

# HI-FI CHOICE

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

DECEMBER 1990 £2.95

## CD midi systems

LOOKING FOR THE BEST VALUE IN  
MIDI SYSTEMS - WE TEST 15 MODELS

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CASSETTE FROM MEMOREX

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TELL YOUR  
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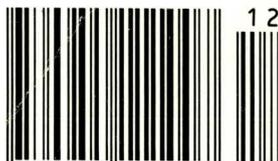
## 950 Test Summaries

IN THE CHOICE BUYER'S GUIDE

## Best Buys Awarded

WE CHOOSE THE BEST BUYS  
& RECOMMENDED PRODUCTS

ISSN 0955-1115



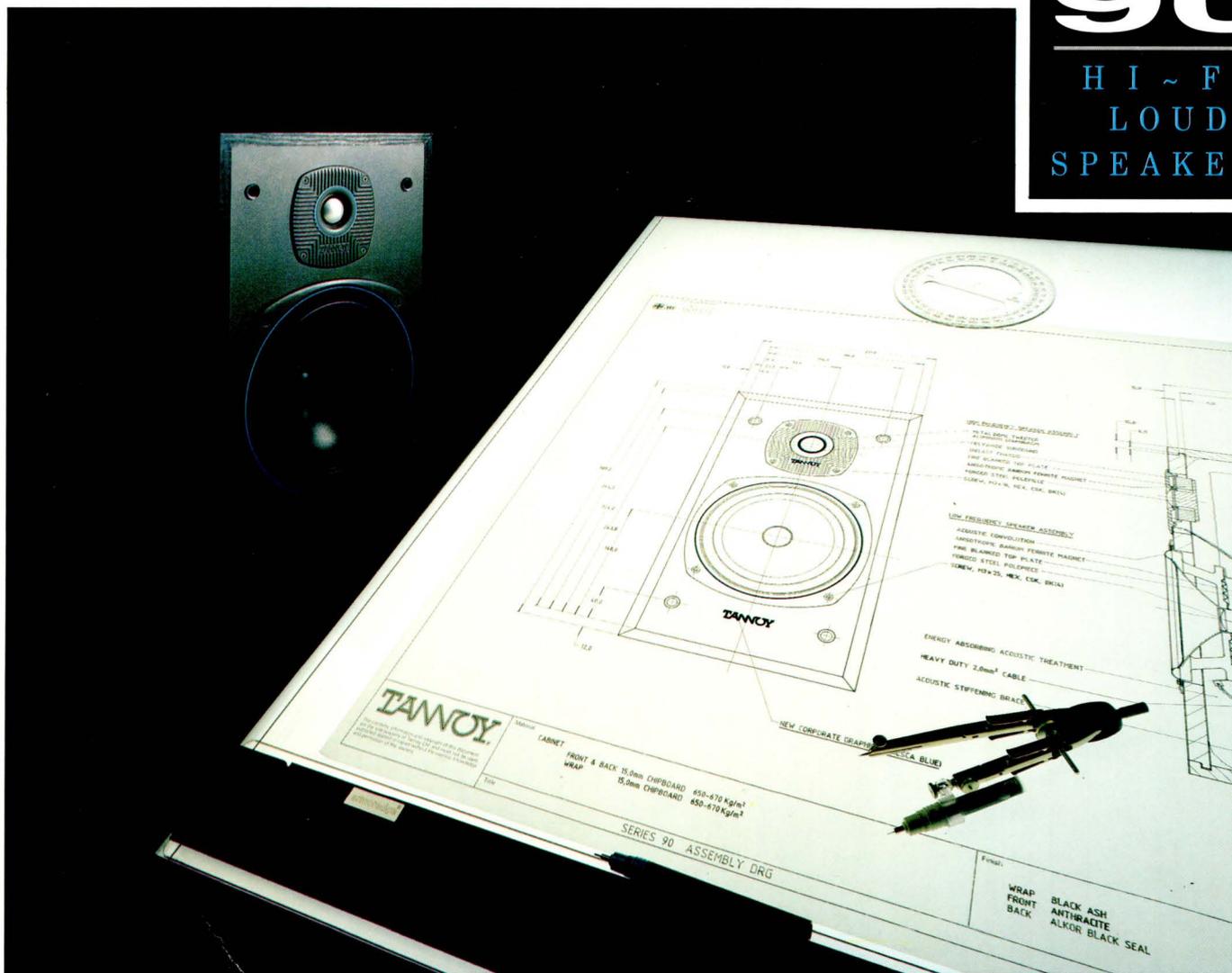
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VOTED 'FAVOURITE HI-FI MAGAZINE' BY HI-FI SHOPS NATIONWIDE

# SERIES 90 - THE STORY CONTINUES...

**E11** "IT MAY NOT GRAB YOU BY THE THROAT BUT IT'S ABILITY TO BEAUTIFULLY PORTRAY MUSIC MAY JUST TUG AT YOUR HEARTSTRINGS". WHAT HI FI, MARCH 1990. • "BI-WIRING IMPROVED STEREO FOCUS AND OVERALL PRECISION WHICH HELPED GIVE A PERFORMANCE REMARKABLE AT THIS PRICE". HI FI NEWS, JANUARY 1990. • **DC1000** "THE TANNOY MADE LISTENING TO MUSIC A MUCH MORE LIVELY, ENJOYABLE EXPERIENCE". WHAT HI FI, FEBRUARY 1990. • **J95** "THERE MAY BE BETTER £500 SPEAKERS OUT THERE BUT I'VE NOT HEARD THEM YET". HI FI REVIEW, AUGUST 1990. • **DC3000** "RECOMMENDED WITH ENTHUSIASM - EVEN WITHOUT THE LEAD SHOT". HI FI CHOICE, JANUARY 1990...

**TANNOY**  
**SERIES**  
**90**  
HI ~ FI  
LOUD  
SPEAKERS



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

# HI-FI CHOICE

ISSUE NUMBER 89: DECEMBER 1990

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(July-Dec 1989 - 23,847)



# Menu

# W

hile not the usual *Hi-Fi Choice* fare, CD midi systems traditionally are the topic of our December issue each year. Once again Alvin Gold has given a dozen-or-so packaged systems a thorough workout for us, to see which models represent fair value for money.

On the whole, the sound quality of many midi systems has improved since the advent of cheap CD player mechanisms. While owners of top-flight hi-fi systems will hear that CDs generally do not sound as 'natural' as LPs, CD has dramatically lowered the price of decent quality sound in the home. It is the very poor quality, moulded plastic turntables accompanying low-cost midis which have tended to give such systems a bad reputation. To work properly, a record player needs to be crafted as a piece of precision machinery - and as a consequence 'hi-fi standard' turntables tend to cost a packet. (As much, if not more, than the price of an entire midi system, in fact!)

Talking of the way in which compact discs have changed the entire home audio scene, this month's *Choice* includes a long-promised feature by Paul Miller explaining the technology behind Sony and JVC's PLM and PEM digital-to-analogue converters. Not for the techno-fearful, it provides insight to the mind-boggling number-crunching going on inside the CD players we use in our homes.

As you will see when reading this month's reviews, most midi systems are still let down by the poor quality loudspeakers supplied as part of the all-in-one package. Far better to invest in pair of low-cost speakers from a specialist manufacturer. As we go to press, our loudspeaker reviewer Paul Messenger is busy compiling the results of our latest listening tests on over 20 new speakers to appear on the market, and the reviews will be published in next month's issue. We are also putting the finishing touches to our special high-end edition, **The Collection**, which this year is a glorious full colour extravaganza. Separate from our normal monthly issues of *Hi-Fi Choice*, *The Collection* is a 13th edition which goes on sale November 23rd.

Meanwhile, in addition to our exhaustive loudspeaker tests, January's *Choice* will include a massive survey on blank tapes in a FREE supplement. On sale December 12th, it's going to be in huge demand - so order your copy now to avoid missing out!

John Bamford



Cover photograph  
by Chris  
Richardson

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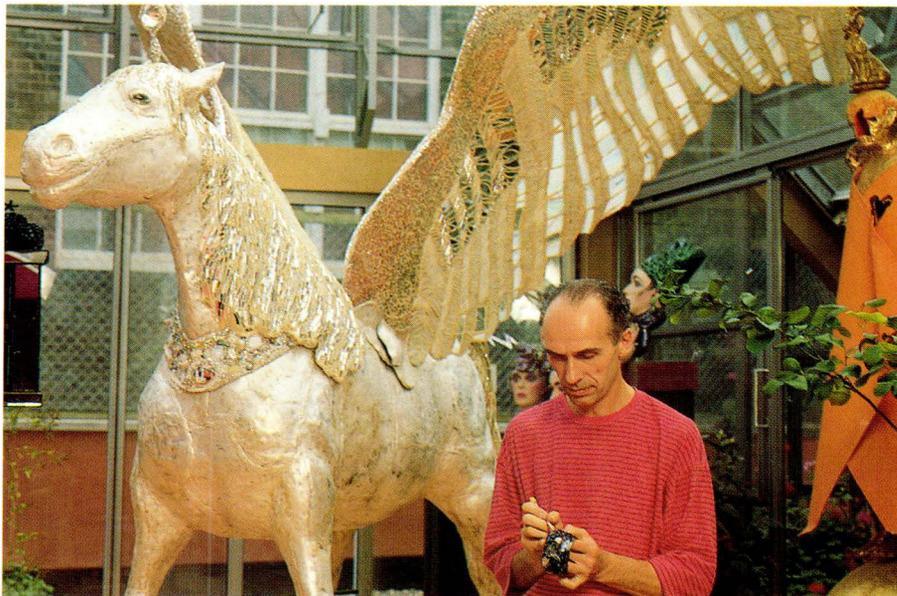
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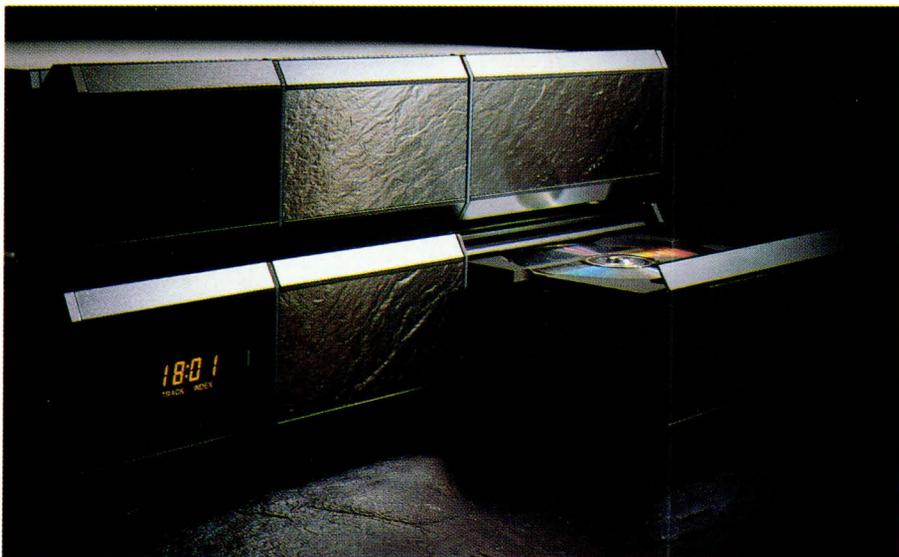
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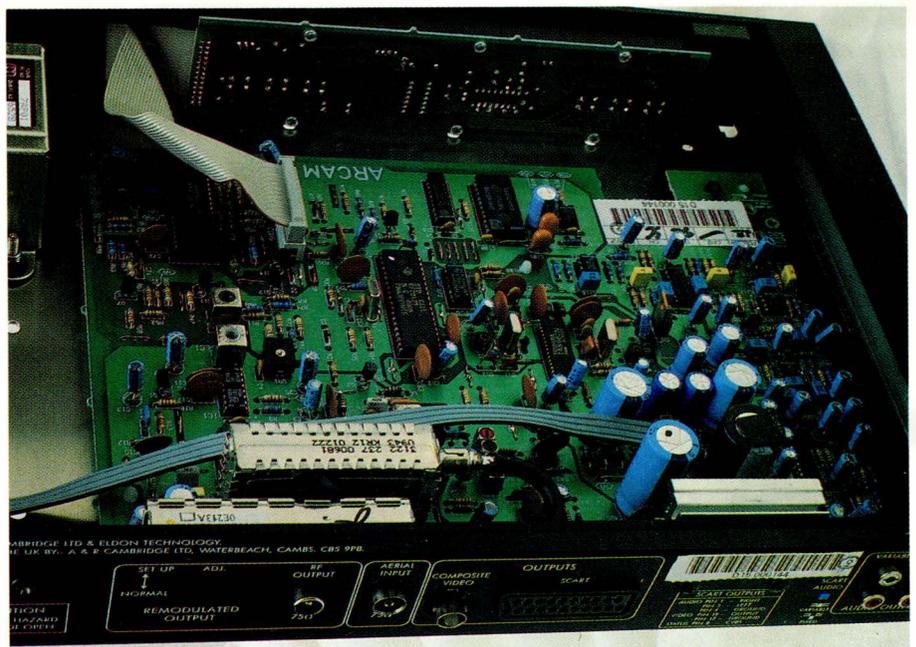
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Next month we're testing 24 new loudspeakers, plus there's a FREE



We experience the sound of Arcam's NICAM tuner in this month's Sessions.



FREE with this issue - a chrome C90 tape from Memorex. Details on page 35.

supplement all about the best blank tapes. And don't miss *The Collection*, Choice's essential and

unequivocal coverage of high-end audio - on sale soon.

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We're keeping the fan - but the Valdi and Series 500 amplifier are up for grabs!



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MASH

*SL - Z1000*

*SH - X1000*

*This new Technics CD player system is expensive. Very expensive. The two components, a drive unit and a digital processor, are linked by an interference-free fibre optic cable.*

*So with the drive unit isolated, it can extract and correct data while remaining dedicated to the single job of reading pure sound.*

*And with all the DAC decoding happening in the digital processor to avoid the slightest vibration or interference with the signal, you only hear exactly what you want to hear. Pure sound.*

*Indeed such is the quality of reproduction you'll always want to keep it within ear-shot. Safe and sound.*

---

*SL-Z1000 precision CD player combining high speed linear motor technology with high stability, anti-vibration construction.*

*SH-X1000 performance digital processor with high-end MASH D/A converter/noise shaping system and anti-jitter interface.*

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

---

**Technics**

For Music Lovers.

FORTUNE IN A MUSIC BOX.

