interrelationship between the two makes measuring either in isolation exceedingly difficult.

But to get back to the rat and the maze, with the '*bariks* set up properly I got on with the serious business of enjoying the Mana. The sound was a shade hard and edgy on some discs, but I suspected (quite correctly for

once) that this was due to a rather knackered *Troika* that Linn had lent me a month or two previously while servicing my old one. My *Troika* had needed a new stylus, so a brand new replacement cartridge was awaiting installation.

On the third day I was starting to get depressed by the sound, which seemed to have got harder, slower, and was 'splashing' to the left, so I (erroneously) changed cartridges. Yes, much of the hardness had gone, but so had the speed and timing, and images still pulled left. Three and a half sides (of gloom) later, at least some of the speed had returned. Yes, new cartridges need running in . . .

Very late that night I checked the '*bariks* on their stands, and found that the left one wasn't properly seated after all. Two minutes surgery with adjustable spanner and everything came right again – indeed better than before, thanks to the new cartridge which had now learnt how to 'boogie'.

Maybe I was starting to grow a pointy nose, whiskers and a tail too; this was all starting to get a bit obsessional. By nature I'm very reluctant to participate in the more arcane rituals of vinyl replay, and only wish LP was as easy as CD. But now I find myself removing the cover from the turntable simply because it sounds better that way, even if everything does get dusty. And since room temperatures are lowest in Spring (which this was) and Autumn, I've brought in an Anglepoise lamp to warm the vicinity of the cartridge. I give the stylus a quick scrape between each disc, just to save having to get up and do so in the middle of a side.

The punchline is that I'm not going to try and tell you what the Mana sounds like (not this month anyway). It's irrelevant; behaviourism tells the whole story. The electron-implanted experimental rat doesn't need

to know why it keeps pressing the button and starving to death, it just goes on pressing the button – just like I've been getting up and changing records, for about twelve hours of every day. I've just been through all four sides of Dylan's *Blonde on Blonde*, which is something I haven't done in more than a decade.

Something of the sort is a normal consequence of upgrading a component in any decent hi-fi system. Indeed, it's the most convincing *raison d'être* I know for getting stuck on the hi-fi escalator in the first place. But I haven't experienced such a startling improvement through changing a single component for a very long time indeed – and a *Sound Table* isn't a hi-fi component in the accepted understanding of the term.

Being a responsible sort I have to add the rider that it works in my Linn/Naim system, in a largish room with traditional suspended wooden floor, and may not turn the same trick elsewhere. (Right this moment the sound is threatening to demolish said room and precipitate subsidence, delivering quite astonishing in-phase bass out along the floorboards.)

Instead of merely going through a few old favourites and enjoying them afresh, I've started to work my way systematically through the whole collection. I won't pretend every single disc sounds better or nicer – the laying bare of recording studio practices rarely makes a pretty sound – but I haven't yet found one which doesn't reveal much more information about what the musicians and engineers were doing, and that's what really matters.

Just as the turntable is usually the limiting factor in the majority of serious hi-fi systems, the inescapable bottom line here is that the turntable is only as good as its support surface allows it to be.

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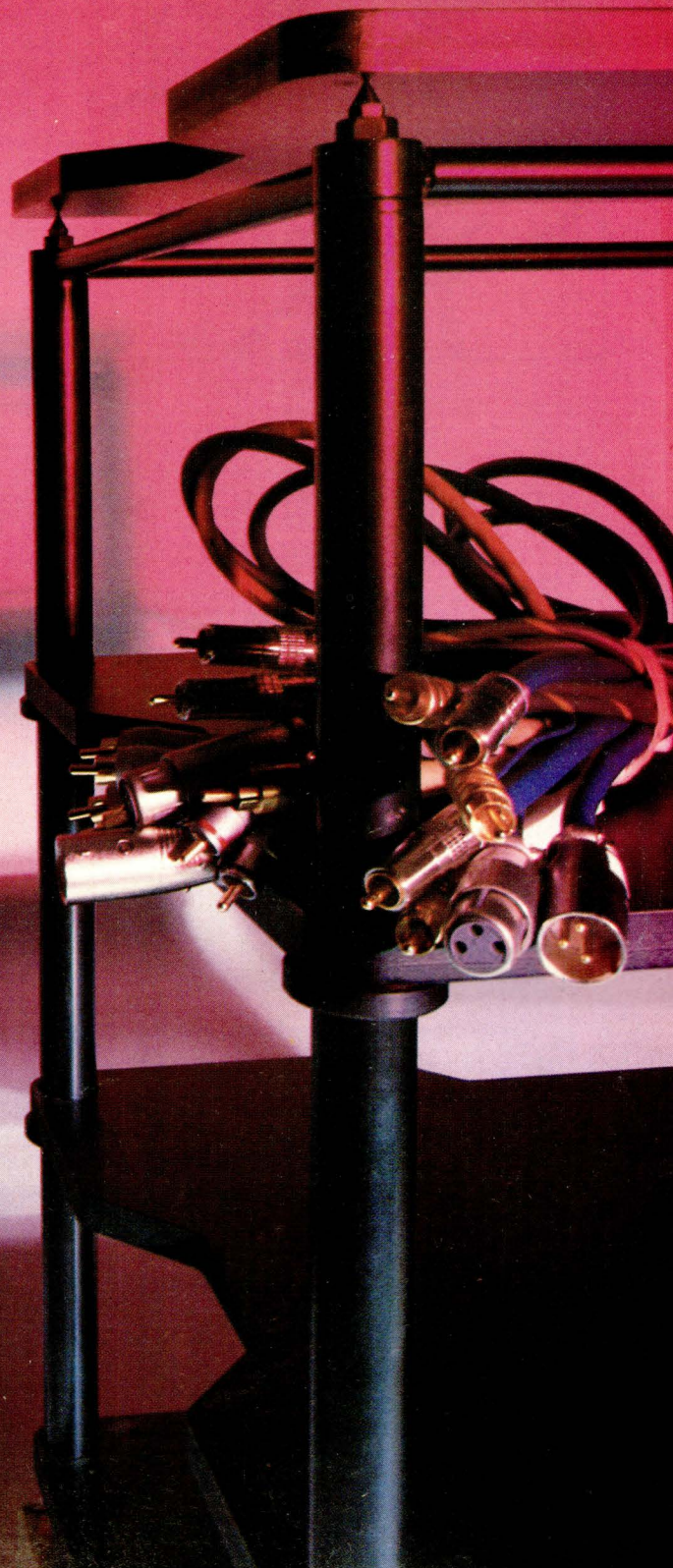
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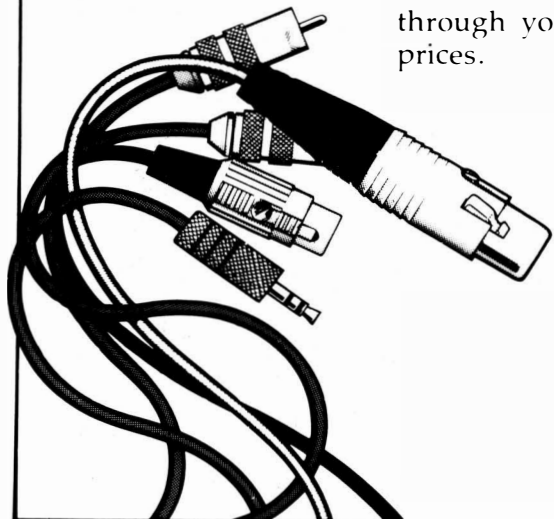
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Choosing and using... Cables and Stands

This month's brief overview of audio accessories concerns itself with the more important add-ons - the necessary accessories for all hi-fi systems.

At the beginning of the system 'chain', interconnect cable can have a significant influence on the performance of different CD players. On the one hand this may be a simple interaction of the cable's resistance, capacitance and inductance together with the output impedance of the player, the combination furnishing some form of crude filter.

However the characteristics of any cable are related to a wide variety of parameters. These include the purity of the conductor, nature of the insulating dielectric, mechanical construction, physical geometry, the radio frequency (RF) characteristics, level of screening and quality of termination (plugs).

Much the same is true of speaker cables which offer a similar blend of electrical and mechanical properties though are subject to a slightly different set of priorities. For instance, the resistance of a speaker cable may be particularly important, especially if lengths in excess of five metres are to be employed. Similarly, a cable with a high inductance can increase the total impedance of the cable/speaker system at high frequencies, resulting in a change of tonal balance.

Straightforward experimentation can often be the best route to successful system building as the interaction of amp, cable and speaker is occasionally very unpredictable. Much the same is true of speakers and speaker stands, though general rules of thumb - such as using Blu-Tak as a rigid coupling material with heavyweight stands - can generally be relied upon. The idea is to either couple both speaker and stand in a fashion that promotes some kind of unified structure or, alternatively, allow the stand to hold the speaker rigidly at low frequencies but allow higher frequency resonances to go unchecked. This can often be the case with light,

open frame stands equipped with upward-facing spikes.

Those readers interested in a more detailed thesis concerning the characteristics and testing of cables should refer back to Issues 59 and 64. To all intents and purposes the tests for this month's supplement remain the same, though with the addition of series resonant frequency, the series bandpass (or selectivity of the resultant 'tuned circuit') and surge characteristic impedance of the interconnects. This latter measurement gives some idea as to whether the cable is suitable for use as a 75ohm 'digital' interconnect - say between a CD player and outboard digital-to-analogue converter.

CABLES AND STANDS ARE AN ESSENTIAL PART OF EVERY HI-FI SYSTEM. PAUL MILLER OUTLINES THE BACKGROUND TO THE TESTS FOR THIS MONTH'S SUPPLEMENT.

The mechanical excitation of the loudspeaker stands also follows a common theme (see Issue 58), though the stability and decay of resonances in the speaker baffle are now measured directly. This gives an indication of how the

drivers' frames are modulated by sustained resonances, though the effect is, to a degree, specific to the Wharfedale 505s used for the tests.

By contrast the assessment of resonances within the structure of equipment supports has evolved considerably. In this instance each support was excited with a pseudo-random noise via its base, the exact level and distribution of noise being confirmed at each of the three or four spikes. Subsequently the range and distribution of energy reaching the top-plate of the support (loaded with 5kg) was monitored and the difference between that at the base of the structure recorded.

This method therefore gives a direct indication of which frequencies (vibrations) are either attenuated or liable to excite resonances within the structure of the support. These characteristic resonances can then be linked to specific areas of instability in the partnering turntable, for instance. Direct objective/subjective correlation is possible using this technique.

Paul Miller

Audio Spec Latitude L4

AUDIO DIMENSIONS, 506 UPPER NEWTOWNARDS ROAD, BELFAST BT4 3HB. TEL: (0232) 655135

Manufactured by the Vantage Source Corp in Canada and imported into the UK via Audio Dimensions, this basic but competent cable is still very reasonably priced. In material and constructional terms 'L4' is not exactly state-of-the-art but at least the figure-of-eight winding infers a degree of shielding from EM and RF interference.

Two pairs of multi-strand conductors are employed, each insulated in a colour-coded hard PVC dielectric. The copper itself is of fine-crystal electrolytic-grade stock, not LC or PC for instance.

No directional inclination is suggested and, if purchased off the reel, the wire is easily stripped for termination. Because of the close weave of the cable its series inductance (and therefore total high frequency impedance) is kept usefully low - implying that little frequency imbalance will be detected over long cable runs. On the other hand its correspondingly high-ish 833pF/5m capacitance contributes to a relatively low RF resonant frequency of 4.8MHz, which is not so good.

Similarly the parallel leakage of the cable also deteriorates, though the low DC resistance maintains an equally low 0.08dB power loss (into 8ohm). Subject to the mechanical impulse test the charge migration settled relatively quickly (4-5msecs) considering the dielectric absorption usually associated with a PVC insulator. Several components were isolated, the most prominent being a -100/+67mV resonance centred close to 1.5kHz with lower modulating components from 250Hz-850Hz.

Possessing a similar overall character to Kimber 4VS, Audio Spec L4 still managed to introduce a little extra weight and plumpiness to strong bass notes. It was certainly not quite as fresh and transparent as the Furukawa FS-2F09 but warmer and ruddier instead. Furthermore there was some muddying of upper bass detail, particularly during louder, more complex orchestral passages.

Quieter and more delicate pieces of music were not affected in the same fashion; here a very slight restriction in treble 'air' was noted. Still the background was always very dark, almost 'damped', so the finest treble details were preserved. Overall then, L4 proved to be a competent and personable all-rounder despite it losing the transparency and lucidity of competing designs such as Mission's *Cyrus* and Audioquest's *BC4*. Not Best Buy material but Recommended nonetheless.

Deltec Black Sixteen

DELTEC LTD, UNIT 7, EAST MOORS BUSINESS PARK, EAST MOORS ROAD, CARDIFF CF1 5EG. TEL: (0222) 482818

In tandem with the improvements wrought to Deltec's *Black Slink* interconnect (see page 8), similar changes have been effected to the matching *Black Sixteen* speaker cable. The overall topology of the cable has not been radically altered, only the choice of PTFE dielectric has been up-rated. So, *Black Sixteen* still employs a total of 16x0.6mm silver-plated OF copper strands per conductor but each of these strands is now insulated in a colour-coded Gore-tex dielectric.

The strands are wound very tightly yet in a fashion that minimises contact area, the symmetrical signal and return 'halves' of the cable mounted side-by-side and wrapped in several layers of fine Gore-tex tape. The thick layer of moulded polyethylene that is used to clamp these cores has been omitted in this version of the cable, a choice not without side-effects. For example the closer proximity of the two cores has nearly doubled the parallel capacitance of *Black Slink* to 301pF/5m while reducing the calculated RF resonant frequency to 5.9MHz. Fortunately the DC resistance and reactive impedance of the cable is still very low, ensuring a low 0.04dB power loss, high 208 damping factor (vs 8ohm) and very selective resonant bandwidth of just 2.5kHz. Hawk-eyed enthusiasts may also note that the parallel leakage has deteriorated to 66Mohm, though this appears to be related to the solder flux migrating within the lockable WBT 4mm plugs.

The effect of this tighter winding and sheathing is also reflected in the impulse response - a clear improvement over that of the older *Black Sixteen*. In this instance the charge migration is exceptionally rapid (+90mV @ 1.5kHz), the minimal dielectric absorption of Gore-tex PTFE shown by the fast 1.3msec settling time. Lower frequency components are evident around 300Hz, probably as a result of the flexure in the high-gloss polyurethane jacket.

Regular readers will remember this as the cable used during our amplifier tests. Re-auditioned for this survey it demonstrated the virtues of power, a tight control over dynamics, neutrality and transparency. Once again it came closest to the sound of 'no cable at all'. Further discussion of its subjective merits is almost superfluous for these are overtaken by the repercussions of the partnering amp and speakers. What it will not do is act as a sympathetic buffer between the two; *Black Sixteen* cannot disguise the faults of amp or speaker with colorations of its own!

TEST RESULTS	
5M LOOP:	
Inductance	1.3µH
Capacitance	832.6pF
Resistance	75.7mohm
Leakage	7.65Mohm
Q-Factor (@ 1kHz)	27.9
Resonant Frequency	4.838MHz
Series Bandpass	9.268kHz
Power Loss	0.082dB
Damping Factor	105.7
Price per metre	£3

TEST RESULTS	
5M LOOP:	
Inductance	2.4µH
Capacitance	300.5pF
Resistance	38.5mohm
Leakage	65.9Mohm
Q-Factor (@ 1kHz)	>100
Resonant Frequency	5.926MHz
Series Bandpass	2.553kHz
Power Loss	0.042dB
Damping Factor	207.8
Price (4.5m terminated pair)	£528

Furukawa FS-2F09

QUANTUM AUDIO LTD., 22-26 NELSON ST.,
KILMARNOCK KA1 1BA. TEL: (0563) 71122

The Furukawa Electric Company has long been involved in the manufacture of bars, billets, strips and cakes of copper and copper alloys for associated specialist industries. More recently it has undertaken considerable research into all aspects of cable design, much of it pertaining to the audio industry. This has culminated in a joint study with Prof. Ohno of the Chiba Institute of Technology towards the mass production of PC OCC copper ingots of extended length.

PC OCC (Perfect Crystal by Ohno Continuous Casting) describes a manufacturing process in which the die temperature and drawing speed is carefully adjusted to precipitate uni-directional crystal growth. It is quite possible to draw out a single crystal wire some tens of metres long by this technique, avoiding the deleterious effects of lattice deformities and interstitial impurities found in 'ordinary' OF or LC-OF copper.

Imported by Quantum Audio, FS-2F09 is Furukawa's cheapest and simplest speaker cable. Two multi-strand PC OCC conductors are employed within a fairly flat, soft blue PVC dielectric, the spacing of the conductors reducing the parallel capacitance down to 158pF/5m but increasing the inductance to 5.4µH. This together with the 209mohm 5m loop resistance adds up to a total inductive impedance of 0.71ohm at 20kHz - longer cable lengths could produce an audible change in the speaker's frequency response. Power loss and damping are also affected though the physical spacing of the conductors does tend to reduce microphony.

This cable was capable of maintaining a very fresh, open and uncluttered sound that was quite free of annoying compression or thickness. The high-ish resistance tended to reduce the subjective impact and depth of bass transients yet this hint of leanness was not traded for any loss of lucidity and articulation. Indeed bass notes generally sounded pleasantly quick and focused. More importantly the mid and treble revived much of the music's air and ambience, factors that tend to reduce discomfort when listening over long periods. However, in common with other PC-OCC cables, the FS-2F09 did demonstrate some directional inclination, sounding slightly sharper but brighter running head-to-toe. There was almost always the merest - and I mean merest - hint of frostiness in the treble but this was easily forgiven in view of its poise and refinement when handling very quiet, delicate passages. Certainly worth a try over short (<5m) runs.

TEST RESULTS	
5M LOOP:	
Inductance	5.4µH
Capacitance	58.2pF
Resistance	209mohm
Leakage	30.1Mohm
Q-Factor (@ 1kHz)	21.1
Resonant Frequency	5.445MHz
Series Bandpass	6.160kHz
Power Loss	0.224dB
Damping Factor	38.28
Price per metre	£6

Furukawa FS-2T15S

QUANTUM AUDIO LTD., 22-26 NELSON ST.,
KILMARNOCK KA1 1BA. TEL: (0563) 71122

The second Furukawa cable in this test occupies the top slot in their catalogue, for though its construction is simple enough the conductors are composed of Super PC OCC copper. Distinct from ordinary PC OCC copper, which goes on to be reworked or drawn to size, Super PC OCC is cast to the desired cross-sectional area directly from the heated mould. 6N purity (99.9999 per cent Cu) is achieved currently, though 7N copper (99.99999 per cent) will soon be available.

FS-2T15S utilises a single 1.5mm Super PC OCC copper strand for each of the signal and return paths, thereby avoiding the problems of RF interference caused by non-linear conduction across the surface of a multiple-strand cable. These cores are insulated in a hard polypropylene dielectric and separated in a flexible, green-coloured cross-linked PVC jacket. Stripping and termination could not be simpler! The symmetrical, tightly clamped construction of the cable infers a gratifyingly low level of microphony (just +32.6/-45mV). However the inferior dielectric properties of polypropylene and cross-linked PVC (as compared to PTFE for example) results in a low-level but protracted charge migration, components as high as 4kHz (-71dBV) being isolated from the spectrum.

The standard electrical parameters are just satisfactory for a 5m loop. With its total resistance of 102mohm giving rise to an 8ohm power loss of 0.11dB and damping factor of 78, I would advise against longer cable runs. Still, the reactive component of the cable's impedance is an acceptable 0.34ohm at 20kHz even if the selectivity of the cable near its RF resonance is a little broader than the best cables.

In certain respects this cable resembled Musical Fidelity's solid-core PC-OCC derivative (*Lifeline*) yet, subjectively at least, the Furukawa possessed a worthwhile edge. Either way, there was certainly a greater sense of articulation, precision and general facility about the sound when compared to the multi-strand FS-2F09 cable. Bass notes were not quite as full as they were with Deltec's cable but they enjoyed an excellent sense of solidity and definition. Similarly the mid and treble were very open, with highly resolved details. This was a very musical cable, open fresh and responsive to the natural ebb and flow of the music. There was little or no compression or thickening to confuse the interplay of individual instruments while the treble remained starkly accurate without sounding unforgiving or clinical. Highly Recommended for runs under 5m.

TEST RESULTS	
5M LOOP:	
Inductance	2.7µH
Capacitance	390.0pF
Resistance	102mohm
Leakage	40.6Mohm
Q-Factor (@ 1kHz)	63.5
Resonant Frequency	4.905MHz
Series Bandpass	6.013kHz
Power Loss	0.110dB
Damping Factor	78.43
Price per metre	£50

Kimber Kable 4VS

RATA, EDGE BANK HOUSE, SKELSMERGH, KENDAL,
CUMBRIA LA8 9AS. TEL: (0539) 83247

Distributed by RATA in the UK, the US range of Kimber Kable adopts a theme of gradual technical improvement from one cable to the next. Superficially there might not seem to be much difference between the cheapest cable (4PR) and a costlier version such as 4TC, as all the cables adopt a multi-conductor open-weave topology for improved rejection of EM and RF interference. In fact the real differences between the various cables lies in the materials used in their construction.

Take 4VS as an example. This cable uses the same high grade copper as 4TC but without the proprietary surface coating. Yet, unlike the cheaper 4PR, 4VS does employ a total of seven unequal diameter strands per insulated conductor, there being a total of eight conductors catering for the signal and return paths. A colour-coded PVC dielectric avoids confusion when stripping and making up the cable while also distinguishing the likes of 4VS from 4PR, for instance.

Technically 4VS has the low inductance, resistance and high frequency reactance of the costlier 4TC but its inferior dielectric gives rise to the high parallel capacitance and poor leakage figure typical of 4PR. As a further consequence the calculated RF resonant frequency is fairly low at 4.8MHz while the relatively wide 12.7kHz series bandpass implies an equally wide selectivity. Once again, subject to the impulse test this cable incurred a fast charge migration (+136/-218mV) in the 900Hz region followed by a more protracted 14msec decay due to dielectric absorption (around 250Hz).

Though not as smooth sounding nor as richly detailed as Kimber's PTFE-insulated 4TC cable, these lengths of cheaper 4VS still put in a creditable performance. There was a faint loss of stereo focus in the bass while the upper midrange was rendered slightly 'tizzy', yet the far treble was neither glassy nor objectionably bright. Otherwise the sound was comfortably, if not entirely neutrally, balanced and suffered no glaring 'nasties'. This is all par for the course at this price level where some masking of low level detail and/or subtle loss of integration is to be expected.