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

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

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

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

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

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

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

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

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

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

Today, George Michael's



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

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

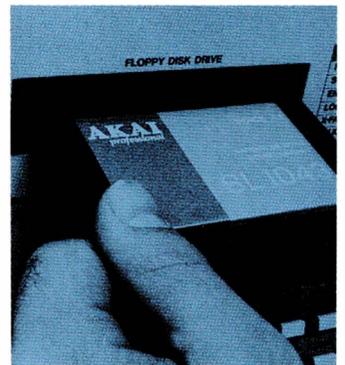
After spending up to six hours a day over the past eight months perfecting what he calls the "sound picture" of each song, Chris often listens to the tape on his Akai midi-system. Doesn't he



notice an incredible difference in quality?

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

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



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

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



**AKAI**  
always professional

# Update



## PRODUCTS

### 2000 finishes

Superb sound *and* style are rare attributes in hi-fi but a new company, launched at the Penta hi-fi show in September, showed that it had both. AV International has been founded by Martin Grindrod, of Kelvin Labs fame. The company offers a lineup of two amplifiers, a CD player and a tuner under the auspicious *Series 2000* banner. The equipment isn't cheap, but when one considers that the integrated amplifier has the claimed performance of Kelvin's *Absolute Zero* pre and monoblok power amplifier combination, plus being in a stylish one-box package and fully remote controlled, then £1,995 looks competitive.

AVI also offers a Monoblok amplifier (£2,495 a pair), £1,995 CD player, and £1,295 tuner. All the units can be controlled with one handset while manual controls are concealed behind a hinged panel on the fascia. A liquid crystal display on the front of every model tells the listener of its status; such as the tuned frequency or track number and time on the CD player. The system also offers two-room operation

using a second remote receiver (£250).

While the technical specification looks impressive to say the least, and probably sounds impressive considering the pedigree of AVI, the arresting feature of *Series 2000* is the styling. "By doing away with all the knobs we allowed a more radical styling," said Martin. "The front plates are finished in 1.5mm thick formica, and customers can choose whatever finish they like - there are 2000 variations available. Basically we're offering something like B&O with the styling, but of course this has the audiophile sound as well."

### Make it metal

While some hi-fi loudspeaker manufacturers maintain that doped paper cones still provide the most natural sound, Monitor Audio is going out for all metal drivers. The latest range of MA loudspeakers - *Studio 10* and *15* (with *20* to come), all use cones made from soft pure aluminium sheet - anodized with a ceramic coat. MA, a long term proponent of metal dome tweeters, says that the material gives very precise acoustic properties. The series excels in mid-range



Spot the Bacofoil: But the new MA 15 isn't a cooking speaker.

clarity, power attack and smoothness according to the firm. The latest addition, the 51cm high £1,500 *Studio 15*, uses the new bass and midrange driver in conjunction with the tweeter designed for the company's flagship *Reference 1800/Gold model*.

### Travelling hi-fi

When a man walked into our office carrying a suitcase, we thought he must be selling accessories such as brushes or record cleaning fluid. The case turned out to be a portable hi-fi system from Cambridge Soundworks of America. The UK distributor (for it was he!) opened up the case, switched on and we could hardly believe our ears - this *was* hi-fi and it *was* portable. It's a new product, and has been designed by the pioneer of such systems, Henry Kloss, who runs Cambridge Soundworks in Massachusetts. The system is called *Model Eleven* and retails in the UK for £499. It comprises three-channel amplifier, two six-and-a-half-inch high satellite loudspeakers, cable and subwoofer built into the case itself. There is also space in the case for a portable CD player, or cassette portable, of your choice (and your price). The system is an upgrade of Kloss' own stereo phonograph in a suitcase (*KLH Model 11*) marketed in



Slated to succeed? AVI's new line in separates offers a huge choice in fascia finishes.

the Sixties. Kloss has apparently been out of the industry for several years but has returned with the new company and two new products. Apart from the portable which won our vote on all counts from wacky to sound quality, there is the *Ensemble* - a loudspeaker system which uses two bass units taking the low frequencies (below 170Hz or the lowest two octaves) and a pair of satellite mid-high frequency units finished in dark grey nextel. Gold plated binding posts on all the cabinets promise something special, especially at the price of £299.

Both systems are available now - but only through mail order. "We prefer to call it 'manufacturer direct selling'; we can keep them cheap by cutting out the middle man," said the distributor, Konrad Stachel. However the company also believes that the best way to audition the system is in your own home, and offers a 30 day trial on both systems. Cambridge Soundworks UK, Hazlemere Crossroads, High Wycombe, Bucks HP15 7LG.

## New phase for Incatech

Two new Incatech products, an integrated amplifier and loudspeaker, are being launched to coincide with the company's latest change of ownership. The Incatech *Quattra* is something of a first - incorporating four separate power amp output stages allowing bi-amping of two-



*Hi-fi for a spy... Cambridge Soundworks has the ultimate audiophile holiday accessory.*

way loudspeakers, all packed into a slim minimal case. The price is £349. The *Prima* loudspeakers cost £269. Standing 20 inches tall (by 10 wide by 12.5 deep), the speaker is a two-way model featuring two sets of cable binding posts which the firm says make it ideal for use with the *Quattra*. *Prima* uses a one-inch aluminium dome tweeter, sourced from Denmark, and an eight-inch mid-bass driver. At the time of writing, the company was hoping to offer a real wood veneer finish on the speaker.

The changing fortunes of the amplifier specialist are hopefully due for a more settled spell. Founded in 1985, Incatech won early acclaim for excellent amplifier designs with the *Claymore* and *Sabre* models. After several administrative changes, the company has been taken over by AAS Ltd, a St Ives (Cambs) based electronics firm specialising

in PCB (printed circuit board) assembly, which is run by Paul Bulling - one-time designer of Lentech amps. Russell Kauffman, Sales Director of Studio Power, which had been handling Incatech, now takes over the sales operation at AAS. Colin Wonfor, Incatech's founder and the brain behind all the products, remains as designer.

## BUSINESS

### Wharfedale takeover, and over

Wharfedale plc has its cheque book out at the moment. The loudspeaker company has bought electronics specialist Cambridge Audio which went into receivership in August. The move allows Wharfedale to enter the electronics market; it will now take the full range of Cambridge separates (CD players, amps and cassette deck) into the marketplace. Cambridge was due to launch its new range at Penta, but bankers pulled out before it could make any money. "Basically they were right on the edge of getting it right with the new equipment," said Wharfedale chairman Ashley Ward, "what they got wrong was the finances."

Cambridge will be run from Leeds, but the manufacturing facility will remain at St Ives. The move gives Wharfedale the staff and facilities to re-launch the *Leak* brand of amplifiers -

'sometime in the next year' according to Ward. Never one to do things by halves he added that Wharfedale was also near to buying another British 'high end' designer electronics brand based in the South East. Watch this space.

## Ariston winners

Another month means another bunch of lucky winners here at *Choice*. This month we've picked the winners of the Ariston competition run in the September issue. The big first prize went to Craig Brown from Alton who wins a complete system comprising Ariston *Q Deck* turntable and arm, remote control *Amplifier* and *CD Player* with *Image II* loudspeakers. Second prize of a stylish Ariston *CD Player* went to Gordon Smith of Scalby, Scarborough and the third prize, an *Icon* turntable, was won by Peter Gregor of Newport-on-tay. Green with envy? Then don't miss your chance to win some fabulous Audio by Design equipment this month (see page 44).

## PRODUCTS

### Italian style

Milan - September 20: The Italian pro sound specialist RCF has launched a range of hi-fi loudspeakers which will be arriving in the UK as this issue of *Choice* is published. Dubbed *Mytho*, the range consists of four loudspeakers, priced from £450 to just over



*Hi-fi under a tree. Lucky winners walk away with Ariston.*

£1,600. *Mytho 1*, the baby of the pack is a bookshelf-type model, which on first impression will take on the likes of the similarly priced KEF 101/2 - and give it a run for its money. *Mytho 2* is slightly larger and uses a carbon fibre elliptical mid-bass driver which RCF believes is better suited to the typical living rooms of today, the two and three-way floorstanding 3 and 4 models also employ elliptical drivers for the same reason. The idea behind the elliptical driver is that the speaker reacts better in an environment where the ceilings are comparatively low. All the speakers use the same metal dome tweeter. RCF says it has adopted the British philosophy in designing the *Mytho* range, and more or less admits it has cribbed ideas from the top UK manufacturers. The finish is all Italian, however, and a variety of real wood veneers are available from brier to light natural ash matched for symmetry in a pair.

RCF has made loudspeakers for the budget to mid-price home market for many years; the company has been making public address systems since it was founded after the second world war, and also makes a range of In Car speaker systems. RCF UK is based in Laindon, Essex. Tel: (0268) 415150.

## NAD CD players

Two new CD players from NAD have been launched using the Technics MASH PWM bitstream digital to



### This year's Milan collections: Mytho hits the catwalk.

analogue converters. The NAD 5000 and 5440 are functional no-nonsense designs following the company's tradition and cost £310 and £290 respectively. Apart from using 'one-bit' D/A conversion, the players offer separately regulated power supplies - eight in all, dedicated to the different functions within the player - and CDR. CDR, or controlled dynamic range, is an optional feature which compresses the dynamic range of the player's output and is said to deliver better results when taping (for the car) or listening late at night at low levels. Both players are remotely controllable and feature a digital output for coupling to a DAT machine say.

## Room to improve?

Room acoustics have a significant effect upon the performance of any hi-fi system - one is often listening to the room itself as much as the hi-fi and acoustics of the recording situation.

Addressing room acoustics is

a complex task but help is at hand in the form of Bob Burns, an engineer who runs Room Acoustics Services. For a fee (£195) RAS offers a postal consultancy which assesses the characteristics of your room and analyses its acoustics such as 'low frequency room induced



effects'. RAS also works with dealers. Room Acoustics Services, 3 Elizabeth Way, Barton-upon-Humber, South Humberside DN18 6AJ. Tel: (0652) 635523.

## Goodmans for audiophiles?

Well not quite. But the company that brings you microwaves and loudspeakers is adding to its

newly established range of hi-fi separates with *Series 600*. The new separates follow Goodmans' launch of the 435 series earlier this year and offer customers a chance to realise some 'brand loyalty' to the company. An amplifier (£140), digital tuner (£90), compact disc player (£140), twin cassette deck (£100) and graphic equaliser (£80) are sourced from the Far East to make up the range. The whole system is remotely controllable using a 30-key pad which comes with the amplifier.

## Finial's Phoenix

The Finial *Laser Turntable*, launched in the UK earlier this year, has been taken on by a Japanese company. The

### Goodmans moves upmarket with Series 600.

ELP Corporation, based in Tokyo, has bought the patents from US-owned Finial Technology and plans to sell the *LT-1* for around £11,000 - half the original market price!

The *LT-1* reads conventional vinyl records with a laser beam. As there is no stylus, its main selling point is that record wear is non-existent. However, the original UK launch turned into the proverbial damp squib, with the distributor here pulling out after admitting that the machine was finicky to use and required records to be meticulously cleaned before each playing. Neither the BBC nor the British Library's National Sound Archive were impressed by the unit.

Now ELP is selling the *LT-*

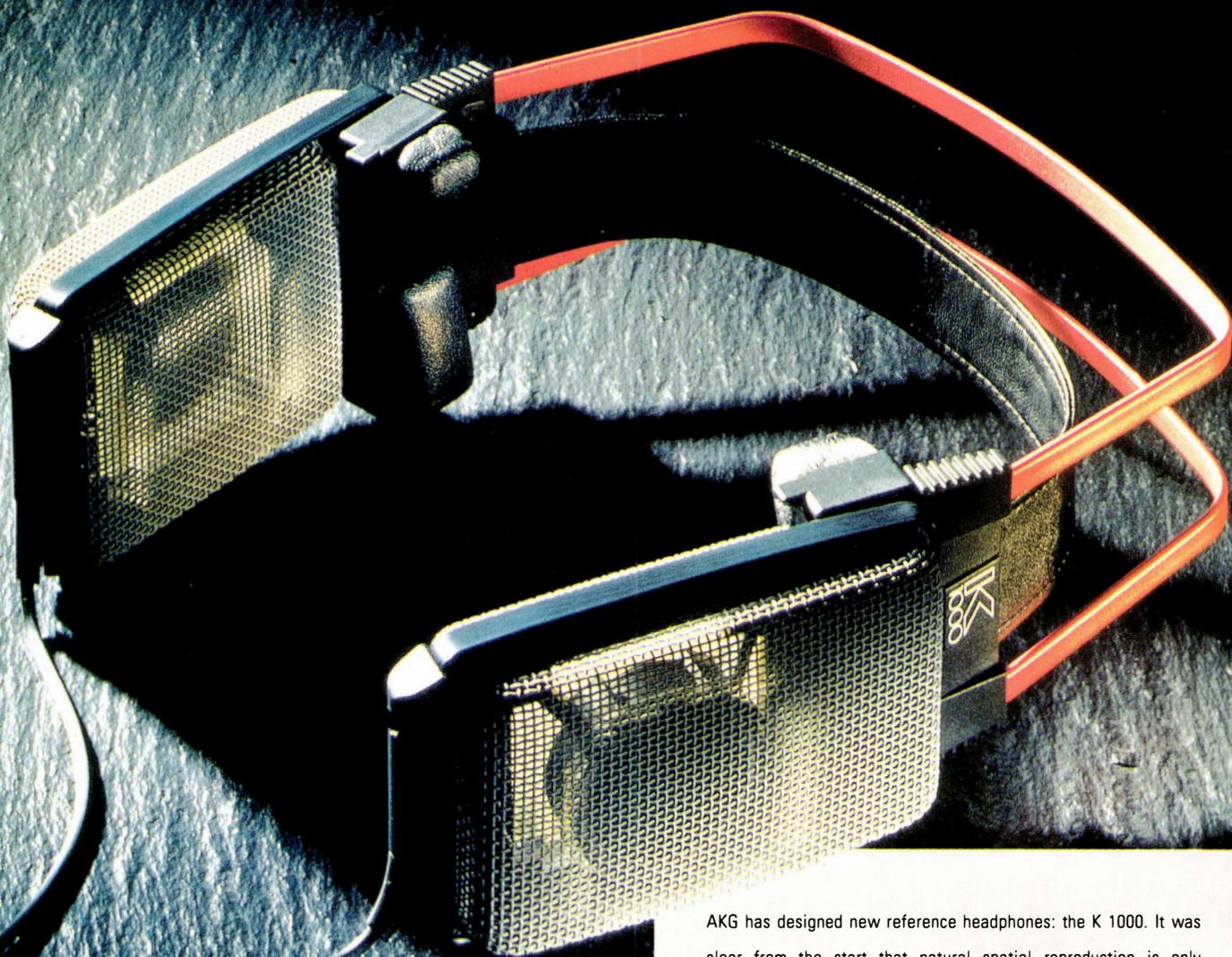


The more expensive of NAD's brace of CD players, showing at a shop near you.