However, Kimber's 4PR is not to the sub-£10 sector what 4TC is to the sub-£50 price bracket. Indeed with cables such as the Mission *Cyrus*, Audioquest *BC-4*, Deltec *4S* and Audio Spec *L4* on its tail, Kimber 4VS begins to look less competitive. It's worth considering though, particularly for in-car audio applications.

TEST RESULTS

5M LOOP:

Inductance	1.1uH
Capacitance	992.6pF
Resistance	87.9mohm
Leakage	9.85Mohm
Q-Factor (@ 1kHz)	35.5
Resonant Frequency	4.817MHz
Series Bandpass	12.72kHz
Power Loss	0.095dB
Damping Factor	91.01
Price per metre	£7.15

Monster SCI 16-4

ZENONLEC, FOURBURY HOUSE, 36 VICTORIA
ROAD, MORTIMER, NR. READING RG7 3SG. TEL:
(0734) 333636

Contrasting with Monster's traditional clear 'n' chunky multi-strand speaker cables, *SCI 16-4* trades a little brute force for simplicity and flexibility of design. *SCI* actually stands for Standard Custom Installers, a clumsy name for a series of cables conceived for in-car and multi-room wiring.

At its most useful, *SCI 16-4* functions as a single cable capable of feeding two separate loudspeakers or one fully bi-wired speaker. This is achieved by using 4 independent 16-gauge conductors, each composed of 139 fine OF copper strands insulated in a soft PVC dielectric. A soft white Duraflex jacket encloses the four conductors. Each conductor is colour coded for signal right/return right and signal left/return left. Nevertheless do take care when wiring up an amp with this cable. A wrong connection could prove expensive!

A cheaper two-conductor version called *SCI 16-2* is also available though it is just as easy to combine the four conductors of *SCI 16-4* into a twisted pair for conventional use - at least the resistance would be halved from 175mohm to 88mohm and the power loss reduced from 0.188dB to 0.095dB for a 5m loop. The inferior dielectric stability of the Duraflex insulation is reflected in the 4.2Mohm leakage and low audioband Q of 17.5, while the moderate capacitance and inductance give rise to a low calculated RF resonant frequency of 3.7MHz. The selectivity at resonance would also be sharpened up by pairing up two of the internal conductors as previously suggested.

Either way, I was pleased to hear little of the thickening and congestion that had characterised some of Monster's earlier cables, though this unusual derivative still lacked some resolution throughout the lower midband and bass. Upper midrange and lower treble details were more starkly defined by comparison, possessing a better sense of tactility and stereo focus - improved fluidity and freedom in fact. Gritty colourations were not as prominent as I might have expected, which is a good point, so the slight discontinuity in balance between the upper and lower octaves was a little surprising.

Some improvement in the solidity and 'clout' of the music was achieved by twisting each four-core cable into two pairs of conductors, though the subjective benefits of added transparency and greater depth were on a par with the effects of bi-wiring itself! Recommended more for its diverse application than ultimate sound quality.

TEST RESULTS

5M LOOP:

Inductance	2.8uH
Capacitance	674.5pF
Resistance	175mohm
Leakage	4.15Mohm
Q-Factor (@ 1kHz)	17.5
Resonant Frequency	3.662MHz
Series Bandpass	9.947kHz
Power Loss	0.188dB
Damping Factor	45.71
Price per metre	£2.50

Isoda Electric HC-05

ROKSAN ENGINEERING LTD., 21 DDOLE ROAD,
LLANDRINDOD WELLS, POWYS LD1 6DF.
TEL: (0597) 4911

Available through Roksan Engineering, Isoda Electric's latest interconnect cable utilises a very novel hybrid construction. Hybrid in this instance refers not to the actual topology of the interconnect, which is wholly symmetrical, but to the choice of conductor material. Specifically, *HC-05-PSR* utilises some nine individual strands per conductor, one conductor being used for signal, the other for return together with a tinned screening braid that is terminated at both ends of the cable.

Each conductor is made up of 0.1mm and 0.2mm diameter strands drawn from copper-clad aluminium and a copper-zinc (brass) alloy instead of pure copper. The use of Group IIB and IIIB elements such as zinc and aluminium is unusual (copper, silver and gold are all Group IB metals), though copper-cladding will greatly enhance the stability of the aluminium. These alternative metals do not possess quite the conductivity of pure copper, and together with the relatively small cross-sectional area of each conductor this pushes the total series resistance up to 273mohm.

Capacitance and inductance are also quite high which leads to a low 14.8MHz RF resonant frequency and, together with the high resistance, a broad selectivity implied by the wide 90.5kHz bandwidth. Some dielectric instability is also suggested by the low 9.3Mohm leakage and audioband Q-factor of just 15. Nevertheless, the mechanical impulse resulted in a very symmetrical low frequency charge migration (+30.3/-36.1mV @ 610Hz) with a slightly prolonged 7msec settling time. The frequency domain spectrum revealed other components at 1.5kHz (-62dBV) and 5kHz (-84dBV) but very little spurious HF noise was recorded above 8kHz or so - not a bad result.

Subjectively too, this new Isoda design fared surprisingly well. It proved to be a pleasantly balanced cable, offering some of the liveliness of the Monster coupled with a measure of the free, fluid and gentle dexterity exposed by the YFERE. There was a very gentle softening of midband sounds, whether strings or vocals. This did not extend to a modification of the instrument's natural timbre but just veiled the subtlest musical inflections. So, though not wholly transparent, neither was the sound obviously compressed or clouded in any way - this is an important distinction for it explains the very easy-going and strain-free character of the cable.

TEST RESULTS

1M LOOP:

Inductance	0.48µH
Capacitance	240.5pF
Resistance	273mohm
Leakage	9.3Mohm
Q-Factor (@ 1kHz)	15
Resonant Frequency	14.81MHz
Series Bandpass	90.52kHz
Characteristic Impedance	44.68ohm
Price (1m terminated pair)	£49.95

Monster Interlink 300

ZENONLEC, FOURBURY HOUSE, 36 VICTORIA
ROAD, MORTIMER, NR. READING RG7 3SG.
TEL: (0734) 333636

Cheapest of Monster's *Interlink* series, the 300 has actually been available for some two years now. It's an attractive-looking cable equipped with blue Duraflex insulation and robust gold-plated phono plugs. In this respect it is similar to *Interlink 400*, but the 300 lacks the patented multiple-gauge stranding network which distinguishes the costlier interconnect.

In this instance about ten mildly flattened copper strands (each with an equal cross-sectional area) are woven about a micro-fibre core that lies at the centre of each signal and return conductor. The weave is Litz-like in construction though the topology of the finished product is wholly symmetrical. Additionally, Monster has provided the cable with a foil screen and uninsulated drain wire which is terminated at the source-end of this directional interconnect. The preferred inclination of the cable is marked on the outer jacket. I should also mention that Monster produces a dual-screened version called *Interlink 301* specifically for in-car use.

Interlink 300 might have been suitable as a digital interconnect even though the 63ohm characteristic impedance is a little low, but the cable's low RF resonant frequency throws a spanner in the works. At 16.8MHz with a broad 78.5kHz bandpass, this sits squarely on the 3rd harmonic of the CD Bit Rate of 5.65MHz! Leakage and audioband Q-factor are both fine but a large -29.9mV low frequency charge migration (140-240Hz) was prompted by the impulse test. The spurious output declined by 35dB from 750Hz to 7kHz (-103dBV) while full settling was achieved some 4.7msecs after triggering.

Monster's slightly undersized phono collars ensure a snug fit over standard phono-sockets, but do not tug too hard when removing the leads. Once connected the sound of this cable was comparable to that of *Supra EFF* in that it shared a faint grittiness about the treble, yet in terms of projection it was subjectively bigger, more lively and somehow 'louder'. The unnatural warmth and dynamic compression of Monster's earlier cables has diminished, though the 300 is not wholly balanced, preferring to lay some minor emphasis on harder upper-midband sounds at the expense of bass weight and impact. Furthermore it just failed to capture the emotive ebb and flow of the music, appearing slightly constricted or processed. At marginally greater cost *Interlink 400* represents better value.

TEST RESULTS

1M LOOP:

Inductance	0.60µH
Capacitance	150.1pF
Resistance	296mohm
Leakage	>350Mohm
Q-Factor (@ 1kHz)	>100
Resonant Frequency	16.77MHz
Series Bandpass	78.52kHz
Characteristic Impedance	63.22ohm
Price (1m terminated pair)	£22

Supra EFF-1

GAMEPATH LTD., 25 HEATHFIELD, STACEY BUSHES, MILTON KEYNES MK12 6HR. TEL: (0908) 317707

Hailing from Sweden the Supra range of cables is distributed in the UK by Gamepath, of Rotel fame. The latest addition to the range is the EFF-1 interconnect, a chunky cable finished off with a light blue/grey PVC jacket and basic quality gold-plated phono plugs.

Once again a wholly symmetrical topology has been chosen with matching signal and return conductors, each surrounded by an independent foil screen which is grounded via a drain wire at one end. This is the source-end of the interconnect if we assume the 'Supra EFF' printing runs from source-to-destination along the jacket.

The two principal conductors are composed of silver-plated OF (oxygen free) copper strands that are wound in a helical fashion around a centre-core of hard PVC. This technique is used by other manufacturers, such as Audioquest, to maximise conductor area while minimising strand-to-strand contact.

Unfortunately the high 451pF parallel capacitance and weak 9Mohm leakage figure imply some sort of dielectric instability, a factor also reflected in the low (calculated) RF resonant frequency of 9.8MHz. Fortunately the low 65mohm loop resistance improves the Q and selectivity of this resonance, reducing the chances of RF intermodulation. Either way, Supra EFF-1 is total unsuited to duty as a digital interconnect.

More worrying was its complex reaction to the mechanical impulse test, the initial 1.2msecs including signals between 1.8kHz-8.5kHz with peaks occurring at +29mV and -42.8mV. Transposing the time domain plot into the frequency domain revealed an extended output from 380Hz to 14kHz across a 66dB range, which is unusually messy in my experience.

Unlike Supra's loudspeaker cables, which generally impart a somewhat warmer and fuller balance, these interconnects tended to highlight the grittiness of recordings. Plucked strings had an artificially edgy 'feel' about them while the texture of subtle brush strokes was just a little smeared. These were very minor colorations in the light of those imposed by CD players and amps for instance but were nevertheless audible under critical conditions.

Spatially too, Supra EFF-1 was found wanting, tending to compress front-to-back dynamics and somehow reduce the emotional impact of a piece of music. All these discrepancies are most probably linked to the poor mechanical and dielectric stability of the cable which, even at its off-roll price of £15/mono metre is a trifle expensive.

TEST RESULTS

1M LOOP:	
Inductance	0.59µH
Capacitance	450.6pF
Resistance	65mohm
Leakage	9.2Mohm
Q-Factor (@ 1kHz)	20 Resonant
Frequency	9.761MHz
Series Bandpass	17.53kHz
Characteristic Impedance	36.19ohm
Price (0.75m terminated pair)	£60

YFERE LC-OFC Quad

QUANTUM AUDIO LTD., 22-26 NELSON STREET, KILMARNOCK KA1 1BA. TEL: (0563) 71122

These oddly-named interconnects are part of a range consisting of two and four-conductor cables utilising either LC-OFC or PC-OCC copper strands. YFERE ('a friend') is simply a UK tradename, the cables are actually sourced from a Japanese company along with a range of matching accessories such as plugs, 'tip-tops' and damping pads which hail under the equally bizarre name of YBLENT.

As its name suggests this particular derivative utilises four independent cores of polyethylene-insulated LC-OF copper, two catering for signal and two for return. The cores are wound in a star-quad array while added shielding is provided by a peripheral LC-OFC braid terminated at the source end of the cable. Directionality is marked by a small white band at one end of the cable. An attractive soft red PVC outer jacket encloses the cable which is also equipped with high quality gold-plated phono plugs, a substantial outer collar clamping its constituent parts into place. YBLENT silver solder is used throughout while for an extra £5 the distributor can supply a PC-OCC version of the cable.

Technically this is a fine cable, offering a moderate capacitance and inductance, a suitably low 1m loop resistance of 74mohm and a selective bandpass of just 32kHz about its 20MHz resonant frequency. Nevertheless its surge characteristic impedance is sufficiently low to preclude it for use as a digital interconnect. Subject to the impulse test this YFERE cable gave rise to an initial, moderate output in the 2-2.5kHz region (+7.05mV) with a subsequent lower frequency settling migration in the 330-380Hz region (-6.7mV). Microphony is therefore acceptably low.

An immediate improvement in poise, refinement and general smoothness of treble detail was evident upon swapping the latter Supra cable for YFERE's interconnect. Moreover the soundstage took on a more three-dimensional aspect, instruments enjoying a greater sense of focus and proportion, surrounded by a convincing sense of space.

The sound was open, fresh and free but a very faint plumminess in the lowest octaves distinguished it from Deltec's Black Slink which was the more neutral and refined of the two. This said, YFERE's LC-OFC Quad came closer than many of the hundred or so interconnects in my collection to the transparent and highly musical standard set by the costlier Deltec cable. An excellent buy at this price - I hope to report on the PC-OCC version very soon.

TEST RESULTS

1M LOOP:	
Inductance	0.37µH
Capacitance	169.7pF
Resistance	74mohm
Leakage	235Mohm
Q-Factor (@ 1kHz)	>100
Resonant Frequency	20.09MHz
Series Bandpass	31.83kHz
Characteristic Impedance	46.69ohm
Price (1m terminated pair)	£85

Chord Mono-t

THE CHORD COMPANY, 19 ST MARKS ROAD,
SALISBURY, WILTSHIRE, S91 3AY. TEL: (0722) 331674

With five and a half years production now behind the company, Chord has amassed a comprehensive range of interconnects. The same basic four-conductor cable (similar to a microphone cable) is employed throughout the range but is implemented to suit various applications. Everything from five-pin DIN/four-phono to a quarter-inch jack socket/4x4mm banana connections are catered for by this method.

The *Mono-t* phono-to-phono interconnect sits near the top of the range and is distinguished by, among other things, its Tiffany-lookalike plugs which are actually sourced through Tremiver in the UK. The cable is made up of four standard quality multistrand cores, each individually insulated in a soft PVC dielectric and surrounded by a copper screening braid. A grey PVC sleeve clamps the conductors and is covered in a yellow heat-shrink tubing, with a black band to denote the directional inclination of the finished cable.

However, if only as a matter of expedience, Chord has chosen to adopt an unsymmetrical topology with only one central conductor used for signal and the braid acting as return. Hence the high DC loop resistance of 337mohm which, in conjunction with the low 0.28µH series inductance, results in a broad -3dB bandpass of 192kHz about the 32MHz resonant frequency.

This interconnect is therefore less selective than many others so could be more sensitive to RF interference. But at least the leakage figure is exemplary - a testament to Chord's soldering - while the parallel capacitance is usefully low. The impulse test revealed a fairly symmetrical charge migration and showed two distinct resonances in the cable's structure at 875Hz and 1.5kHz, a 'ricochet' being evident some 5.8msecs after triggering.

Subjectively the cable offered a marginally warmer and perhaps more approachable balance than many in this test. Yet this was a temporary illusion, the true nature of the cable manifesting as a subtle shelving of very high frequency detail, reducing the sense of space and airiness surrounding for instance the delicate patter of percussion. Fortunately there was little 'thickening' of the sound despite its mildly rich balance, though a hint of modulation or blooming of instruments was still apparent with more complex passages.

In general terms the cables are certainly neatly put together, and reasonably priced, although in terms of geometry, material content and overall subjective prowess they are unpretentious in design. Certainly a step up from the average high resistance, unsymmetrical budget interconnect but not quite as fresh and transparent sounding as more expensive contenders such as *Isoda*.

TEST RESULTS

1M LOOP:	
Inductance	0.28µH
Capacitance	87.5pF
Resistance	337mohm
Leakage	>350Mohm
Q-Factor (@ 1kHz)	>100
Resonant Frequency	32.15MHz
Series Bandpass	191.6kHz
Characteristic Impedance	56.57ohm
Price (1.2m terminated pair)	£27

Deltec Black Slink Gore-tex

DELTEC LTD., UNIT 7, EAST MOORS BUSINESS
PARK, EAST MOORS ROAD, CARDIFF CF1 5EG.
TEL: (0222) 482818

Choice's first cable reviews featured the original *Black Slink* interconnect - the forefather of today's flexible *Black Slink* with Gore-tex dielectric. Gore-tex is the tradename of a superior PTFE insulator which incorporates a large proportion of air, thus improving its dielectric stability over conventional solid PTFE or Teflon.

The general construction of *Black Slink* remains the same, with 8x0.4mm silver-plated OFC strands for both signal and return though now each strand is insulated with Gore-tex dielectric. A 1mm Gore-tex tape replaces the 3mm heat-shrunk polyethylene jacket used before, this 94 per cent air-spaced/6 per cent PTFE dielectric also inferring greater mechanical flexibility. However, increased 'bendability' has been gained at the expense of increased capacitance and microphony, the very low charge migration of original 'stiff' *Black Slink* increasing by a factor of about 10x.

The latest result shows an impulse reaction of lower frequency (165Hz instead of 2.1kHz) with all spurious output above 1.7kHz reduced to 120dBV or more, a fabulous result. Further improvements have been wrought by annealing the conductors at 200 degrees centigrade for ten hours to remove any residual irregularities in the metal's crystal lattice. A balanced screening braid is applied around the taped conductors to offer maximum rejection of RF noise around 10MHz (97per cent), though the calculated series-resonant frequency of the cable itself is closer to 21MHz. This is close to the 4th harmonic of the I²S (CD) Bit Rate but, fortunately, the very narrow bandwidth of this resonance makes it highly selective. On the other hand, the 59ohm characteristic impedance of Gore-tex *Black Slink* makes it unsuitable for use as a digital interconnect anyway.

Complete with chunky WBT phonos, these revised *Black Slink* interconnects promoted a slightly smoother, quieter and yet a subtly more detailed sound than had the original version of the cable. Its deeper, weightier bass was also a function of the reduced absorption offered by Gore-tex dielectric which led to this marginally richer balance.

However, the true magnitude of the differences between 'old' and 'new' *Black Slink*, while not vast, were still more significant than those between the matching *Black Sixteen* speaker cables. As a result I have been quite content to install Gore-tex *Black Slink* in my own system as a new 'reference' quality interconnect. Confidently Recommended.

TEST RESULTS

1M LOOP:	
Inductance	0.45µH
Capacitance	130.5pF
Resistance	45mohm
Leakage	265Mohm
Q-Factor (@ 1kHz)	>100
Resonant Frequency	20.77MHz
Series Bandpass	15.92kHz
Characteristic Impedance	58.72ohm
Price (1m terminated pair)	£152

Alphason New Concept R355

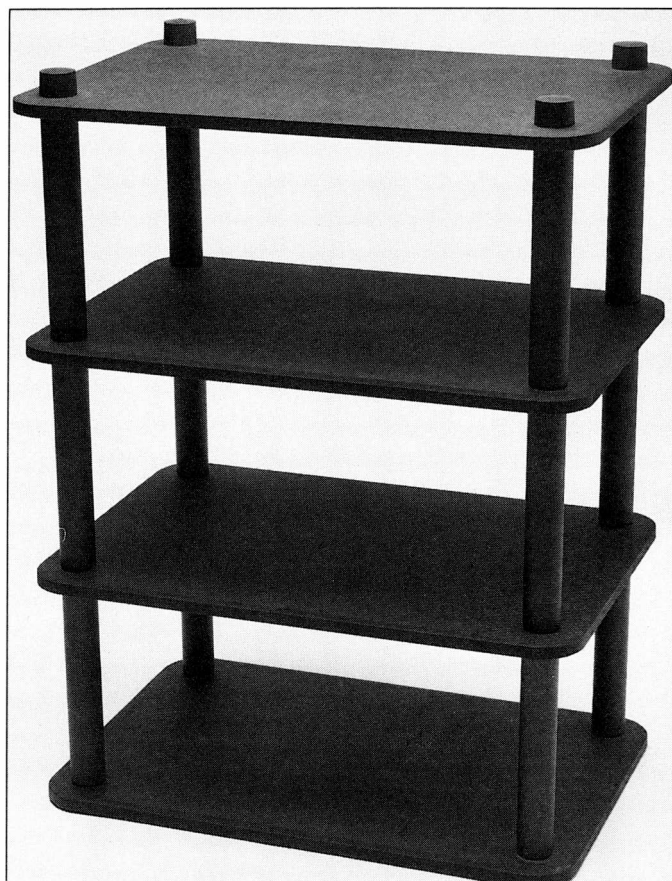
ALPHASON DESIGNS LTD., UNIT 2, LINSTOCK WAY, WIGAN RD., ATHERTON, LANCS M29 0RL. TEL: (0942) 897308

Alphason nailed its corporate colours to the 'high-mass' flagpole with the introduction of the heavyweight *Sonata* turntable. This general disdain for lightweight structures is reflected in the new Alphason equipment rack which, with all four shelves in place, clocks in around 21kg!

This massive frame is based around four uprights, each fashioned from 32mm diameter mild steel tubing and enclosing an 8mm steel rod which is kept under tension via nuts located on the top and base of the stand. The corners of each 18mm MDF shelf include a circular cut-out which accommodates each of the four uprights together with their steel

tensing rods. The structure is then pre-stressed by tightening the rods, the cantilever effect altering the coupling between shelf and frame in a fashion that, hopefully, unifies the entire structure. The stiffness of the MDF shelves is certainly improved judging by the well-defined bending resonance located at a relatively high 85Hz but there are also some related products at 150-170Hz to deal with. Anyway, filling the columns with sand certainly increases the mass and helps damp any high-Q ringing modes in the steel frame.

While the hard textured skin of Alphason's equipment rack hardly compliments the wood and



gold-anodising of its *Sonata* turntable, its resonant performance certainly does. Previous tests have demonstrated that the *Sonata* is most sensitive to vibrations in the 450-600Hz range, a region of little activity as far as the table is concerned. As a consequence the two proved very compatible, the turntable sounding very lucid, transparent and 'free' of compressive colorations.

This said, the broad 5Hz-100Hz output, though

offering an absolute rejection of 9dB, was slightly more persistent than many of the other tables. Perhaps as a result the Alphason rack was less successful with low-mass high-rigidity turntables such as the Pink Triangle *PT TOO* which tended to sound a little bloated or diffuse throughout the bass. Most CD players, on the other hand, seemed to fare very well indeed. As a result this ungainly table, which offers plenty of lbs per £, comes Recommended.