# AKG

ACOUSTICS

## A New Reference: The AKG K 1000



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

Based on unbiased studies of all transducer types, AKG chose the proven dynamic transducer. However, AKG has updated this concept by developing a new type of magnet assembly called the VDL (Ventilated Linear Dynamic) magnet, using laser interferometry, and coating the diaphragm with an organic violin varnish formulation that has been in use for centuries.

The way in which state-of-the-art audio technology has been put to work in carrying out a revolutionary idea placed the K 1000 in the "Reference" class in all reviews that appeared to date. Listen to the Reference at the selected K 1000 dealer nearest you.



AKG AKUSTISCHE U. KINO-GERÄTE GESELLSCHAFT M.B.H.  
Brunhildengasse 1, P.O.B. 584, A-1150 Vienna/AUSTRIA  
Tel: (1) 95 65 17-0, Telex: 131839 akgac a, Fax: (1) 95 65 17-245

AKG ACOUSTICS LTD.,  
Vienna Court, Lammas Road, Godalming, Surrey GU7  
1JG/GREAT BRITAIN  
Tel: (4868) 25 702, Telex: 859013 akgmic g, Fax: (4868) 28 967



*Final: It looks the same... but the men who make it now say it's different.*

1 under the aegis of improved manufacturing techniques, and claims that it will play (12inch) records which have been subjected to severe stylus wear, warping, scratching and 'even some cracking'. Initial reactions in the *Choice* office were a little sceptical, especially since the photograph accompanying the press release included a wet and dry pre-cleaning machine. Time, and hopefully hands-on experience, will tell on that one.

ELP UK: PO Box 12,  
Haslemere, Surrey GU27  
3AH. Tel: (0428) 54011.

## Rogers reappraisal

One product which failed to get a mention in dispatches in our Penta show report is the P-24, a new metre-high floor-standing loudspeaker from Rogers. The £1,400 flagship model is a three-way bi-wireable design which comes with its own adjustable spiked stand. It uses Rogers' own drivers - a 200mm long throw bass unit, new 165mm midrange driver and 25mm aluminium dome tweeter - and is crossed-over at 110Hz and 2.3kHz. Internal wiring uses van den Hul cable. Rogers says it has a winner in the P-24 and adds that the speaker is a 'reappraisal of the company's design approach'. Rogers' established low coloration and smooth response characteristics have been adhered to while attention to dynamics, bass extension, power handling and sensitivity should allow the P-24 to stand up to any

competition it may meet. P-24 is available in black ash and walnut veneer but if you twist the company's arm you may be able to get a piano black or rosewood finish.

## Divide and rule

Philips is relaunching the Pye brand in the UK in a move which effectively gives the electronics giant two feet in the door of the consumer electronics market. Pye products have been designed to be straightforward and easy-to use and are due for immediate launch with a range of TVs and a VCR with on-board teletext and Astra satellite reception. Later, the range will include personal stereos, clock radios and midi systems. While Pye products will undoubtedly appeal most to the generation which best remembers them, the company says equipment has been designed for all sectors of the market from teenagers upwards. The relaunch of Pye comes as Philips tries to eschew any downmarket image of itself; the new Pye hat will allow Philips to push up-market with its products.

## Advance on High Street

Yorkshire Electricity is bankrolling a new chain of shops - Advance - which will sell audio and video equipment in both the manner of the specialists and the chainstores. Advance shops offer listening rooms and a hands-on approach to equipment and system building, with free delivery,

testing and installation - up 'till now the mainstay of the specialist independent hi-fi dealers. But Advance also wants to take on the giants such as Dixons by offering a wide range of equipment - both audio and video - and by siting shops in prominent shopping areas. Yorkshire Electricity's Retailing Director, Peter Harris, says sales staff will speak English - not gobbledegook, and customers can buy what they want. It's a sad reflection on the retailing of electronics that this needs to be pointed out. The first three Advance shops are sited in Sheffield, Huddersfield and Leeds.

## Koss headphones for life

Leading headphone manufacturer Koss has extended the warranty on all models, giving them a lifetime guarantee. The company promises to repair or replace faulty headphones with a model of equivalent value. The bold step will cover all headphones sold from June 1990, but only applies to the original purchaser. Koss also requires a single £5 'handling fee' for models more than a year old. So keep those receipts!

## Alphason stands tall

Alphason is keen that you should be aware that the equipment rack we reviewed in the supplement given away with issue 83 (June '90) is not called the R355 as we dubbed it but R444, and that it retails for £20 more than the printed price of £99.95. The company also produces a five tier glass shelved version called GR5555 which retails for £240, details of these and a matching range of speaker stands can be had from Alphason on (0942) 876308.



*Rogers speakers aren't good at David Bellamy impressions...*



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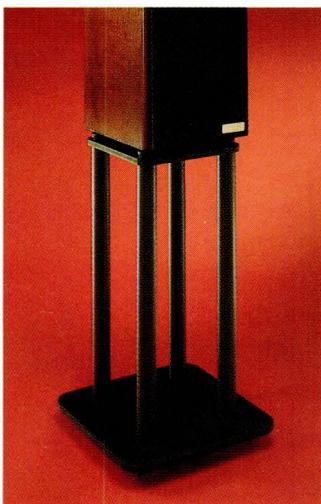
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## S is for Seven

In the naive and not so distant past, the only way to charge more money for loudspeakers was to make them look as if they were worth more, by making the box bigger or putting in more drive units (preferably both). But now that sound quality is the prime criterion, it's widely appreciated that size is no indication of quality. Miniature speakers today can cost anything up to £2,000, but few manufacturers can match Royd's commitment to the breed, and specifically the seven litre enclosure.

Already a feature of the established *A7II*, *Coniston R* and *Eden*, Royd is introducing no fewer than three new models, all precisely the same size but differing significantly in price and engineering. The £140 *Seven*, £198, *Sapphire* and £330 *Sintra* all use an unusual, newly developed rear port/driver brace made from a high density but lossy material, but differ in terms of driver quality and cabinetry.

For example, the *Seven* uses the Audax tweeter that is found in so many successful miniatures, whereas *Sapphire*



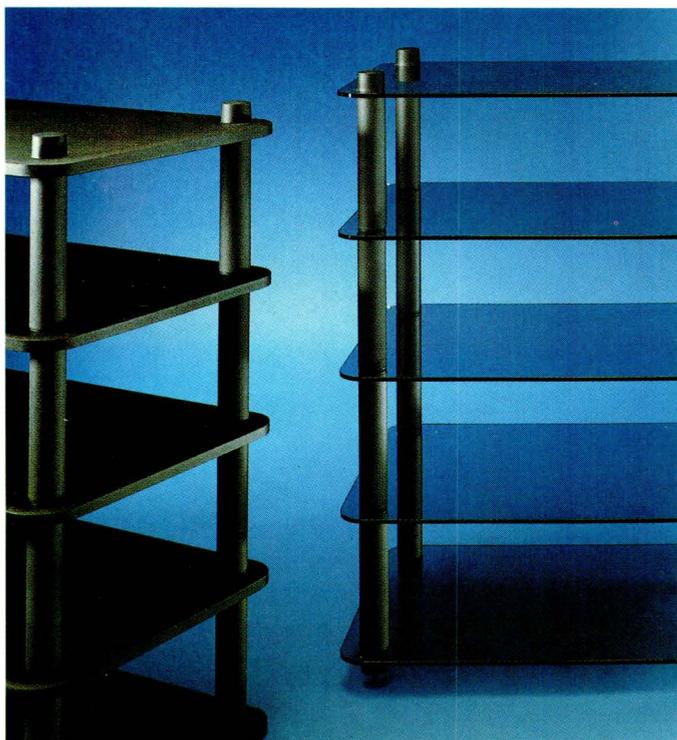
*A lifetime of listening to the new Koss TNT/88 cans: Like all other Koss 'phones they are guaranteed for life.*

has a Vifa (like the *Eden*) and *Sintra* uses a Scanspeak. *Sintra* too has 5kg of cabinet mass loading (like the *Eden*). All of which means you can now spend anything from £115 to £330 for Royd's variations on the most popular size around.

## TECHNOLOGY

### DCC will happen

Philips DCC (digital compact cassette) equipment will be launched in 1992 with home, portable and In Car players. Sketchy details are available but DCC systems will use stationary heads, and software will be the same size as audio cassettes - but with a sliding cover like DAT tapes. DCC is also capable of mass duplication at high speeds. The original idea behind DCC was that cassettes would be both digital and analogue - much in the way that Hi-fi VHS video tapes with FM encoded soundtracks include a standard low-fi linear track enabling them to be played on 'ordinary' VCRs. However this isn't the case with DCC; digital tapes will require digital machines although the players (priced around £300) will play normal cassettes. DCC will be copy guarded with a Solo Copy chip like DAT machines.



Colour me grey: Alphason speaker (top) and furniture stands.

## In brief

Banbury specialist Overture is holding a Quad music evening on Tuesday December 11. Limited but free tickets are available from the shop. Tel: (0295) 272158.

Headphone specialist AKG Acoustics is to distribute the Acoustic Research range of loudspeakers in the UK and Eire. AR recently closed its British loudspeaker manufacturing base and now makes all products in America.

Jeffries Hi-Fi, the specialist with established branches in Eastbourne and Brighton, has opened a new shop in Portsmouth. Offering the best of both British and Far Eastern brands, the shop can be found at 29 London Road, North End, Portsmouth. Tel: (0705) 663604.

Sound Principles, of Wellingborough, Northants, is planning a Quad musical evening on Wednesday November 21 commencing at 8.00pm. Free tickets are available from the shop. Tel: (0933) 441907.

The eighth annual Paul Roberts Hi-Fi and Video Show will be held in Weston-super-Mare over the weekend November 24 and 25. The show promises exhibits from all the major manufacturers and admission is free. Doors open from 10.00am to 7.00pm and the venue is the Berni Royal Hotel on the seafront.

Sevenoaks Hi-Fi and Video has moved the location of its Oxford store to larger premises at 41, St Clements, Oxford.

Wakefield has a new specialist dealer - Image Hi-Fi, which opens in November at 17, The Springs, Wakefield.

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### Under the bonnet

As predicted in our October issue, Pioneer's A400 integrated amplifier is taking the UK market by storm. John Bamford peeps under the lid to see what makes it tick.

The telephone in the *Choice* editorial office has been red hot since my article on the Pioneer A400 amplifier, published, two months ago. Is the A400 really that good? Are we in danger of leading readers astray when saying it possesses a clarity through the midband which is not bettered by £2,500 triode valve amplifiers?

Well, let's put this into some kind of real world perspective. For starters, the £230 A400 is a remarkable amplifier for the money. (So too is its cheaper stablemate, the £180 A300, which I heard for the first time a couple of weeks ago making splendid sounds with a pair of Wharfedale 502.2 loudspeakers.) But of course it isn't the best amplifier money can buy. The key word here is 'money'; I would argue that the A400 is probably as good an amplifier as most listeners are likely to aspire to - and only if you demand state-of-the-art performance, regardless of cost, are you likely to want for something better. Better to spend your budget on a better source or higher quality loudspeakers.

### Incredible, but true . . .

Don't laugh, but for the past couple of weeks I've been using the A400 to drive a pair of £8,000 Townshend *Sir Galahad* loudspeakers, towering monstrosities which were pictured in our report from the Penta hi-fi show last month. And my setup at home was sounding just fine - until Jason Kennedy popped round to visit the 'Bamford Basement' one evening with the fabulous (and fabulously priced!) Audio Note *Ongaku* amplifier in the boot of his car. We fired it up, all £30,000 worth of glowing tri-

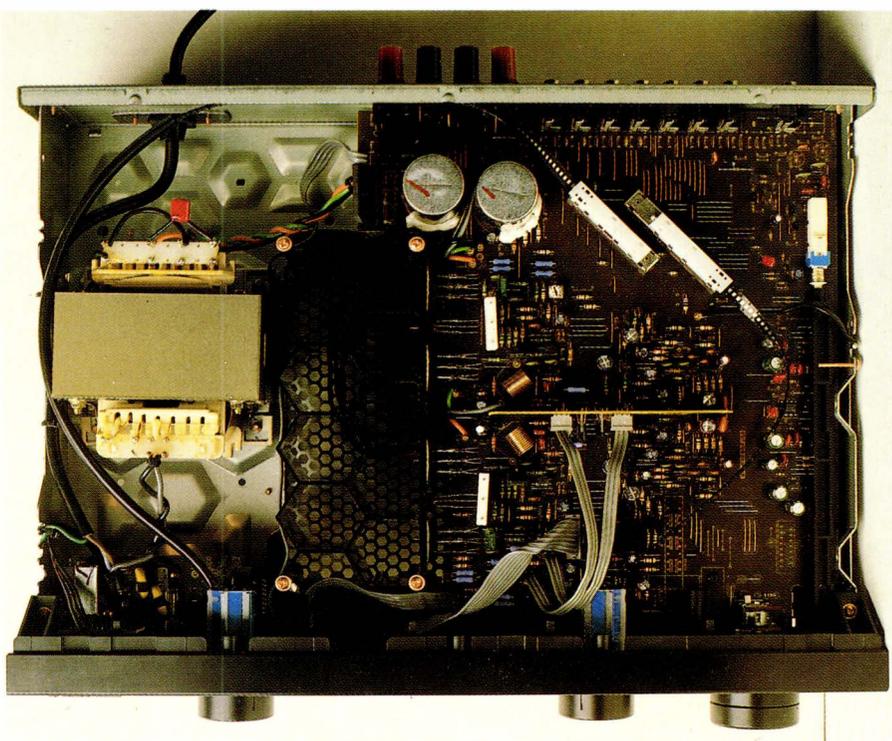
## Choice Sessions

*Things we hear. . . This month: hands-on experience of the Arcam Delta 150 NICAM TV tuner; Tannoy's Limited Edition version of the E11 loudspeaker; looking inside Pioneer's superb-sounding A400 integrated amplifier.*

odes and transformers wound with pure silver wire, and what previously had been a superbly clear and 'fast' sound suddenly became more 'real'. Gone was the transistor 'edge' and 'glare' (which we hadn't really been aware of until we eliminated it), Tracy Chapman's voice and acoustic guitar taking on a sense of true realism which I find impossible to put into words alone. You need to hear the difference, as we heard it that night, to appreciate what you get for your extra £29,800 (!).

And where the A400 does reveal its shortcomings in particular is in the infra bass region. Again, though, this needs qualifying: you won't hear (feel?) its shortcomings unless the loudspeakers you are using have appreciable output below 50Hz, your source is approaching

*Lifting the lid on this year's audio bargain, Pioneer's A400 50 watt integrated amplifier.*



state-of-the-art quality, and the software you're playing contains significant LF information anyway (which sadly is all too rare these days).