TEST RESULTS

Topboard Area	600x395mm
Overall Height	820mm
Spikes, top base	None Adjustable
Resonant Behaviour	V.Good
Finish	Good
Value	V.Good
Typical retail price	£99

Foundation Stable Table

FOUNDATION AUDIO, 9 DERWENT RD., LEVERSTOCK GREEN, HEMEL HEMPSTEAD, HERTS HP2 4PH. TEL: (0442) 236000

Hailing from the manufacturer which brought us lead and sand-filled speaker stands comes a modest range of equipment tables and shelves. The so-called *Stable Table* was apparently conceived with the Linn *LP12* turntable in

mind and closely resembles the Stand Design *Duplex* stand in its design.

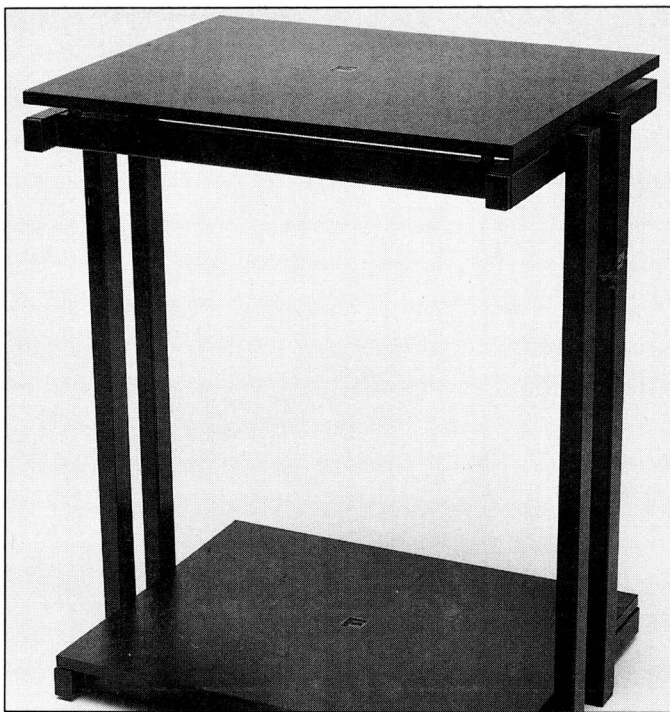
The *Stable Table* is constructed from welded 21x31mm rectangular section steel tubing, finished in a durable black coating and terminated with black plastic

end caps. Two vertical tubes are used on each side of the structure which uses the same rectangular frame for the top as it does the base. Inverted spikes are provided to support the top and base boards while the entire structure stands on four, longer steel spikes.

In this instance we were supplied with the optional £20 *Super Board* - a 13mm chipboard slab with wide grooves machined out of the underside surface. *Super Board* or no, Foundation's table was not quite as 'stable' as perhaps it might have been. The lightweight top-board appears responsible for the bending modes at

35Hz and 70Hz while the steel frame is broadly active between 180Hz-500Hz. Most record decks are fairly well isolated between 60-150Hz so the huge peak at 70Hz (equivalent to a band noise rejection of just 1dB) looks worse than it is in practice. The sensitivity of CD players and many valve amplifiers to vibration in this region is less certain, however.

Several high-Q peaks are evident at 180Hz, 240Hz, 330Hz, 385Hz and 490Hz at amplitudes some +25dB above those recorded for the similar looking Stand Design table. This represents an increase in total band energy (breakthrough) of +5dB in



the critical lower midband. This is a region populated by chassis and suspension resonances of many turntables, including the Linn, PT and Michell Gyrodek to name but three.

Once again there was a firm correlation between the measured breakthrough of noise and an imbalance or unevenness in the sound of the partnering turntables.

The LP12 sounded slightly more forward and aggressive than usual but was coarser and less refined in delivery. Fine timbral and spatial details were disturbed when the Pink Triangle turntable was used though the Alphason appeared to suffer less, perhaps as a result of its considerable mass altering the resonant behaviour of the table's frame.

TEST RESULTS

Topboard Area	465x360mm
Overall Height	640mm
Spikes, top base	Adjustable
Resonant Behaviour	Adjustable
Finish	Fair
Value	Good
Typical retail price	Fair
	£100

Roksan Table

ROKSAN LTD., 21 DDOLE ROAD, LLANDRINDOD WELLS, POWYS LD1 6DF. TEL: (0597) 4911

Roksan's simplest table costs £40 but its concept is easily expanded upon to arrive at the table featured here, complete with top-board and three intermediate shelves all fashioned from Medite sheets into attractive 20-sided figures.

A hole is drilled out of the corner of each shelf so that it slips over the four cylindrical steel legs that comprise the table. These shelves are then positioned on a set of adjustable rings which slide up and down the outside of the frame prior to being locked into position. Extra shelves and a pack of four lockable rings will set you back some £49 a throw. The uppermost platform is supported on a set of inverted spikes which

protrude from the top of each column while a similar arrangement suffices at the base enabling it to be spiked through carpet or floorboards. A thin-walled mild steel tubing is used throughout the structure with welded inserts in the base and apex for reinforcement. A black powder-coat finish completes this fairly expensive package.

The intermediate boards are not clamped, spiked or stressed in any particular fashion, which gives rise to a broad low-Q resonance around 35-45Hz. Importantly, however, the subsonic stability of the entire structure appears to be very good indeed, offering a band noise rejection some 6dB better than that of the



Alphason rack between 5Hz-30Hz. On the debit side are three strong resonant modes attributed to the 12mm and 34mm tubing used in the table's construction. These lie at 140Hz, 395Hz and 540Hz - the latter two peaks appearing in a region of some sensitivity for many suspended subchassis turntables. This said, I have no figures for the Roksan Xerxes, a likely partner for this equipment rack! I was not utterly overjoyed with the sound of either the Alphason or PT turntables on this platform though the Linn LP12 still retained its essential character. The crack

of bass drum appeared oddly slow while a faint chesty coloration pervaded the reproduction of male vocals in particular. Furthermore, loading the intermediate shelves with heavy equipment compromised the sound of the turntables still further whereupon the solidity and rhythmic assurance of the music was faintly diluted.

Nevertheless, in spite of my disappointing results I would not care to dismiss this flexible racking system out of hand. Indeed, in the context of a Roksan-orientated system it may prove just the ticket.

TEST RESULTS

Topboard Area	520x380mm
Overall Height	650mm
Spikes, top base	Locked
Resonant Behaviour	Locked
Finish	Fair
Value	Good
Typical retail price (four tier)	Fair
	£295
	(£169 + 2x£49 + £29)

Origin Live Skyline

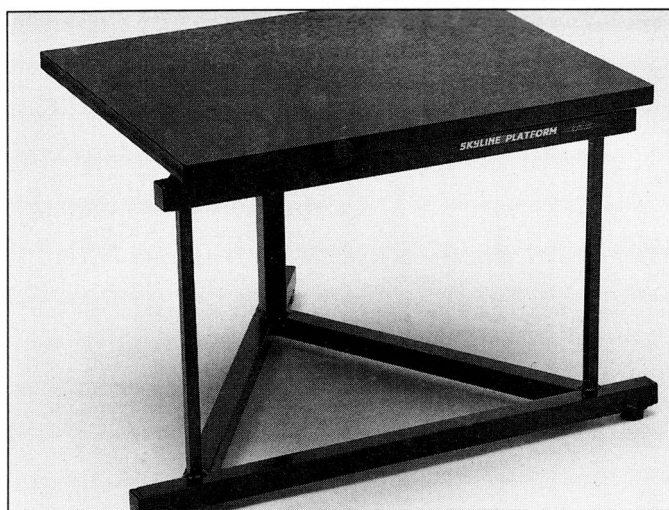
ORIGIN LIVE, 154 PRIORY ROAD, ST. DENYES, SOUTHAMPTON, HANTS SO2 4BT. TEL: (0703) 671237

Keeping track of new developments, revisions and upgrades to Origin Live's copious range of stands, shelves and supports is a full-time business in itself. Each separate range is subdivided into classes headed *Basic*, *Advanced*, *Super*, *Ultra* and *Mega* (yawn) depending on the quality of the steel tubing and overall standard of construction. As such this *Skyline Super* falls midway in the class of equipment tables designed specifically for use on wooden rather than concrete floors.

Both the horizontal base and top sections of the frame

are fashioned into an offset A-shape from welded 26mm square-section steel tubing. They are joined at each welded intersection by a total of three vertical columns, those at the front cut from 13mm stock and the single pillar at the rear from thicker 26mm stock.

Slightly blunt inverted spikes are welded directly above the uprights to support OL's choice of dense 20mm Medite top-board. By contrast the huge, adjustable downward-facing spikes are located further away from the uprights near the three ends of the lower A-frame. This



tends to lower the table's centre of gravity and so make it more stable at subsonic frequencies while the asymmetry of the frame itself minimises the possibility of sympathetic resonances. As such the steel frame is seen to be responsible for the neatly distributed peaks at 205Hz, 245Hz, 370Hz and 550Hz together with a broader fundamental resonance at 135Hz.

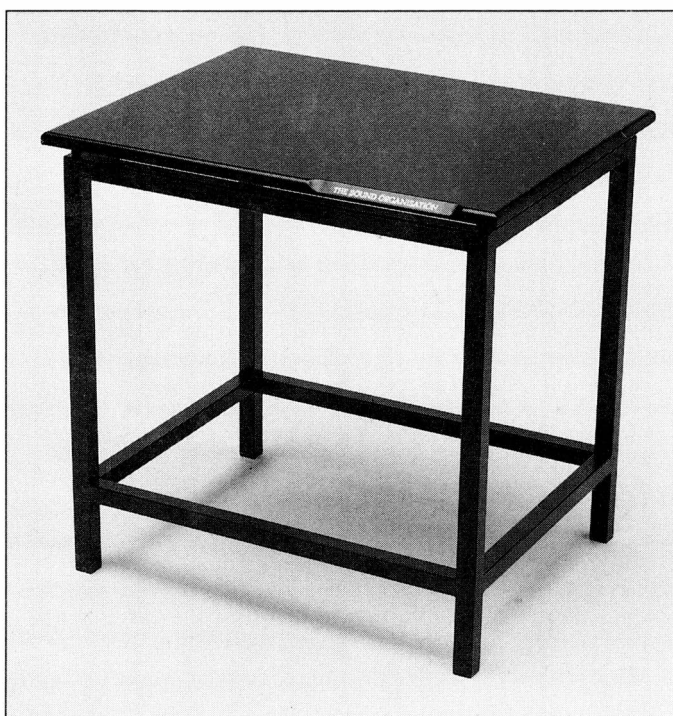
Furthermore, by supporting the rugged Medite top-board on three, rather than four, inverted spikes, the usual bending modes have been traded for an isolated peak at 55Hz followed by a sharp 'crack' at 115Hz - the principal feature of this table's spectrum. Few suspended-

subchassis turntables suffer from resonant modes around 115Hz so the *Skyline* table did prove broadly compatible with all three of the decks used in the listening tests. Bass notes were generally quick, lucid and yet satisfyingly solid while the midband - particularly that of the *PT Too* - proved pleasantly open and transparent.

There was little undue cloudiness or compression about the sound yet I gained the impression of a slightly processed 'feel' about the upper mid and treble ranges, a sensation that contrasted with its quicker and more dynamic bass. Still, in overall terms the *Skyline Super* put in an impressive performance which should certainly ensure its Recommendation.