It's difficult to ascertain precisely what makes the A400 such an exceptional amplifier. One aspect of its design which is promoted heavily by Pioneer is its 'Super Linear Circuit'. The philosophy is to make the 'naked' characteristics of the amplifier circuit as good as possible in order to reduce the amount of negative feedback required, conventional feedback loops having been recognised by audiophiles around the world as having a degrading effect on sound quality. What Pioneer is doing is using PNP and NPN transistors (nominally identical devices, except that their polarity is inversed) connected inversely and provided identical operational conditions. The idea is that non-linearities inherent in the devices – which in PNP and NPN transistors are precisely opposite – thereby cancel each other out.

### Better to come?

The world is not perfect, however, and while PNP and NPN semiconductors are nominally 'mirror imaged' my understanding is that they can never be *absolutely* identical. It makes you wonder how much further this circuit could be developed in the future . . .

Another 'key' design feature of Pioneer's A300 and A400 amplifiers is what the company terms its 'clean ground' system. Much attention has been paid to proper star earthing, of course, while the transformer has been electrically insulated from the chassis and a bypass is used to prevent noise currents created by the transformer core from contaminating the signal line. I suspect the latter has much to do with the amplifier's notable clarity and remarkable ability to resolve low level detail.

Pioneer's engineers have really gone to town with these designs, taking note of the way even the smallest resonances in the structure can affect the perceived sound quality of an amplifier, and keeping signal paths as short as possible. Needless to say they've scored a 'bullseye' – attested to by the unanimous praise these amplifiers have earned from hi-fi enthusiasts throughout the UK. I wonder how long it will take for the rest of the world to catch on.

### NICAM by Arcam

Paul Messenger has been listening to (and watching) Arcam's new Delta 150 NICAM stereo TV tuner.

Many readers will doubtless know that NICAM is a new(ish) and very clever system which allows terrestrial TV broadcasters to stick a digital stereo soundtrack in amongst the existing picture and mono FM sound signals.

That it's an acronym for near-instantaneous companding and audio multiplexing is perhaps less interesting than the facts that some 78 per cent of the population should be able to receive NICAM ITV transmissions by the end of 1990, and that an increasing (though still low, ie less than 20 per cent) proportion of today's programmes now have proper stereo soundtracks.

From a hi-fi perspective, NICAM must be regarded – indeed welcomed – as a very important new source of high quality stereo audio signals. How it will fit into the hi-fi hierarchy must remain to be seen – less important than vinyl or compact discs but on a par with FM radio is my guess.

TV isn't such a natural music medium as radio, but stereo sound provides a fine enhancement for other types of programming as well – sport and drama particularly. And since plenty of audiophiles spend at least some of their leisure time watching television, it makes a lot of sense for a specialist hi-fi company such as Arcam to produce a dedicated NICAM tuner which integrates neatly with a decent quality hi-fi system.

The £350 pricetag may seem steep compared with the £100 or so price premium that CTV or VCR manufacturers expect to get for fitting NICAM decoding circuitry inside the chassis of their

sets/machines. But then a real hi-fi system costs a lot more than the cheap one-piece midi system that does a similar job: the proof of the value must be found in the listening experience.

Arcam has long had in mind producing a high quality TV sound tuner, even before the NICAM possibility presented itself. Well experienced in amplifiers, tuners, CD players and DACs, the one relevant area where the company had no track record was at the front end of the tuner section, specifically the reception and de-processing of the PAL TV signals, and the initial extraction of the NICAM data.

### 'Monitor Standard'

By happy chance Arcam met up with Yorkshire consultant engineers Eldon Technology, an operation set up by ex-Ferguson research engineers following the Thomson takeover. Key personnel had been closely involved with broadcasters and chip manufacturers Texas Instruments since the earliest days of NICAM development, and Eldon was already preparing to introduce a specialist, high quality NICAM tuner package.

The Eldon tuner technology dovetailed neatly into Arcam's *Black Box* type digital decoding, audio processing, ergonomics and build to create what Arcam calls the *Delta 150* 'Monitor Standard TV Tuner'. It's a simple, elegant black unit which matches Arcam's other components cosmetically, but will slip pretty unobtrusively into any stack of full width (430mm) hi-fi components.

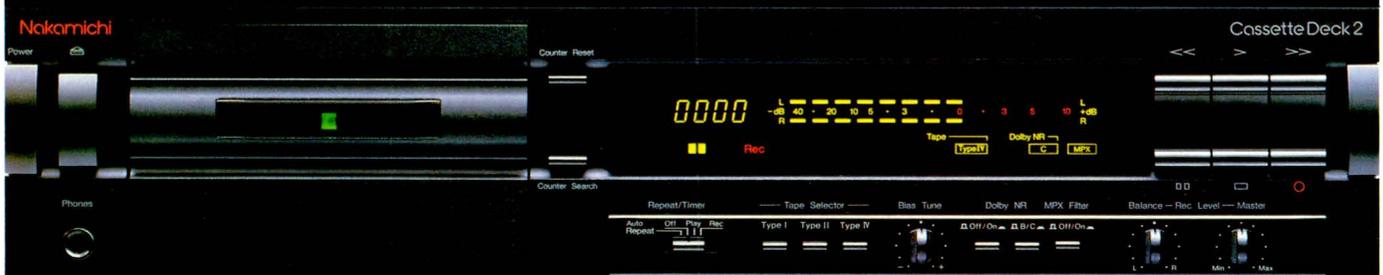
Front panel controls are limited to six



Eldon tuner technology dovetails neatly into Black Box type digital processing.



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buttons, a couple of LEDs and a simple program number display, but a remote handset duplicates programme selection, adding mute and a beautifully gradual remote volume control. The rear of the unit has a good sprinkling of sockets which should make interconnection with other audio and video gear pretty straightforward. 75ohm RF (aerial) in/outputs allow the unit to be daisy-chained with VCR and CTV, the tuned channel being remodulated and presented on channel 36 for those without A/V sockets on their CTVs.

Raw video (CVBS) is also available from a single BNC, while the accompanying stereo audio can come from either of two pairs of phono sockets, one at fixed level, the other variable from the remote handset. Or there's a SCART socket which parallels these A/V base-band connections, maintaining the fixed/variable audio volume option by means of a small selection switch.

Technically, the tuner section uses the latest surface acoustic wave (SAW) filters in quasi-parallel operation to avoid the need to compromise between sound and picture performance.

### Bits 'n' pieces

The audio side starts with the QPSK-decoded NICAM 728k-bit datastream being fed to the TI CF70123C decoder chip, the 14-bit 32kHz interleaved stereo digital signal is then passed to the same Philips multi-bit (16-bit, 4x oversampling) chipset that is used in many of the better CD players around. Subsequent audio processing uses top quality components, helped by five separate regulated supplies. The usual switched test signal enables those using RF connections only (tsk tsk) to tune channels 35-38 to the Arcam, and the usual adjustment thereof should be sufficient to allow it to share the transmission gap with a VCR.

Tuning in the *Delta 150* is a bit of a chore. Since there's no indication of either frequency or channel number, you're in the dark scanning up or down the band until you find the wanted stations. The only source of assistance is that the NICAM LED glows orange instead of red when a NICAM subcarrier is detected; the sound remains mono FM until the NICAM button is pressed, whereupon this indicator glows green, a second green indicator labelled stereo lights up, and the sound might burst into glorious stereo (if you're lucky, and hit a genuine stereo



*The £350 Delta 150 fully justifies its 'Monitor Standard' pretensions.*

broadcast).

Assuming the correct channel has been selected for the indicated programme number, pressing 'store' locks the whole set-up into memory. Up to eight channels may be memorised in this way, which should be quite sufficient for the foreseeable future.

On the connection side I had no difficulties, connecting either to a twin-SCART CTV or daisy-chaining SCARTs via a twin-SCART VCR. Arcam suggests the unit ought to be placed amongst the hi-fi, which makes good sound sense though it might present the unwelcome prospect of running a long fat SCART lead to the TV/VCR.

Having mastered the tuning-in process, the *Delta 150* fully justifies the pretensions of its Monitor Standard TV Tuner name. Not only is the NICAM sound quality considerably better than that delivered from more mainstream consumer electronics products, but the CVBS video output is significantly better than the norm too.

Having sampled some twenty different NICAM implementations over the past eighteen months, I'm in absolutely no doubt about the Arcam's sonic superiority, even via its variable output sockets. My working reference which has hitherto matched or beat allcomers is the Ferguson *FV-39S* VCR, but the superiority of the '150 was obvious and clear when the sound output of each was fed into a high quality hi-fi system. (Whether it would be as noticeable using a pair of Wharfedale *Active Diamonds* is more difficult to predict.)

The Arcam's sonic superiority lies partly in its ability to set down a solid and firm bass foundation, which in turn creates a firmer, more generous and stable sound, and partly in the impressive transparency to the broadcast signal, which brings the sound out of the loudspeaker boxes and creates an impressively coherent and informative soundstage.

People simply sound more like people and less like electronic simulcra,

thanks to the fine subjective speed, timing and dynamics. It is also perceptibly tidier and sweeter at the top end, and altogether a more relaxing experience. I was surprised to discover that the *Delta 150* was quite capable of discriminating between a broadcast signal fed direct from the aerial and one fed via a (decent quality) distribution amplifier, the former sounding clearly superior on a live *Top of the Pops* transmission, especially at low frequencies. No, I don't quite believe it either, but it happened.

Indeed, it has proved impressively transparent to the workings of the sound broadcast chain itself – NICAM or conventional mono FM – frequently showing up errors in the mixdown, which can be very entertaining.

It's still early days to assess the performance capability of NICAM sound per se, since one is entirely at the whim of the broadcast signal and it is next to impossible to perform any repeatable comparison. The nearest thing to an A/B comparison is found in the BBC simulcasts, in which the same programme is delivered in NICAM alongside the TV pictures, while at the same time the sound is carried by a stereo FM radio station. The most obvious regular example of this is *Top of the Pops*, but the hyped-up-to-hysteria sound mix isn't the best medium for making assessments of musical subtlety. The Proms season live (once a week) from the Albert Hall is a much more promising prospect.

### Nicam versus FM

I took great care to get everything ready in time for the Beethoven *Eroica*, performed on September 2nd, and was surprised at the amount of difference between the NICAM (Arcam) and FM (Naim *NAT01*) feeds. It sounded as though both routes were sharing the same microphone feeds, simply because the stereo perspectives didn't shift noticeably when switching from one to the other, but there was no avoiding the fact that listening to the FM stereo feed

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was an altogether more pleasant and listenable experience.

This could of course be due to different mixdown, EQ and so on in the transmission side of the chain. I've asked the BBC for more information on this, and am waiting for further comment. But on the evidence of this particular broadcast, I have to conclude that the NICAM signal suffers much the same sort of degradation in the subtle textures and richness of the string sounds in particular as seems to be the affliction of the CD medium. The FM sound was richer, fuller, more coherent and more relaxing to listen to, while the NICAM sounded by comparison harder, brighter, somewhat compressed and altogether less 'easy' and more 'forced'. Applause in particular sounded mechanical, more like rain on a corrugated iron roof than a passionate ovation.

While the Arcam tuner delivered a clearly more natural and superior sound than a top quality (Ferguson) VCR, the difference between these two was not as great as that between the two simulcast transmissions, where the FM was clearly and comfortably superior, by a significant margin. However, whether this is a function of the medium, differences in on-line signal processing or transmission paths, or the difference between a £350 NICAM tuner and a £1,000 FM device is, of course, impossible to say at this stage.

What is abundantly clear is that the Arcam *Delta 150* execution currently sets the NICAM benchmark by which others should be judged. The hoi poloi seem to be happily paying the £100-150 premium that NICAM currently adds to the price of a new CTV or VCR, but the hi-fi enthusiast is unlikely to be disappointed by the performance which this £350 standalone tuner can deliver.

## Limited Edition, unlimited improvement

*Tannoy has developed an improved version of its E11 loudspeaker, a special Limited Edition model which costs an extra £20. Paul Messenger had a sneak preview. . .*

Though Alvin Gold rated its *Eclipse* predecessor a Best Buy, and Tannoy's *E11* has proved a big success amongst reviewers working for other hi-fi magazines, I – and the blind listening panel for that matter – were rather under-

whelmed by the sound quality when carrying out the *Choice* review in May this year. Neutral enough and capable of nice stereo perspectives, I also found the *E11* sluggish and congested, with indifferent timing and speed.

I wouldn't go so far as to suggest that Tannoy actually agrees with me, but its latest model certainly confirms that the engineers are aware that the standard *E11* is capable of improvement, albeit at some increase in manufacturing cost and price.

Said latest model is the *E11LE*, a Limited Edition run of 1,000 *E11s*, each one with £20 worth of extra 'tweaks' to improve the performance of the basic package, taking it from £129 to £149 a pair. It was officially introduced at September's Penta hi-fi show, where the demonstration quality was disappointing, but I managed to get a sneak preview under excellent conditions when visiting the factory a couple of weeks earlier.

## Numerous tweaks

Resembling in some ways the feature package that separates the *M20* from the *M15*, the task of developing the *LE* was given to Graham Hendry, one of Tannoy's younger engineers. The 'tweaks' are numerous enough, though each alone seems quite modest.

The most elaborate change is a complete internal cross-brace system which dramatically stiffens the cabinet and couples lossily to the driver magnet.

This now has its stray flux cancelled, while internal wiring is by van den Hul, the crossover uses uprated components in a simpler configuration, and gold-plated terminals are fitted. All of which seems more than fair justification for the price premium. The only possibly retrograde step is to revert from blue to gold baffle trim to distinguish the *LE* model.

With drivers and carcass much as before, one might not expect too great a change in the sound quality. One would therefore be mildly dumfounded by the transformation which has taken place. Compared on the end of a top quality system in a good sized listening room, the standard *E11* sounded rather as I recollected it – polite but unforthcoming and lacking in both speed and coherence.

The *LE* variant is a totally different loudspeaker, with the sort of tightness, tautness and all-of-a-pieceness that dramatically improves its ability both to hold the attention and to get the musical messages across. *LE* transforms the standard *E11* into one of the best things I've heard for £150 – and I suspect it could well see off the £230 *M20*, partly by virtue of its smaller main driver and cabinet, though I didn't get a chance to try that comparison.

Tannoy is threatening to limit production to 1,000 pairs, though if it's the commercial success I believe it deserves to be, I'm sure they'll come up with an *SE*, a *GTI* or some other convenient cliché when the serial numbers run out.



*Tannoy E11: listen out for the forthcoming Limited Edition version.*



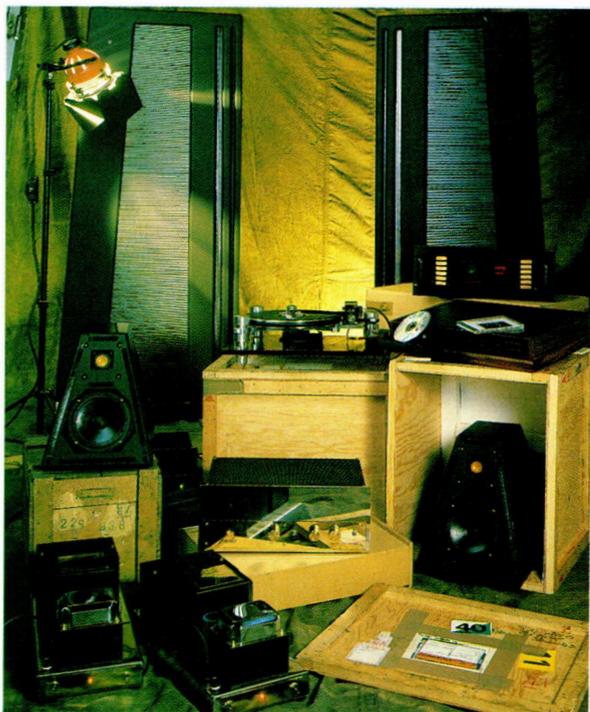
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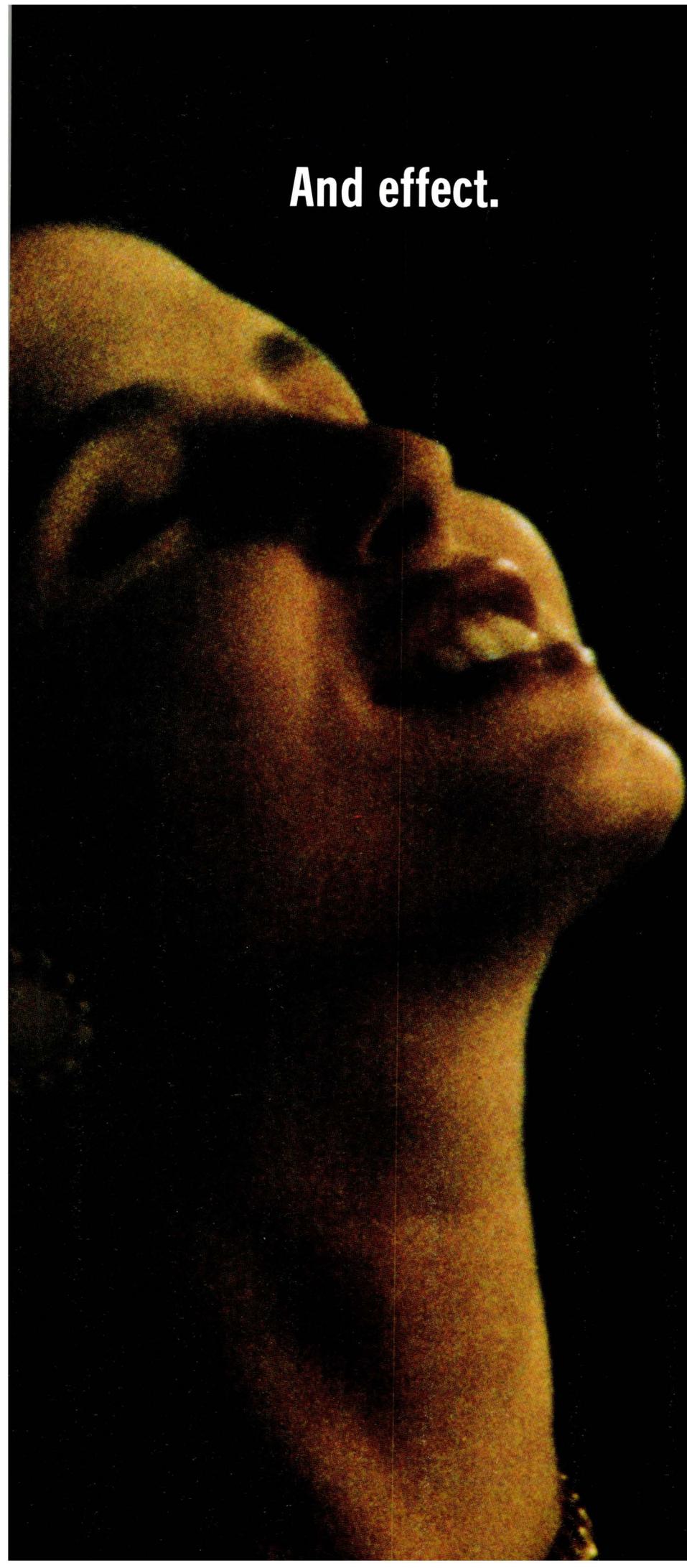


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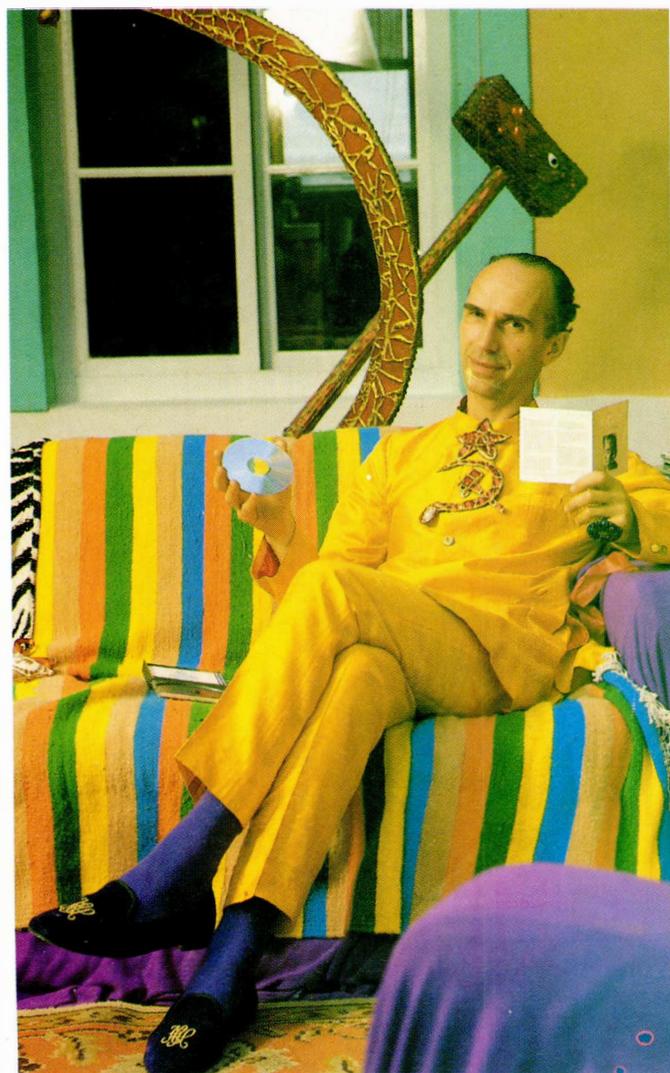


# Interplanetary Communication

*The sculptor Andrew Logan talks to Dan  
Houston about his art and hi-fi - which turn out  
to be one and the same thing. Photography by  
Colin Clark.*

"I'd be much more rich and famous if my name was Andrei Loganovitch," jokes Andrew Logan, cynically referring to the art world's present fascination with all things Russian. The Glasshouse, his studio in London is about the least 'Russian' place imaginable; it's glass roofed, full of light and exudes a sense of fun. Unexpected fun at that. Situated just behind London Bridge railway station, it is incongruously surrounded by council tenements in the sort of streets where you'd expect to find frothy-mouthed Pit Bull terriers straining on the lead. Andrew moved here last September, after he was ousted from his previous studio by the Broadgate development adjacent to the City of London. The Glasshouse is purpose built, and was designed by the architect Michael Davis. It's Andrew's home as well and he lives in a gallery overlooking

*Spot the hi-fi: Here it hangs in front of Andy Warhol. The artist at home (right).*





the space where he works. "The poll tax people came to visit me the other day," he said, "that's why I've put the carpet down. All my life I've been trying to prove that I work in the place where I live and now I'm trying to prove that I live in the place where I work; you can't win!"

## The system in the sun

The studio is on the first floor of the building and is reached via a staircase. Everything in the studio seems to strike you all at once, it's full of bright sculptures - busts, two life-size creations of Pegasus, weird 'think pieces' and outsized jewellery. The walls are a cocktail of orange, blue and lurid pink and on one side are the huge doors necessary to crane some of the larger creations in or out. Two pairs of lovebirds sit in cages on adjustable sculpture stands next to the open French windows on the south side of the studio; a third cage houses a canary.

Music is everywhere, and during our visit opera was played constantly. But the system and loudspeakers are unrecognisable in the setting, and they have to be pointed out. They turn out to be sculptures themselves and this hi-fi is

*Sofa and chairs mark out a living space in the studio (above). A Technics amp (below) within the Sun sculpture.*

called Music of the Spheres. Andrew has taken some fairly basic hi-fi components - a CD player, cassette deck and amplifier, and installed them in a large 'ball' to be hung from one of the steel girders supporting the roof. The loudspeakers were already spherical in shape and are a Marsh design, bought in the States. They feature eight drivers apiece, arranged on



the surface of the sphere to give all-round coverage, and are designed to be suspended in free space. Here they are also hung from roof girders. All three spheres have been decorated with Andrew's own style of sculpture which uses broken mirrors or different coloured glass as well as any shiny object he finds to decorate the surface of the original shape. The main system is thus the sun, covered in gold and red glass while the loudspeakers are two planets - Saturn (with its rings) and The Red Planet.

"Music is very important to me, I always work listening to music," Andrew says. "It's terribly important to use all your senses as much as you can; I think 99 per cent of the population is blind. That is why architecture and the environment are so hideous - nobody minds. But sound is so important too. I enjoy opera of course, and Maria Callas is always by me. But I also like Neneh Cherry's rap stuff. To be honest what overwhelms me is going to a record store and ... well, I just can't go in those places anymore. There's never anyone to tell you what to choose. I prefer specialist shops and places where you can hear the music first."

*Afternoon sun: the system blends into the background of mirror sculptures.*

Andrew began sculpting around hi-fi in 1972, when he built a Garrard turntable into a 'Lily' creation with the loudspeakers firing out of the flowers. He's since made two versions of The Singing Tree - "a very Indian piece, full of heads and portraits with the hi-fi built in", and is planning something new at the moment, possibly along the lines of the original Lily.

### Modern sculpture...

"The reason I do all this," he says, "is to explore what is happening around me. I think that as a sculptor it is my responsibility to explore what is happening now. I have always been fascinated by sound systems, but the designs are so boring to look at. My idea is to lift it so that you have something beautiful to look at as well as something beautiful to listen to."

His attitude to hi-fi is necessarily visual, and the components he uses are generally mainstream from well-known manufacturers. For the Spheres he is using a Technics amplifier, Marantz CD player and Technics cassette deck. "A lot of my music systems have come from literally walking past Dixons and thinking 'that's perfect' and of course it's not because it gives out in two years," he says, admitting to a less-than-consummate knowledge of consumer electronics. One of his four brothers, Richard helped to choose the system components for the Spheres and reminded him that the amplifier needed to be kept cool for instance. "It's not straightforward, you can't just do what you like," he affirms, "I had to make a hole in the bottom and top of the Sun so that the air could keep the system cool. And when we had an exhibition in America we had to change all the voltages to make the system compatible; part of its attraction is that it should work."

Buyers of one of Andrew's hi-fi sculptures aren't forced to keep the working parts; by using standard-size components he ensures the longevity of the work of art if not the hi-fi. He said his original Lily has been upgraded and if one wanted to substitute better components for those already installed in the Spheres it would be quite easy to do so.

If choosing the components with a brother's help was a fairly straightforward process, building them into the finished sculpture has been a painstaking business.



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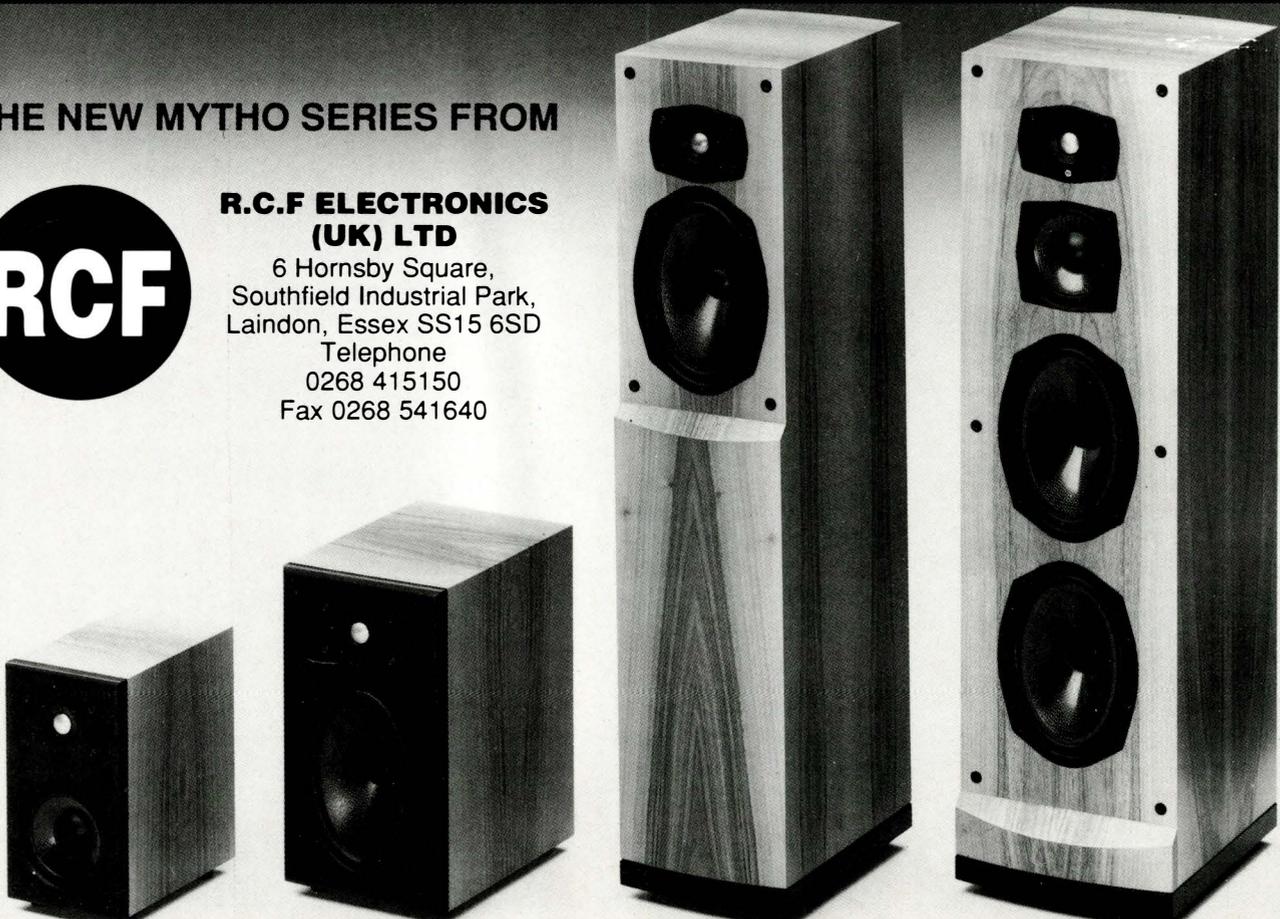
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# Aspirations

The system is housed in a Medite cabinet with the three components on different levels, facing outwards at different angles. Their fascias are built in to make the result less obviously 'hi-fi', and take up very little area of the 'Sun's' surface. The whole sphere is then intricately overlaid with pieces of glass, gold mirror and white shells in the style which is Andrew's hallmark. The result is visually arresting and highly original; can anyone imagine one of the Japanese multinationals, or a British manufacturer with its sights locked on to black and minimalist designs, coming up with a hanging system based on a cosmic theme? With plastic moulding techniques available to large corporations it would be easy to reproduce something along the lines of Andrew Logan's system which basically makes a visual feature out of hi-fi, camouflaging its functional boxy nature. Maybe one day it will happen, but for now the price tag on Andrew's sculpture at £8,000 plus VAT reflects its unique value as a work of art.