TEST RESULTS

Topboard Area	500x400mm
Overall Height	410mm
Spikes, top	Fixed
Base	Adjustable
Resonant behavior	Good
Finish	Good
Value	Good
Typical retail price	£100



Sound Organisation ZO22

THE SOUND ORGANISATION, GIBBON ST., HARRIMANS LANE, DUNKIRK, NOTTINGHAM NG7 2SD. TEL: (0602) 422264

From the company that started it all comes a new turntable table, not a replacement I hasten to add but a more discrete and costly design marketed under the inglorious title of ZO22. Accounting for its high cost many subtle differences exist between this diminutive table and

Sound Org's original.

For a start this model uses a very high quality wafer-thin steel tubing for the main structure, CDS3 steel to be specific. This is folded and carefully welded into shape to afford a lightweight but inherently rigid structure. Spikes are included for both the base and top surface of

the frame but, unlike the company's earlier table, provision for level adjustment is included. This is certainly a more convenient approach but the absolute integrity of the frame is compromised by this facility.

Squat, inverted spikes are used to couple the corners of a relatively massy Medite top-board onto the main frame. Medite was chosen as a concession to aesthetics, compared to lighter chipboard its finer grain allows the edges to be chamfered into a smooth curve, while its planed surfaces take on a silkier satin black finish.

The standards of

construction and finish are undoubtedly high while the light weight and rigidity of the steel frame has deferred its principal resonances to slightly higher frequencies. Still, very little attenuation of incoming noise is effected - we measured a broad range of resonances visible at 200Hz, 245Hz and 445Hz with a spray of finer harmonics between 550Hz-900Hz. The heavier top-board is responsible for broader bending modes between 45-85Hz where the difference in-band noise between incoming and outgoing vibrations is just 2-3dB. Interestingly this lively bass and midband character suited the presentation of the

Linn LP12 for which it is intended - but unbalanced the offerings of both *PT Too* and *Sonata*. There was some modification at the frequency extremes, the *Sonata* appearing slightly diffuse in the bass while mildly withdrawn in the far treble.

The Linn, on the other hand, seemed to enjoy a greater sense of attack or bite. Once again we are faced with the mutual coincidence of resonances in both table and deck, properties that restrict the universal application of this particular design.

TEST RESULTS

Topboard Area	455x360mm
Overall Height	490mm
Spikes, top base	Locked
Resonant Behaviour	Adjustable
Finish	Average
Value	Excellent
Typical retail price	Average
	£97

Recommended

Stand Design Duplex

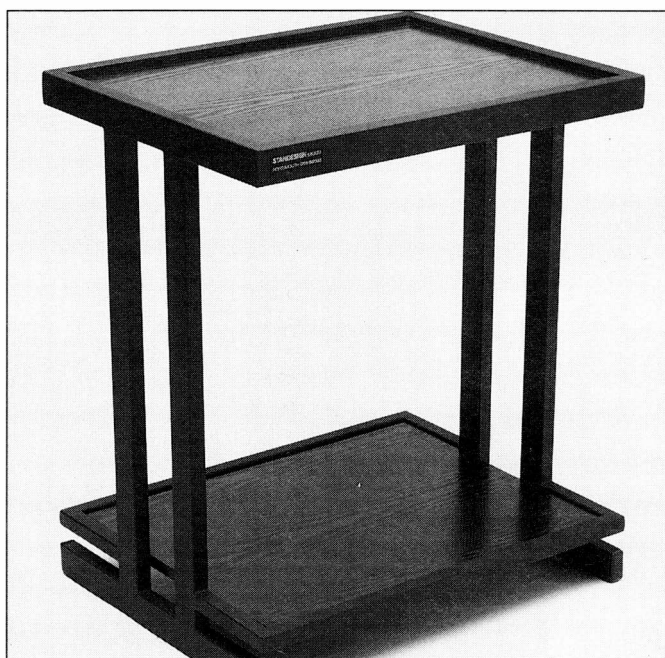
STAND DESIGN (UK) LTD, UNIT 20 VENTURE COURT, VENTURE IND. PARK, HILSEA, PORTSMOUTH PO3 5RZ. TEL: (0705) 697333

Newly designed as a visual complement to the company's range of speaker stands, the *Duplex System Rack* is actually the smallest of four equipment supports which, in its grandest form, will cater for no less than five individual pieces of equipment. The frame itself is fashioned from lengths of 20x20mm, 19x26mm and 20x39mm rectangular-section steel tubing to minimise coincident resonances while the completed structure is finished off in a high quality textured epoxy.

Like Foundation's table,

Stand Design's *Duplex* relies on two closely-spaced uprights though the construction of the upper and lower frames is slightly different. In this instance the vinyl-covered top and baseboards are supported on inverted spikes nestling within the frame, improving both the structural integrity and visual appearance.

This is another table whose resonant behaviour is broadly dominated by flexure of the heavy particle-board top-plate, in this case the bending modes appearing at 45Hz and 65Hz.



The largest peak occurs at 95Hz which appears related both to the board and the fundamental resonance of the steel tubing. Tapping the frame may produce a noticeable 'ringing' sound but little of these characteristic upper harmonics (the 'timbre' of the steel) find their way through to the equipment on the wooden top-board. Consequently the ringing modes of the frame itself appear at a lower amplitude and are nicely distributed, peaks at 155Hz, 215Hz, 275Hz, 360Hz, 555Hz and 920Hz being the most obvious. Fortunately, and in contrast with Foundation's similar-looking structure, no fierce breaks are evident. During the listening tests this

innocuous distribution of resonant modes appeared not to upset the balance and characteristics of each turntable. The Alphason and Linn decks both fared well, the *PT Too* with marginally less success. In this instance there was a slight increase in vocal slurring or sibilance but the effect was not dramatic and could certainly vary depending on the arm/cartridge combination partnering the deck.

If Sound Design could tidy up the LF end of things they would certainly have an equipment support to take on all-comers. For now the cost-effective *Duplex System Rack* seems broadly suitable, offering a standard of build and finish that seals its Recommendation.

TEST RESULTS

Topboard Area	465x360mm
Overall Height	635mm
Spikes, top base	Adjustable
Resonant Behaviour	Adjustable
Finish	Good
Value	V.Good
Typical retail price	V.Good
	£75

Stand Design Z20

STAND DESIGN (UK) LTD, UNIT 20 VENTURE COURT, VENTURE IND. PARK, HILSEA, PORTSMOUTH PO3 5RZ. TEL: (0705) 697333

Formed just two years ago Stand Design has emerged as a very professional outfit offering a versatile range of well-built and exceedingly well finished stands and supports. The Z20 is the tallest of three single-pillar stands in the Z-range, all fashioned from S22 mild steel, TIG welded and coated electrostatically with a textured black finish. A large steel plate is used for the base of the stand which may be spiked into the floor while the smaller top-plate can be used with either Blu-Tack or a set of inverted spikes.

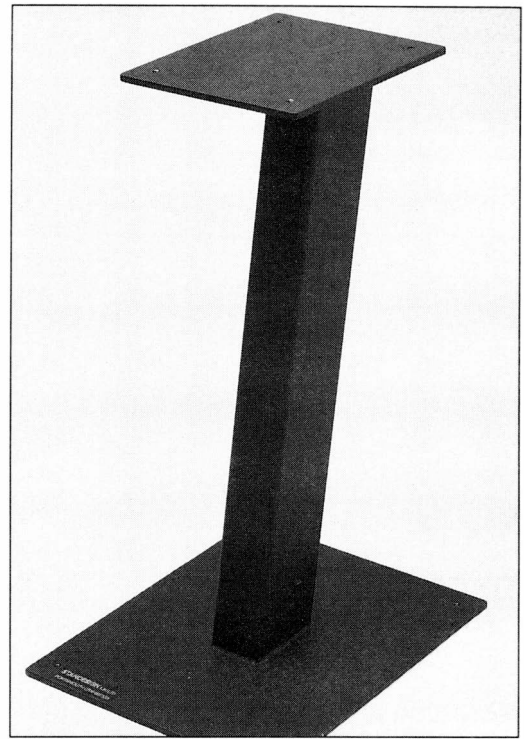
The hollow steel pillar is offset towards the rear of the stand and may be filled with a dry silver sand to increase its mass and so lower the centre of gravity of the entire speaker/stand combination. Tested in this fashion the Z20 turned in a remarkable set of results. The time domain plot shows a healthy attenuation of the initial impulse followed by a gentle, rather than abrupt decay. Similarly the ensuing baffle resonances are concealed with considerable ease, small peaks appearing at 48.8Hz (-109dB), 51Hz (-96dB) and

57Hz (-109dB) only. This result is in partial conflict with earlier readings taken from similar stands with vertical pillars. With such stands it was common to detect some 'flapping' at the edges of the top plate, particularly if this plate was not ribbed or otherwise reinforced. It is perfectly conceivable that heavier speakers, with their own characteristic resonances, will effect less favourable results...

Whether this was simply a symbiotic match with the 505.2s is difficult to say, but the combination certainly proved an exceptionally stable one. I tried the stands filled and unfilled, the latter promoting a lighter and freer but also slightly splashier sound. Filling the stands tended to tame the treble while fleshing-out the bass end. More importantly there was now a very nice sense of integration about the sound, escaping the coarseness

encountered with the Target stands and the sluggish 'feel' of the Audio Dimensions' bass.

Certainly as far as the 505.2s were concerned the Z20s from Stand Design turned in just about the best blend of compromises: balanced in terms of pitch and tempo and affording a fluid, integrated and delightfully musical sound free of fatiguing nasties. Speakers of a similar size and temperament to the 505.2s are clearly ideal suitors for this stand which is heartily Recommended.



TEST RESULTS

Top-plate Area	165x190mm
Weight	10kg (filled)
Height	500mm
Spikes, top	Adjustable
base	Adjustable
Stability	V.Good
Finish	Excellent
Value	V.Good
Typical retail price	£70

Target T40

TARGET AUDIO PRODUCTS, UNITS 3&4, TOWNSEND CENTRE, BLACKBURN RD., HOUGHTON REGIS, DUNSTABLE LU5 5BG. TEL: (0582) 472037

Originally designed as an interim replacement for Target's S-range of stands, this particular version was eventually incorporated into today's T-range - one of four product lines currently in the company's catalogue. The stand comes as a trio of parts that are easily assembled using the supplied Allen key, nuts, bolts and spikes, the

latter in two sizes for both the base of the stand and flat top-plate.

Jansen rolled-steel tubing is used throughout, neatly welded and finished in a satin-black powder coating which, thankfully, does not foul the various screw threads. The completed stand is not designed for any sort of filling and so is fairly

light, though the extended T-shaped base with its three carpet-piercing spikes ensures a reasonable degree of stability.

However, the accelerometer plot taken from the speaker's baffle shows little attenuation of the original 50msec impulse and very little damping thereafter. As a result the decay of this transient signal appears to adopt an exponential character as the speaker's baffle - and therefore the drivers themselves - continue to vibrate some 400msec after the electrical impulse has ceased.

In fact this result is very similar to that obtained with no stand at all, the spray of

45Hz harmonics at 89Hz (-100dB), 135Hz (-100dB), 179Hz (-105dB) and 225Hz (-104dB) all attributable to the behaviour of the speaker's undamped wooden baffle. So, though the stands do not 'rock', neither do they help reduce or modify unwanted cabinet vibrations.