## Jewels for Zandra...

Andrew first started working as a sculptor in 1968 when he ceased to pursue his original career in architecture. "I worked in America designing old people's dwellings and supermarkets but I really don't know if any of them were ever built," he comments offhandedly. His initial subjects were close family or friends and one wall of the studio is hung with mirror portraits of himself and his four brothers, while busts of his mother and

*A bust of Zandra Rhodes sits under Saturn (AKA hanging loudspeaker).*



father gaze at each other in one of the studio's centrepieces. He is perhaps best known for his jewellery, and designs for Zandra Rhodes, making great chunky pieces to dangle on the bodies of the rich and whacky.

On one side of his studio is a plastic chest of drawers containing the beads and sequins used throughout his work. "I use all kinds of methods," he explains, "and I like recycling mirrors because they are very spectacular. These red and gold mirrors come from Thailand, from Bangkok, and they're very easy to work with because they are so thin - you can just break them into pieces with your hands."

The two statues of Pegasus are lifesize; one is ten years old, based on copper and called Hope while the other was recently completed, based on lead and called Joy. Both look a little fragile close to; Joy's wings are made with 'feathers' of opaque white glass and she is encrusted with sequins and seashells which wouldn't do well outdoors within reach of small boys, or pigeons.

Between the mythical flying horses is a haphazard sculpture known as the Three Graces - a satirical view of the Broadgate Development which was otherwise so widely praised. "At the bottom you have nature," Andrew explained pointing out the frail-looking branches which support the structure. "Then you have man's temple with the three Greek figures inside. Then there's

*Andrew Logan's studio: The second loudspeaker is out of shot on the right.*

this volcanic waste with Lenin trying to get out of it. He's having a go. And the plastic dollar sign on top of that contains a million shredded dollars. On top of everything is the little sandcastle referring to 'An Englishman's home is his castle.'" In the light of his own experience the sculpture aptly describes how dated the adage is, but he hasn't sold it yet.

## Or busts...

Nor has he been commissioned for any of his highly original busts. "They tend to be friends or people I admire; it's very difficult to get someone to sit for you. I once asked an Indian waiter who had a superb face but he was absolutely horrified and thought I was trying to pick him up," he explained candidly.

This may change when Andrew opens his own gallery next summer. The gallery will show a cross section of his work and is likely to contain some audio sculpture. It's an appropriate pilgrimage away, in Berriew, North Wales: "A cheap property came up; it's two squash courts so there are fabulous floors, and it's a favourite place which I've been visiting for years," he told me.

For now this Englishman's gallery is his glasshouse and in it he's metaphorically throwing stones, both at the grand but steamrolling aspirations of capitalist society and at accepted designs in hi-fi.

System designed and installed by Andrew Logan, The Glasshouse, Melior Place London SE1.



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# CD Xtract reader offer

Since we gave away a small pack of CD Xtracts free with our October issue, the *Hi-Fi Choice* office has been inundated with 'phone calls from readers asking where they could buy some more. Thanks to an exclusive deal with the manufacturer, Design Logic, CD Xtracts are

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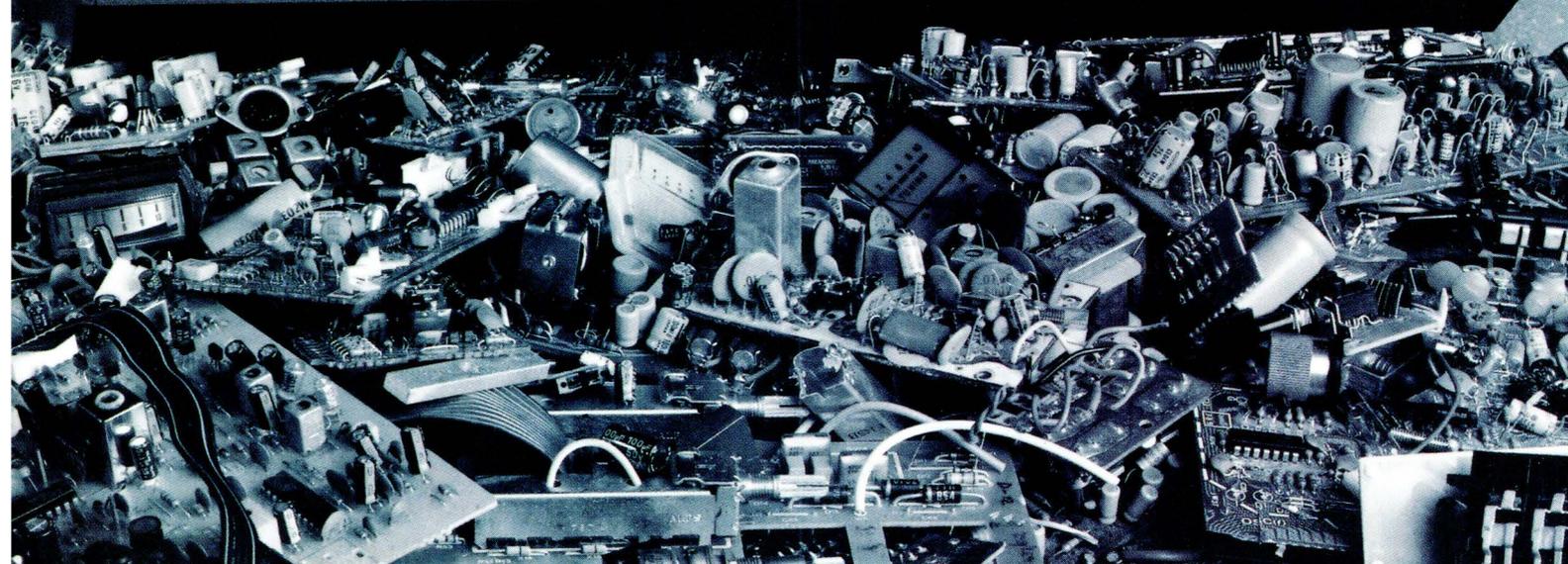
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CD Review

**MUSICAL FIDELITY**

*Monitoring what's happening on the high-end scene. . . This month, Malcolm Steward uprates his Linn LP12 with the new Lingo two-speed power supply, Roy Gregory discusses the Lead Balloon*

## Statements

*turntable table, and Richard Black visits a record cutting session at The Exchange where they were using 'our' Studer tape recorder, the old C37 which we rescued from a builder's skip a couple of years ago.*

**T**hroughout its long history the Linn *Sondek LP12* has seen many updates and improvements. Virtually every component in the deck has been altered or upgraded at one time or another. All modifications have been retro-fittable, so owners could benefit from them no matter how old their decks.

Virtually all of the changes to the deck have improved its sonic performance. (I say virtually all because even the most ardent Linnophile couldn't claim that swapping to a clear lid after the smoked version could enhance the deck's sound!) One of the largest improvements came when the *Valhalla* circuitry was fitted to clean the mains input and improve the motor drive. The leap forward in performance could justifiably be described as remarkable and significant. Which leaves me with two less adjectives to use when reporting the dramatic benefits to be had by using a *Lingo* box to drive the motor in place of the *Valhalla* board. And a shortage of adjectives is something one can do without when faced with a product with *Lingo's* exceptional capabilities.

### Pricing structure

From now the *LP12* will be sold in two versions: *Valhalla* (£598) and *Lingo* (£1,068). The new power supply can be fitted to older decks for £496. The advantage of having the *Lingo* variant is that as well as greatly enhanced performance at 33<sup>1</sup>/3rpm the new kit also offers 45rpm at the touch of a button. Regular single-players will not mourn the redundancy of Linn's 45rpm motor pulley adaptor and second drive belt, plus all the hassle that accompanied its deployment.

The new *Lingo LP12* has no mains lead, instead there's a captive lead through which it communicates with and draws power from the outboard supply. The *Lingo* box is fitted with the mains power on/off switch – and that is

all. All control functions are handled by the switch mounted on the turntable's top plate: push once for 33<sup>1</sup>/3rpm, once more for stop, or push and hold for 45rpm. Nice and simple – which is not what I would call the packed printed circuit board within the *Lingo* case. There looks to be sufficient electronics in there to start World War 3! My immediate reaction to this mass of components was to wonder, "How could all this be necessary to perform a simple task like driving a turntable motor?"

It transpires that the *Valhalla* circuit used before – and that was not to be found wanting in a component count – still allowed the motor to suffer at the vagaries of the mains supply. It also drove one phase of the motor only, the second being coupled by a phase-shift capacitor. To achieve the smoothest running and most uniform torque the Linn motor needs both an exceptionally clean supply voltage and each of its phases

driven at exactly ninety degrees with respect to the other. This is where the *Lingo* improves over the previous supply. For example, look inside a *Lingo* deck and a *Valhalla* deck and you'll spot a difference in the motors: the same unit is used in each but in the *Valhalla* version there is a cap fitted to the end of the spindle. Within this there is a ball and spring arrangement which is necessary for smooth, mechanically quiet running. In the *Lingo* deck this is dispensed with as it is no longer required.

### Out of Numerik . . .

The *Lingo's* circuitry owes a small debt to Linn's £25,000 *Numerik* digital studio recording unit. It was from this device that its low noise crystal oscillators were derived. The turntable switch selects which one of the two oscillators is required (one for each speed) and its output is then fed to a synchronous counter to produce a 50Hz or 67.5Hz square wave. These pass through a precision filter to remove harmonics and give the pure sinusoidal waveform required to feed the motor. The sine waves pass through a phase shift network which synchronises the feeds for each phase of the motor. Their last stop before the motor windings are two high voltage Class A amplifiers.

As with the Linn *Axis* turntable, the *Lingo LP12* motor starts up at a higher voltage in order to get the platter moving. When the platter is up to speed loading circuitry drops the voltage to the motor to a level sufficient to maintain the platter's inertia. The motor runs noticeably more quietly as a result. The *Lingo* is powered by a toroidal transformer which in conjunction with filtering circuitry effectively leaves the motor independent of the mains. Even a 2000 volt spike on the supply is said not to affect the motor. Less dramatically, but importantly, it also remains unperurbed by beat and subsonic garbage.

What is hard to understand, however,



is that the *Lingo* does far more than one would expect from a circuit which, to all intents and purposes, *only* drives the turntable motor more consistently and quietly. Asked to imagine the effects of such a device, most would answer that they'd expect an improvement in pitch stability, leading edge definition, and areas concerned with timing information. Some might stretch to assuming greater musical cohesion and hence greater communication. But few would expect a subjective increase in information coming off the record and a dramatic expansion of dynamic range and perceived bandwidth. I would not like to guess whether these phenomena are measurable but an A/B comparison with a *Valhalla* equipped deck will soon dispel any doubts that they exist.

I began by making such comparisons between my regular *Valhalla LP12* which is fitted with a Naim ARO tonearm and Linn *Troika* cartridge, and an identically equipped *Lingo LP12*. Amplification was Naim *NAC52* preamp, through a *NAXO 2-4* electronic crossover to a brace of *NAP250* power amps. Naim *NAC A5* cable connected the active *SBL* loudspeakers. I'll not trouble you with the details of the A/B testing. Suffice it to say that the *Lingo* does everything the *Valhalla* does, only more so and better –

**Linn Lingo: if you want more music, it's well worth upgrading a 'standard' LP12**

after it has warmed up fully. I reckon one is looking at five days for the *Lingo* to shift into top gear. After it has, hang on to your hat!

The new power supply cleans up the sound of the *LP12* dramatically. Musical elements that were previously submerged or veiled now spring to the surface. This is not due to any exaggerated forwardness in the presentation, rather it's a result of a layer of 'grunge' having been peeled away to expose once hidden nuances and subtle iota. This new found information manifests itself in various ways. To begin with there's the obvious – the "I never heard those quiet guitar chords in the background before" reaction. Then one starts to notice differences in the structure of music one thought one knew intimately. For example, where one could not previously appreciate the harmonic or rhythmic relationship between two instruments in a complex piece, that relationship becomes clearly evinced. Captain Beefheart's more obscure compositions will never seem quite as outrageous now that the *Lingo* is giving order to the proceedings.

The 'cleaning' operation is nowhere

more noticeable than in the lower end of the frequency spectrum. Bass instruments now exhibit greater definition in terms of timbre and note shape; there's more texture to their sound and the starts and stops of notes are more clearly delineated. This is also true of high frequencies which are better controlled and presented; the reproduction of cymbals, in particular, is greatly enhanced, with more detail and differentiation immediately recognisable.

### Tape-like security

My computer now tells me I've nearly over-written and I've not yet mentioned other important aspects of the *Lingo* experience: the superior stereo imagery and focus; the way it removes much of the nastiness from poor digital recordings; the overall tape-like security of the sound; the more convincing pitch definition and stability. What I must not neglect to mention is that the combined effect of all these improvements is not just a step forward in hi-fi terms. With the addition of the *Lingo* the *LP12* communicates music more fluently and convincingly than ever before.

Is it worth having a *Valhalla* turntable upgraded to the new spec? If you want more music from your deck, there's no question.

Malcolm Steward

**F**or some months now I have been using the marvellously named *Lead Balloon* at home, and the time has come to put pen to paper.

For those who are wondering what on earth a *Lead Balloon* is, it's a turntable stand, and – perhaps not surprisingly, given its name – it is distributed in this country by those 'audio crazies' at Electroactivity. Yes, it's imported. Hasn't the UK got enough hi-fi furniture? Not like this it hasn't!

So what makes it so different? The heart of the *Lead Balloon* comprises a trio of two-inch diameter steel tubes welded together by braces top and bottom, to form a hollow triangular column 3 inches high and with 18 inch sides. The bottoms of the three columns are closed by welded discs which are threaded in the centre to take downward facing cones. These cones, which are sharper in profile and about half as tall again as the familiar, tall Michell *Tenderfoot*, are more complex. Made by the American company Simply Physics, and dubbed *Tone Cones*, these are composite structures similar in concept to the incredibly expensive Goldmund cones. For the sake of completeness, I did try the *Lead Balloon* with tall *Tenderfeet*, and there is no doubt that the *Tone Cones* are superior; more neutral and better focused than the aluminium cones.

### Coining it!

Moving up to the other end of the columns, these are supplied with loose metal dishes to seal them once you have filled the uprights with sand, or – even better – lead shot. I've drawn the line at sand so far, but I just know that curiosity is going to get the better of me soon...

Now we get to the fun part. Once these caps are in place, you put on the middle of each one a one cent piece (supplied). No, I haven't tested them to see which way up they sound best! However, I did actually make sure they were all the same way round, in this case with the portcullis grid uppermost. Onto these, via adjustable grub spikes similar to those found on the top plates of many speaker stands, is placed an open frame, welded out of rectangular steel, which looks not unlike a three rung section chopped out of a ladder. And now the best bit of all. You get two solid lead bars, about  $18 \times 1 \times \frac{3}{4}$  inches, which sit on the platform. It is on these extremely heavy and well damped



'Snapped' last year: a *Lead Balloon* table supports Arcici's own record player.

objects that you place the feet of your turntable.

The whole is well finished in black satin paint and looks rather reminiscent of the very smart Sound Factory *Tripods*, or a Roksan table which has been sent to Ben Johnson's doctor. With the VPI *TNT* turntable, the feet are so far apart that I have to top the whole lot off with a slate slab. With the skeletal black turntable, this results in an edifice which looks at best chic-ly Bauhaus, and at worst like an oilrig. Mind you, it's a vast improvement on the Target table which it replaced – both sonically and aesthetically.

All this talk about the *TNT* is not strictly relevant. Not only is this American deck absolutely huge, it's not exactly common in this country either. No, the real proof was in the use of the *Lead Balloon* with other, more familiar beasts – and what should happen along but a Roksan *Xerxes*. Perfect.

Roksan, of course, recommends the use of its own three legged table with the *Xerxes*, and its effect should not be underestimated. In my experience *Xerxes* turntables have always sounded dramatically better on their own supports than on other tables – until now. Shifting a *Xerxes/Artemiz/Shiraz* combination from its own (medium height) table onto the *Lead Balloon* brought about a huge improvement. Suddenly the bass went much deeper with far more weight and authority and more clearly defined edges. The whole soundstage had 'firmed up', gaining in focus and stability, while the biggest gain was in the overall sense of lucidity. Each strand in the musical picture was far more clearly separated and made more sense. But unlike some components which separate everything so much that they pull the performance apart (cartridges are prime offenders), the *Lead Balloon* made the interaction between

musical elements clearer. The relationship between the different players in the orchestra or band became more apparent, as did the way musicians play 'off' one another.

### Twice as good

The Roksan tables are fine, and offer good value for money. The *Lead Balloon* costs twice as much, but I reckon it's easily twice as good. So far I haven't had a chance to try it with a Linn, which seems so at home on lightweight platforms. (Having said that, I don't think the Mana Acoustics table could be described as lightweight, and that seems to be gaining quite a reputation.) At home, the *Lead Balloon's* importer uses both Roksan and Pink Triangle *PT T00* turntables, with excellent results. The normal caveat of try before you buy still applies, but I don't foresee any great compatibility problems. (I might get a chance to try it with a Linn soon!)

So there you have it. A nicely finished and superbly thought out turntable from those nice people at Arcici, via those equally nice people at Electroactivity. Even if all it did was raise the height of your turntable above canine and junior interference, looking pretty while it did it, I would recommend it. Oh bliss to have a turntable at waist height. Given its effect on sound quality as well, I applaud its designers.

Incidentally, in the States the top frame and lead bars are available separately for equipment already on shelves or the floor. It's called *The Lead Belly*. Stranger still, Arcici markets a triangular turntable which mounts directly atop the *Lead Balloon* frame. I just knew these people were serious about integrated design!

The *Lead Balloon* costs £260 and further information is available from Electroactivity on (081) 445 6151.

Roy Gregory

Some time ago we recounted in these pages the story of an old Studer C37 studio tape recorder, rescued from the scrap metal merchants through the good offices of Editor JB and brought to new life by Tim de Paravicini of EAR. At the time, we promised a follow-up featuring the machine in action; here (a little later than intended) it is. . .

In fact, the re-built C37 has already been used several times at recording sessions for Altarus Records, but the first occasion on which your intrepid reporter was able to attend was another part of the process – a record cutting session. Normally, a tape is simply sent to a cutting room and the engineers there are left to get on with it. But when the tape is on a format that the cutting room doesn't have (in this case, stereo on one-inch tape), a suitable playback machine must be provided. So it was when the American cable and cartridge manufacturer Audioquest wanted to commit the first title of its new record label to disc.

## Audiophile recordings

Audioquest first became involved in record making around a year ago, when it sponsored a record by Strunz and Fahrah on the Water Lily Acoustics label. Joe Harley of Audioquest explained to me that he had previously come across another Water Lily record, featuring Jose Neto, and realised that it was the first 'audiophile' record he had heard that he really liked. Thus when Kavi Alexander of Water Lily asked Audioquest for sponsorship of a record, support was readily forthcoming.

A chance discovery in a local bar of blues singer Robert Lucas led to an agreement to record him, this time for a new label to be set up by Audioquest, and so in due course the recording was made that I heard at the cutting session. Robert Lucas is apparently well known in southern California but not yet widely appreciated, and Audioquest intend to change this, distributing their record not only via specialist audiophile channels but through blues record dealers too.

After sponsoring (and indeed co-producing) the Water Lily record, it was only natural that Audioquest should choose to employ the services of Kavi in engineering their own record. Water Lily's mastering system is all analogue and all made or modified by Esoteric Audio Research; the tape recorder is a

one-inch converted C37 just like 'our' machine, and microphones and amplifiers are EAR models. Kavi's preferred recording technique is to use two microphones, arranged as a 'crossed figure-8 pair', around six to eight feet from the musicians, a technique which gives very natural-sounding results and good imaging – but which is insufficiently fancy and technological for many of today's record companies (a bit like analogue, or valves – "Of course it can't work . . . it's old, innit?").

## The Exchange

Once a tape has been made and edited, it is carefully wrapped against the ravages of international freight forwarders and sent to the cutting room, in this case The Exchange in North London, which is fully equipped with EAR amplification and signal processing electronics to complement the original recording chain.

Record cutting is simply a matter of reversing the playback process by driving a cutting stylus with the music signal and removing material from a blank disc to form the groove. The blank (or 'lacquer') consists of nitrocellulose coated on stainless steel, and it sits on a large turntable which is driven by a powerful motor to overcome the considerable drag of the cutter stylus. The cutter itself contains two perpendicular coils (one per channel) which drive the stylus and which are powered by large amplifiers (around 500W is typical). To apply the required RIAA equalisation,

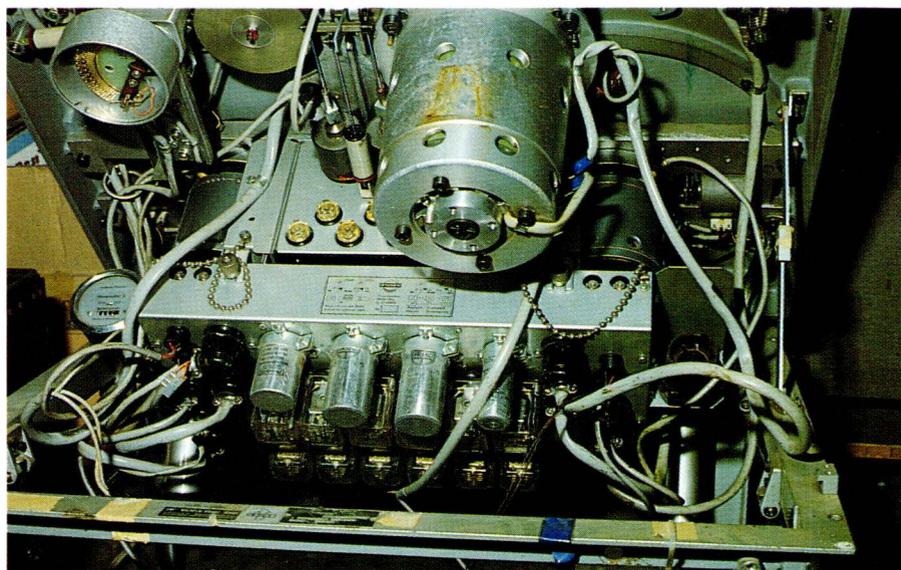
and to compensate for cutter characteristics, the signal is filtered to boost the treble strongly, and only fractions of a watt are required to cut low frequencies.

After cutting, the lacquer is then plated to form metal stampers, used to press the vinyl records, but The Exchange only handles the cutting side. Final lacquers must not be played, but 'test cuts' can be made and played on a normal record player (a Townshend *Rock*, in this case). Comparing the lacquer directly with the tape from which it was just cut is quite impressive – it is possible to cut an awful lot of information on to that disc!

Sitting conspicuously on the floor of the cutting room, the C37 behaved itself perfectly. There is something about the sound of the very best master tapes which is almost enough to disillusion one with any normal hi-fi, and the Audioquest tape, made with the best help of Tim's electronics, Kavi's engineering and the musicians' and producers' skill and judgement, certainly qualifies as one of the best. No less importantly, of course, the music seemed (to my ear, accustomed mainly to other styles) well worth the effort – everything blues should be.

It's always nice to get something for (almost) nothing. But it was especially gratifying to see the old Studer C37 tape recorder which we saved doing its bit for the furtherance of what it's all about – true fidelity.

*Richard Black*



*The classic C37, refurbished with tender loving care by Tim de Paravicini.*



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*We've another selection of fabulous prizes to give away this month, courtesy of the **Audio by Design** company which manufactures Audio Innovations valve amplifiers and distributes Voyd, Audio Note and Snell products. Win the first prize in our competition and you will be the proud owner of a Voyd Valdi turntable complete with Moth tonearm. Win the second prize and an Audio Innovations Series 500 amplifier will be glowing in your living room. We've some runner-up prizes, too: three Audio Note ANA 1 metre interconnect cables. As ever, our competition is **FREE** to enter. Good luck!*



## How To Enter

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

## The Prizes

The first correct entry drawn from our mailbag after the closing date will win a Voyd *Valdi* turntable fitted with a Moth tonearm. The second correct entry will win an Audio Innovations *Series 500* valve integrated amplifier. The third, fourth and fifth correct entries will each win a runner-up prize of a 1metre length of Audio Note *ANA* interconnect cable.

## The Questions

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

1. Audio Innovations manufactures some power amps called *First* and *Second Audio* amplifiers. What type of valves do they employ?
2. Voyd makes a larger turntable than the *Valdi* called, simply, *The Voyd*. How many motors does it use?
3. Audio Note makes cables, amplifiers and even loudspeakers - but is better known for a range of other components. What are they?
4. Which manufacturer has recently released a loudspeaker called *P24*?
5. For which radio station does Johnny Walker currently present an evening show?
6. Linn Products has produced a device which now gives its top turntable the ability to play 45rpm singles. What is it called?

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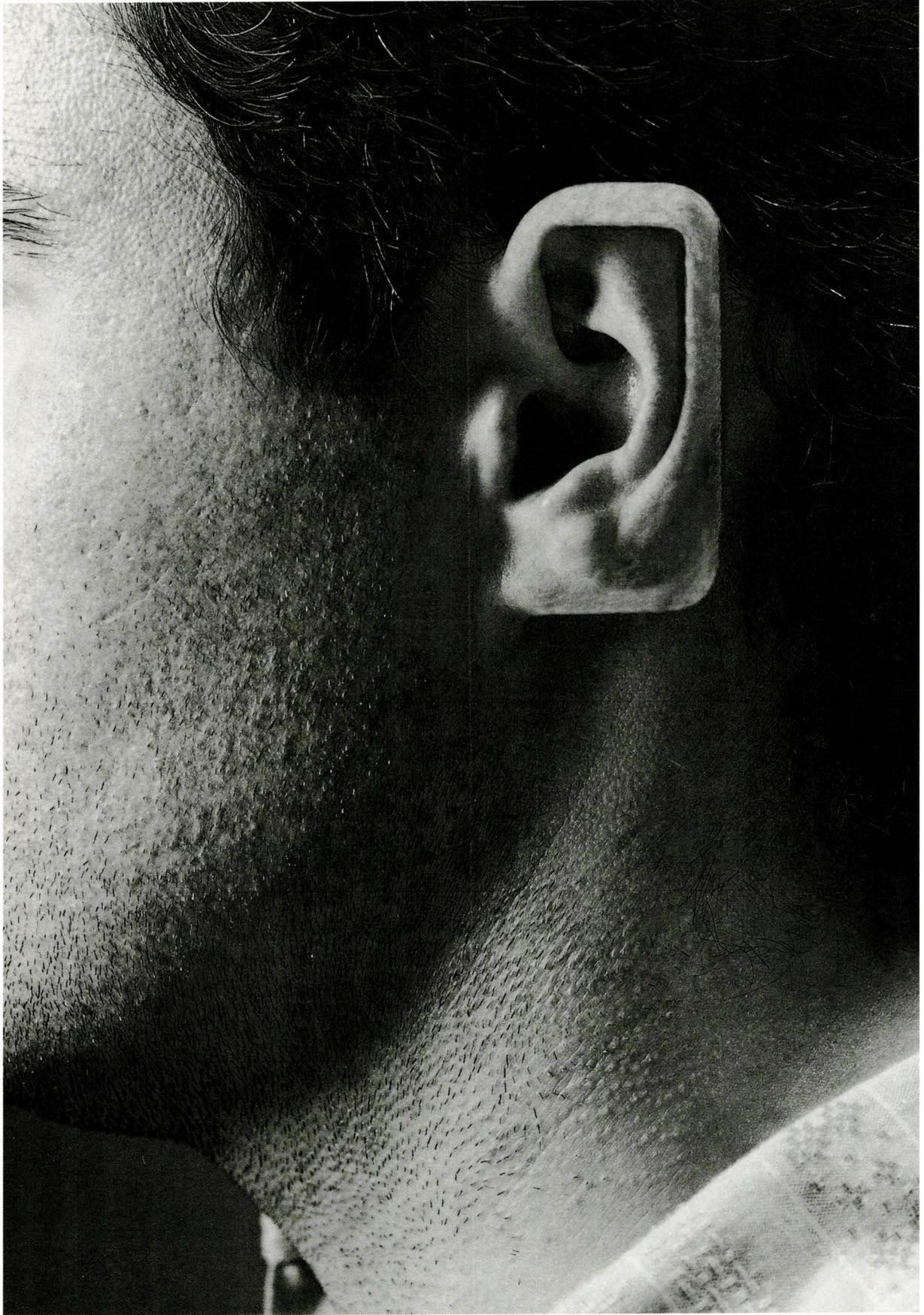
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- 1) All entries must be on the entry forms provided. Photocopies will not be accepted. Incomplete forms will not be considered.
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- 3) Employees of Dennis Publishing Ltd and associated companies, the manufacturers and suppliers of the prizes, their agents and relatives, are not eligible to enter the competition.
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- 5) The prizes will be awarded to the first sets of correct answers opened after the closing date. No correspondence whatsoever will be entered into regarding the competition. The Editor's decision is final and binding.
- 6) The winners will be notified by post and the results will be published in *Hi-Fi Choice*.