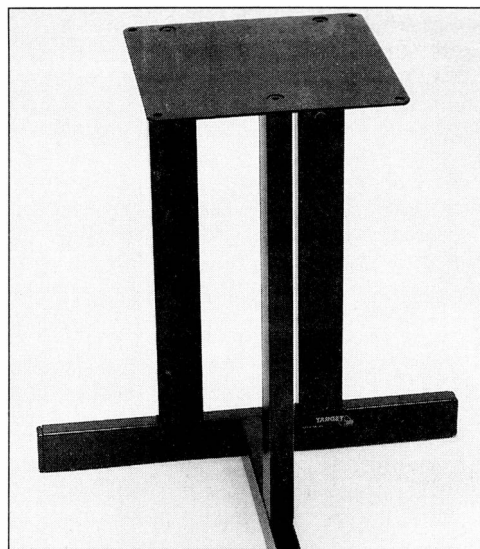
Even taking into account the reduced height of the Target T-40s (and the subsequent change in tweeter level) there was no doubting the brighter sound produced by the Wharfedale speakers. This effect was more marked than any other in this test, the natural edginess of strings, piano and brass percussion brought noticeably forward in a trade-off against bass weight,

power and extension. In fact the integrity and structure of bass rhythms was diluted quite markedly. Instead the sound was harsher, certainly more smeared and generally

coarser throughout the treble. I very much doubt whether all speakers will suffer a similar fate on these stands but even if this result could be put down to some

unhappy incompatibility the *T-40s* are still unlikely to be suitable for lively, energetic loudspeakers.

The *T-series* is certainly a step up from flimsy castored designs, yet so much more is available from stands of marginally higher cost - including those in Target's partnering ranges.



TEST RESULTS

Top-plate Area	190x190mm
Weight	3kg
Height	400mm
Spikes, top	Unthreaded
base	Adjustable
Stability	Poor
Finish	V.Good
Value	Fair
Typical retail price	£48

Origin Live Advanced

ORIGIN LIVE, 154 PRIORY ROAD, ST. DENYES, SOUTHAMPTON, HANTS SO2 4BT. TEL: (0703) 671237

Derived from the open-framed tripod stand that was reviewed in our original test, the *Advanced* is now one of three related products available from Origin Live. Like the original version this stand is composed of 26mm steel tubing, finished in black and supported midway by a

welded horizontal T-brace. Once again the rear leg is fashioned from two lengths of square-section tubing (one of which is damped with lead), welded back-to-back in an effort to distribute structural resonances.

Massive 18mm diameter steel spikes are located into

the base of each leg and locked into position using 24mm steel nuts! However this *Advanced* grade stand differs from the original version in the attitude of the three legs, the two front supports now adopting a vertical rather than angled stance. This will decrease



TEST RESULTS

Top-plate area.	220x206mm
Weight	5kg
Height	440mm
Spikes, top	Fixed
base	Adjustable
Stability	V.Good
Finish	Good
Value	Good
Typical retail price	£145

the stability of the structure by shifting its previously low centre of gravity to a higher and more forward position. Similarly, the change from a T-shaped to H-shaped top surface will tend to introduce further structural resonances, particularly as part of the tubular top-plate remains unsupported.

The resonant clusters around 26Hz (-107dB), 133Hz (-113dB) and 160Hz (-108dB) seemed to refer to bending modes in this frame while the sharper peaks at 47Hz (-85dB) and 54Hz (-91dB) were directly related to unattenuated baffle resonances. Unfortunately Origin Live has welded four inverted spikes to the stand's top surface so Blu-Tack cannot be employed as an alternative mode of coupling speaker and stand. The time domain plot shows that movement of the speaker baffle is not effectly damped as a result.

As suggested by the objective measurements, the performance of these stands did vary depending on their orientation. Preferentially

they should be used with freestanding, not wall-mounted speakers with the third, angled leg pointing to the rear. In this instance they offered a very much more stable platform, a stability reflected in the open, transparent and delightfully airy nature of the sound. Bass transients were handled convincingly too. Furthermore it seemed possible to drive the speakers harder before the music seemed obviously 'louder'. The breadth and depth of the soundstage seemed to increase in scope instead - the mark of a good system in my experience. However, from memory I did not feel this latest version offered such a stark improvement over the other stands in this test as had the originals, although the possibility that other stands have improved at a faster rate than this design is also a possibility.

Good though they undoubtedly are, perhaps a degree of flexibility in use has been traded for a notch in sound quality.

Audio Dimensions Classic 2

AUDIO DIMENSIONS, 506 UPPER
NEWTOWNARDS RD, BELFAST BT4 3HB. TEL:
(0232) 655135

Supplied by the distributor which handles Shan loudspeakers and Audio Spec speaker cable, the *Classic 2* conforms most rigorously to the 'heavyweight' school of stand design. Chunky steel plates are used for the top and base of the stand which incorporates four square-section steel uprights. Each of these columns is filled with a dry, powdered limestone which infers rather different characteristics to either silver sand or lead shot fillings.

In order to retain a flat, unperturbed surface Audio

Dimensions has chosen to seal the in-fills using a plastic insulation tape. Unfortunately the filling can easily escape during transit. Similarly, though AD has thoughtfully supplied four substantial brass nuts and spikes for the base of the stand the screw threads were fouled by the final matt-black coating.

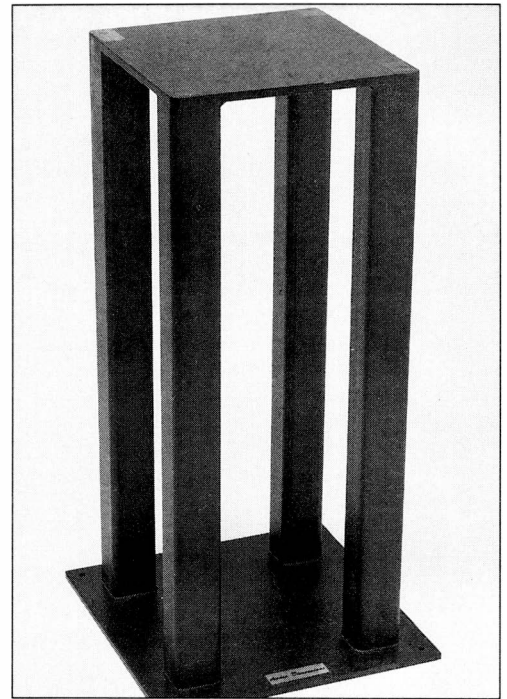
Anyway, the appreciable stability of this stand is demonstrated by the low amplitude of both the 50msec impulse and subsequent decay on the time domain plot. The initial impulse is greatly attenuated

despite being succeeded by a minor reflection after 177msecs (equivalent to one cycle at about 5.6Hz). In fact this stand offered an attenuation factor some ten times greater than that of others in this test!

Three distinct baffle resonances have been isolated at higher frequencies though the peaks at 40Hz (-100dB), 47Hz (-96dB) and 53Hz (-109dB)

are swiftly damped by the stand. The end result here is exceptionally clean and well-controlled, properties that tie in quite nicely with the subjective listening tests.

Here the presentation of music was seemingly more immediate and tactile, particularly throughout the upper octaves. The raw edge of stringed instruments and the crisp shimmer of percussion was tightly focused, though not in an artificial or irritating fashion. Whether this harder, more positive sound will suit all speakers is a matter for experiment, though I would have thought the *Classic 2s* might provide a suitable



tonic for tired, overly relaxed-sounding speakers.

In the case of the *505.2s*, which already possess a delightfully open and delicately detailed sound, the stands also unearthened a deeper and thicker sensation of bass that was not quite so well received. This added weight and substance to the music but it also brought a slow contrast to the fluid dexterity and lightness of touch that pervaded the upper octaves. Once again, this subjective bass reinforcement will certainly suit some speakers more than others.

In terms of stability and damping the *Classic 2* must be judged a success.

TEST RESULTS

Top-plate Area	203x203mm
Weight	14.5kg
Height	520mm
Spikes, top base	None
Adjustable	Adjustable
Stability	Excellent
Finish	Average
Value	V.Good
Typical retail price	£110

Foundation Sir FRED

FOUNDATION AUDIO, 9 DERWENT RD.,
LEVERSTOCK GREEN, HEMEL HEMPSTEAD, HERTS
HP2 4PH. TEL: (0442) 236000

FRED, in this case, is a rather clumsy acronym for Foundation Rigid Economy Design, its basic manifestation appearing in our earlier test of speaker stands. *Sir Fred* is an upgraded model, still

featuring the two pillar uprights but now equipped with proprietary in-fills and pickled and oiled mild steel top/bottom plates.

The baseplate has provision for four lockable spikes, the top-plate for no

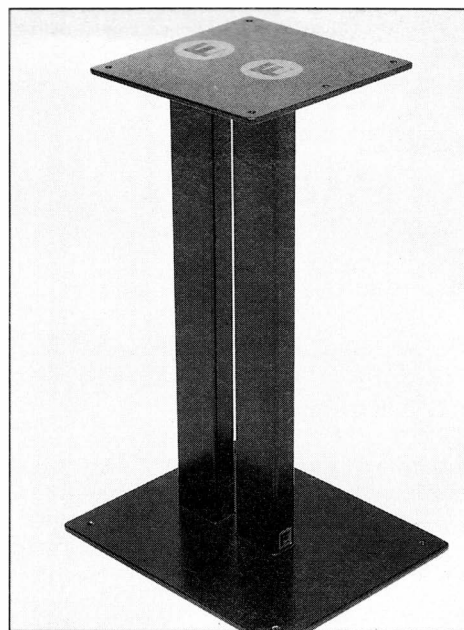
less than five inverted spikes though the manufacturer specifies Blu-Tack for optimum speaker/stand coupling. Once again, Foundation has opted for a nylon powder-dip coating to give the stand a slightly thicker and more resilient finish - at least the screw threads were neatly re-tapped on this model. Unlike the basic *FRED* stand, *Sir FRED* utilises two different in-fills: a low density vermiculite for the rear column and a specific grade sand for the front column. Foundation makes play of these specialised fillings but of course the efficacy of any

damping material will depend very much on the type of speaker that accompanies the stand. In terms of the damping offered to spurious vibrations in the speaker cabinet itself the Foundation seemed, at first, very similar to the Audio Dimensions stand. Certainly the fundamental baffle resonances at 43Hz (-96dB) and 52Hz (-86dB) are comparable (if marginally less well damped) but the 3rd harmonic resonances at 146Hz (-102dB) and 155Hz (-96dB) are quite distinct and peculiar to this stand/speaker combination. The

subjective manifestation of these resonances was difficult to gauge though I felt the 505.2s sounded marginally smoother and perhaps slightly better integrated when used on the Foundations than, say, the Targets or Goldrings. Yet

they also lacked a little of the sparkle and vivacity heard with the Audio Dimensions and Origin Live stands. The transparency of sound was there but some of the top-end crispness seemed artificially sweetened, less tactile and less immediate.

Fortunately there was a warmth and naturalness about the sound that kept me interested. There was not the solid reinforcement of deep bass notes heard with the heaviest of stands but there was an air of unification about it that may suit many different types of speakers. This said, those hoping to encourage a brighter, sharper sound should look elsewhere.



TEST RESULTS

Top-plate Area	190x190mm
Weight	7kg
Height	465mm
Spikes, top base	Adjustable
Stability	Fair
Finish	Good
Value	Fair
Typical retail price	£80

Recommended

Goldring Black Satin

GOLDRING LTD., 8 GREYFRIARS ROAD, BURY ST EDMUNDS, SUFFOLK IP32 7DX. TEL: (0284) 701101

For a speaker stand to be produced by a manufacturer better known for its efforts in miniature engineering is rather unusual. However, the all-Medite *Black Satin* stand is just one new product to emerge from the UK's most famous manufacturer of pick-up cartridges. Goldring has opted for Medite because it combines the virtues of lightness and moderate rigidity without the high-Q resonant character of tubular steel. And of course it presents an ideal acoustic

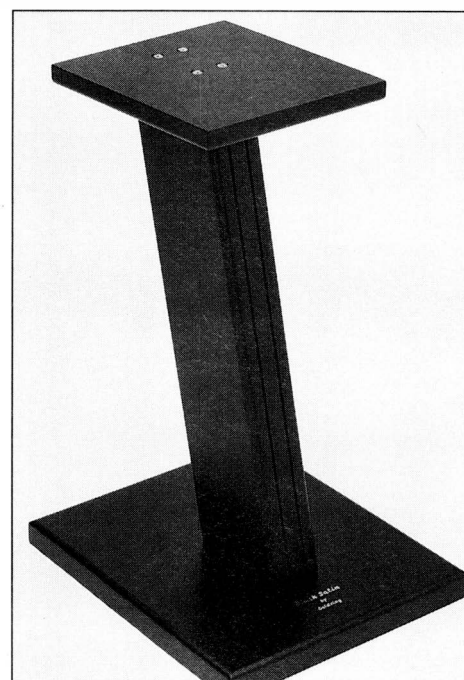
impedance match with the cabinet material of most modern loudspeakers!

The stand arrives in three pieces and is quickly and easily assembled. The single angled pillar is solid so no filling is required. Spikes locate into bushes that are inset into the stand's platform while Blu-Tack is recommended to locate the speaker on the top-plate. The overall standard of presentation and finish is high, Goldring having used a smooth matt black coating

together with some mild styling of the main upright.

Weighing-in at just 3.5kg Goldring's *Black Satin* is not a particularly weighty stand nor does it possess a particularly low centre of gravity. As such the absolute stability of the structure will depend, as much as anything else, on the mass of the attached loudspeaker and the height of the chosen stand. In this case a very distinct baffle resonance was observed at 43Hz (-86dB) together with odd harmonics at 129Hz (-113dB) and around 214Hz (-122dB). These odd harmonics are not as serious as those witnessed with the Foundation stand but Goldring's effort did introduce various subsonic rocking modes of its own at 5.6Hz, 8.8Hz and 15Hz.

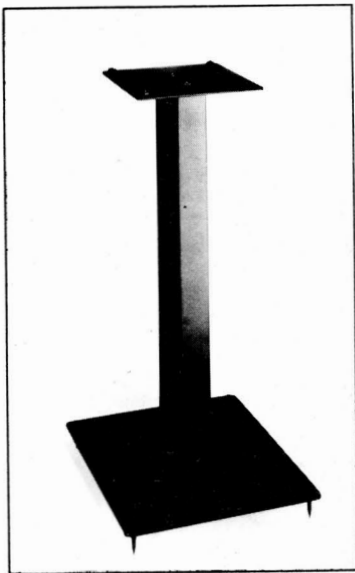
Perhaps as a function of their relatively low mass and fair rigidity - if not stability - these wooden stands promoted the sort of light, transparent and open sound you might expect from a conventional open-frame stand. Indeed the characteristically delicate and



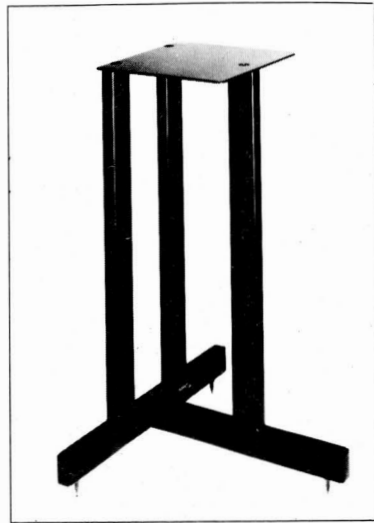
lucid sound of the speakers was well represented, the midband as sweet and buoyant as the treble. Only the bass gave any real cause for concern; here there was a lack of weight, of drive and sheer authority. This could undermine the power of a piece of music but did not really compromise the natural sense of pace or rhythm. If this effect is common to most speakers then I would tend to partner Goldring's stand with rich, over-warm speakers that might just sound a little boomy with a traditional heavyweight stand. Recommended with this qualification in mind.

TEST RESULTS

Top-plate Area.	180x200mm
Weight	3.5kg
Height	460mm
Spikes, top base	None
Stability	Adjustable
Finish	Average
Value	V. Good
Typical retail price	Average
	£65



HS 20



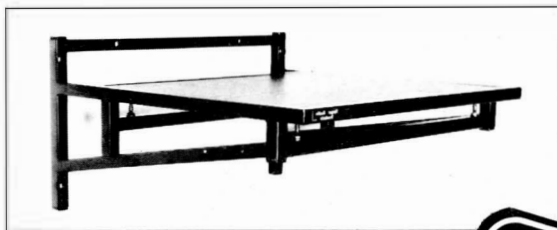
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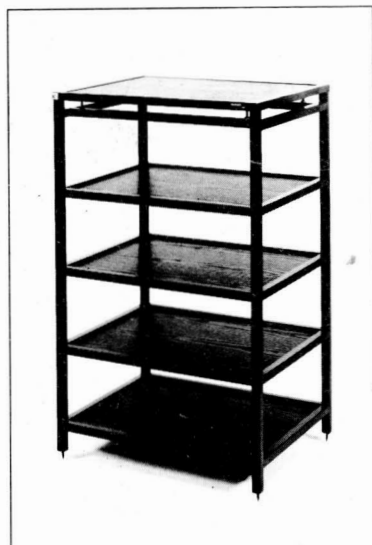
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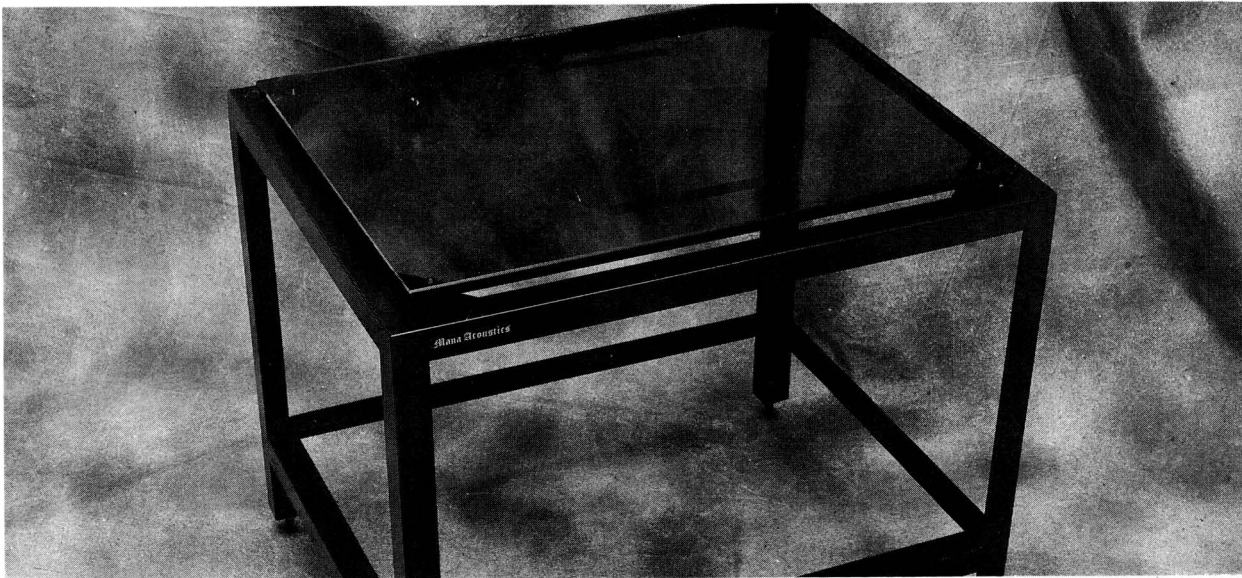
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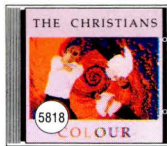
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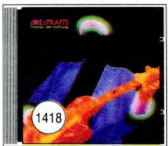
Words - I Found Out - There You Go Again - In My Hour Of Need - Man Don't Cry.



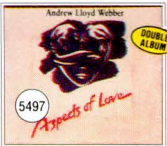
We Didn't Start The Fire - I Go To Extremes - That's Not Her Style - Leningrad.



Love In An Elevator - Janie's Got A Gun - What It Takes - Monkey On My Back.



Romeo & Juliet - Twisting By The Pool - Sultans Of Swing - Brothers In Arms.



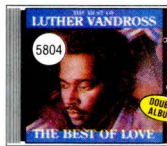
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Angel Of Harlem - Desire - When Love Comes To Town - All I Want Is You.



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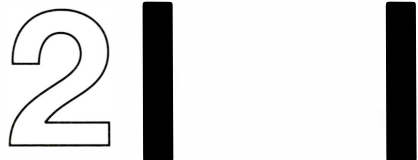
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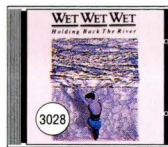
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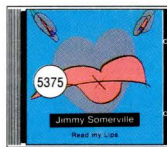
I Feel The Earth Move – Water – Toy Soldiers – More Than You Know.



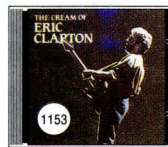
Sweet Surrender – I Wish – Broke Away – Blue For You – Hold Back The River.



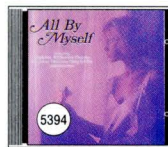
I Want It All – Scandal – Breakthru – The Miracle – The Invisible Man.



You Make Me Feel (Mighty Real) – Comment Te Dire – Adieu – Rain – Read My Lips.



I Shot The Sheriff – Wonderful Tonight – Layla – Lay Down Sally.



Simply Red – Wet Wet Wet – Chris Rea – Living In A Box – George Benson – Billy Ocean.



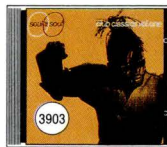
This Woman's Work – Love And Anger – The Sensual World.



I Don't Wanna Lose You – The Best – Falling Like Rain – Steamy Windows.



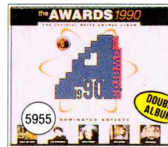
Blame It On The Rain – I'm Gonna Miss You – Girl You Know It's True.



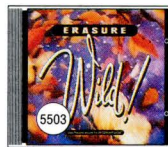
Back To Life – Fair Play – Keep On Movin' – Feel Free – Holdin' On (Bambalela).



Heartbreaker – Walk On By – All The Love In The World – That's What Friends Are For.



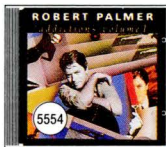
Lisa Stansfield – Prince – Neneh Cherry – FYC – Bobby Brown – Black Box – Yaz.



You Surround Me – Drama! – Blue Savannah – Star – La Gloria – Piano Song.



Woman In Chains – Advice For The Young At Heart – Sowing The Seeds Of Love.



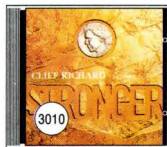
Addicted To Love – Simply Irresistible – Looking For Clues – Johnny & Mary.



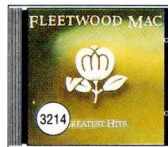
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5347	MICHAEL JACKSON: 18 Greatest Hits Ben – Got To Be There – One Day In Your Life – ABC.
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