Send your completed forms to:  
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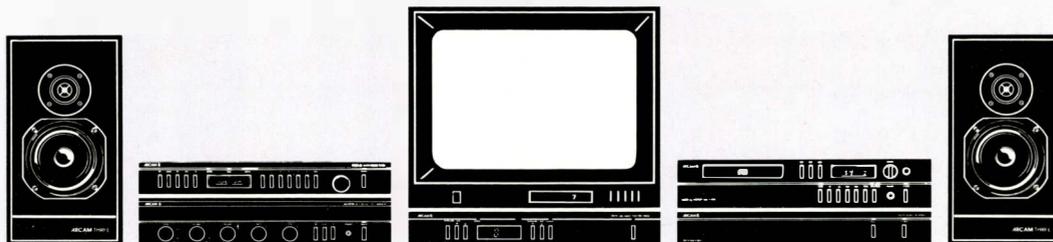
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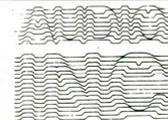
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# Readers Write Choice Answers

## Compact Connections

I own a Philips CD460 compact disc player and want to invest in some interconnect cable, but am unsure which to go for as there are so many alternatives. I have been advised to try van den Hul but don't know if this would be best; perhaps you could suggest some alternatives. My system consists of Rotel RC/RB850 pre/power amps, Denon DRM-500 cassette deck and Rogers LS4a loudspeakers.

On another note, I've been reading with interest about the Sage Audio Digitrap, which is claimed to increase signal detail by up to 30 times. Would this be worth buying or would I just be wasting my time?  
P. D. KENT,  
WALTHAMSTOW, LONDON

*Which interconnect you go for depends ultimately on two factors – price and taste. You may be aware that cables can be purchased for almost any sum and generally the better ones tend to be more expensive, although the law of diminishing returns applies here as much as*

*anywhere else. In a system such as your own we would consider £50 to be the most you should spend, the improvements wrought by expensive alternatives wouldn't be fully revealed by the rest of the system. Taste, of course, cannot be accounted for, so we try to recommend cables on the basis of transparency and lack of coloration. However, your player may have certain characteristics which you wish to play down and interconnect can be used as a form of 'tone control' – see the Directory for potted assessments of various cables and their tonal balances.*

*On the other hand, if you want to hear an untainted version of what your player is putting out, the following cables would be worth a listen: Audio Note Copper, Deltec Slink and Kimber Kable PSB. At the last count these cables all retailed under £50 and were considered to be the best in their class at time of review. As for the Sage Digitrap, we haven't had any experience of this device and thus can't tell you whether or not it is worth trying. The best advice we can give you is to try and borrow a sample, or purchase one with the option of returning it should it prove unsatisfactory, and then you*

*could find out for yourself. If you do, drop us a line and tell us what you think.*

## Back on the Tracks

Recently I decided to enter the world of CD and purchased a Rotel RCD-855 compact disc player. Shortly after this, my ageing cassette deck took a turn for the worse and I promptly purchased a Rotel RD-865 to fill the gap.

Now the ball is rolling it seems appropriate to review the rest of my system and consider upgrades worthy of my two latest acquisitions. I am considering replacing my Mission 710 speakers with 763 models, but what about my JVC JA-S22 amplifier and T-V5L tuner (both around 15 years old)?

Is a Rotel RA820AX amplifier superior to mine? If so, is the Rotel RX850AL receiver worth considering, as I understand the amp section is the same as the RX820A, or should I be looking further up the ladder to do justice to my CD player and cassette deck?

My main source of listening will be CD and cassette with

only occasional tuner use.  
D. W. ALLEN  
KENT.

*It would be well worth replacing your amp and speakers if you want to get fuller benefit of your new components. Rotels amps are very competitive, but so are alternatives from Arcam and Pioneer. However, the RA-820AX that we looked at in our March issue was remarkably good, and if coupled with a nice pair of sensitive speakers, could provide much listening pleasure. Speakers worth auditioning include JPW AP3s, KEF's C15/C200 satellite and subwoofer combo, and Mission 781s. Don't forget to purchase suitable stands and cable. A dealer that stocks any of the above speakers should be able to guide you in this respect.*

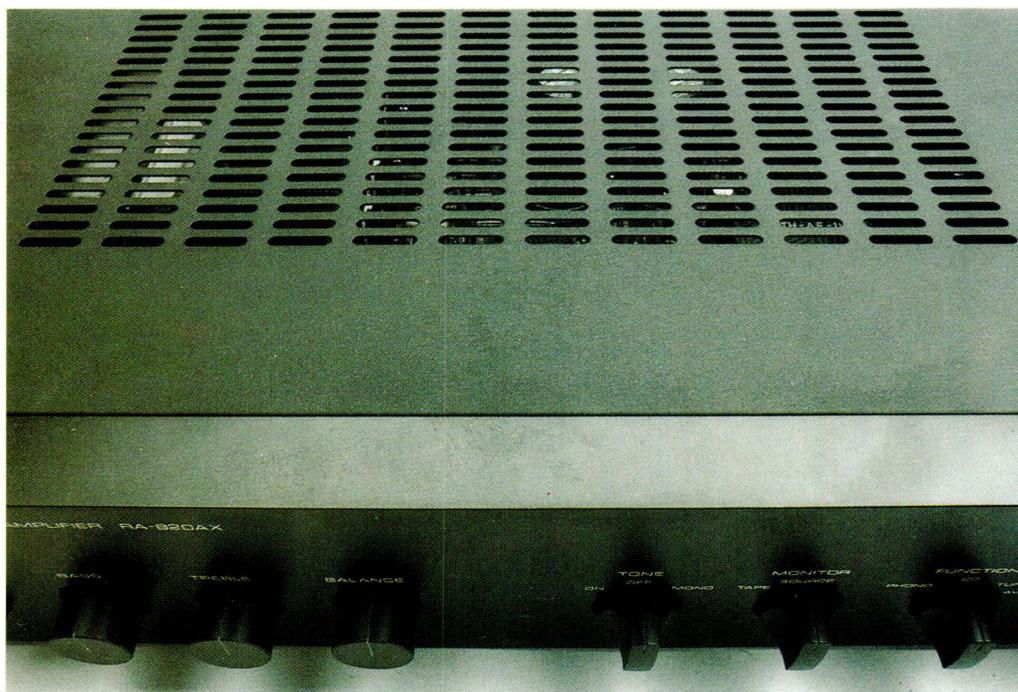
*We would suggest that you use your old tuner with a separate amp as this will give slightly better sound and save money. If you want to improve the T-V5L why not try a roof aerial?*

## Give me Involvement

I am a keen reader of your magazine, and shall appreciate your expert opinion on upgrading my system. It consists of Marantz CD80, Nakamichi CR-2, Marantz PM75 amplifier and Mission 762 speakers with Mission solid core cables. I find the system is not involving enough.

I have listened to Rogers LS7t, Allison AL120, and Musical Fidelity MC-4 all of which provided only slight improvement. It was suggested to me that I change the amplifier and so I have tried Arcam Delta 90.2, Mission Cyrus 2, Linn Intek, and Musical Fidelity A100, (all sub £500) but again none of these was completely satisfactory. (In fact, I thought the PM75 sounded better than any of them). I have £800 to spare on any changes you recommend, and I listen mainly to jazz and pop music.

Finally, may I suggest that you pay more attention to



**Rotel's RA820AX: a real hot rod of an inexpensive amp, providing you give it an easy load.**

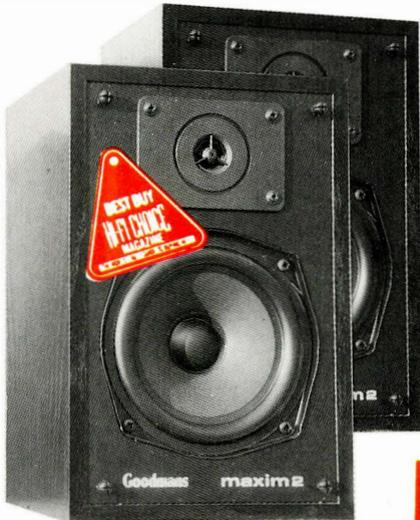


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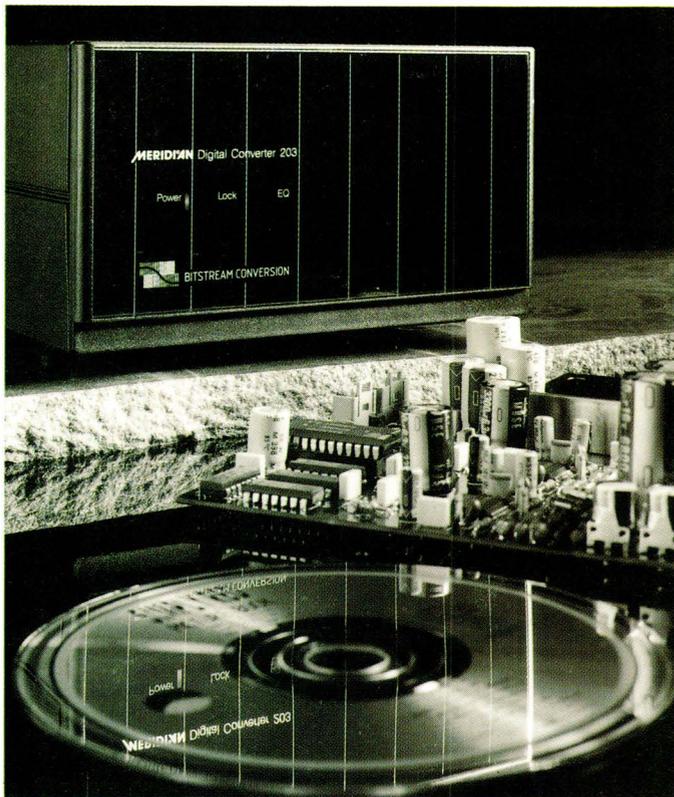
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'Bitstream' D-to-A conversion: will it give you involvement?

'mid-market' equipment as most magazines (including yours) appear to concentrate on budget and 'up market' systems.

DR. OLA FAMUYIDE,  
BARNESLEY.

You're obviously a hard man to please, but we'll have a go. Fundamentally, the problem might lie in the medium. No-one on the Choice staff gets a great deal out of CD, better (usually much more expensive) players help, but 99 per cent of the time we'd prefer to listen to LP's.

However many people seem to enjoy listening to silver discs and it may be that improving your player and the cables between it and your loudspeakers will do the trick. There are a variety of alternatives you could try. First, see what adding an outboard DAC such as the Meridian 203 does, and if that isn't enough try some other players. The Arcam Alpha and Meridian 206B are both highly rated and represent good examples of, multi-bit and 'bitstream' DAC technology. See the Directory for our preferences on the cable front.

Another possibility is that the loudspeakers, and to a lesser extent the amplifier, are letting the side down. You could do

worse than trying some Mission Cyrus 781s, SD Acoustics SD3s or anything made by JPW or Snell. Couple most of these with a Pioneer A-400 or Kelvin Integrated and you'll have as musically entertaining a mid and back end as you're gonna get for the money. If none of the above work, you're going to have to get a Systemdek and put up with the odd scratch in exchange for musical involvement!

Finally your last comment seems somewhat incorrect; we do look at equipment from right across the hi-fi spectrum, with an emphasis on affordable 'budget' and 'mid-market' equipment. If you don't believe us, have a look in the Directory!

### Tubeophilia

I recently got hold of a copy of the June 1990 issue of *Hi-Fi Choice* and read with interest the first instalment of your series on vacuum tubes. One rarely sees English writers making a case in favour of triode output tubes (appreciated in Japan and France thanks to the efforts of a couple of audio designers, Jean Hirago being the foremost).

Devoting substantial time to the study of the early

history of audio, for a forthcoming book, I may be in a position to point out a couple of minor inaccuracies in the first part of the article, and I wanted to offer some additional comments on the paper, which I enjoyed very much.

Firstly I would like to point out that Lee De Forest invented the triode tube in 1906 rather than 1907: his two basic patents were respectively filed in October 1906 and January 1907.

You did not quite explain the grid action in a triode tube, which is the result of disturbing the electrostatic field produced around the cathode by the heating action. (As the grid is held at a negative potential with respect to the cathode, it will repel approaching electrons back to the cathode thereby reducing the flow of electrons to the plate).

The first commercial application of the triode tube was not audio amplification but wireless communication, as a radio wave detector. Both Fleming and De Forest were looking for ways to improve the detection of radio waves, 'wireless' being the big thing at the beginning of the century.

De Forest proposed the first audio amplification circuits in early 1912 and, later in that same year, Fritz Lowenstein proposed the concept of grid biasing.

Recognising the potential of Vacuum tubes for telephone line amplification, Western Electric Co. immediately went to work with impressive results: by mid-1913 the code A tube had been developed and put to use on the New York-Washington DC telephone line.

The characteristic curves shown for the 23A are just not true: the real life curves have a deeper knee and are significantly slanted. To match your drawing I suggest that you rather take the VT-52 (45 special) or 845 curves: both have among the most linear static characteristics I am aware of. Their drawbacks are low power output for the former and low grid sensitivity for the latter. Arguably the best all-round audio output tube ever must be the Western Electric 300B triode.

You were correct in saying output power is limited with triodes but it is plenty enough for reasonably efficient loudspeaking devices (which loudspeakers should be in the first place but this opens a whole new can of worms . . .).

A. R. BALATON,  
SUMMIT, NEW JERSEY.

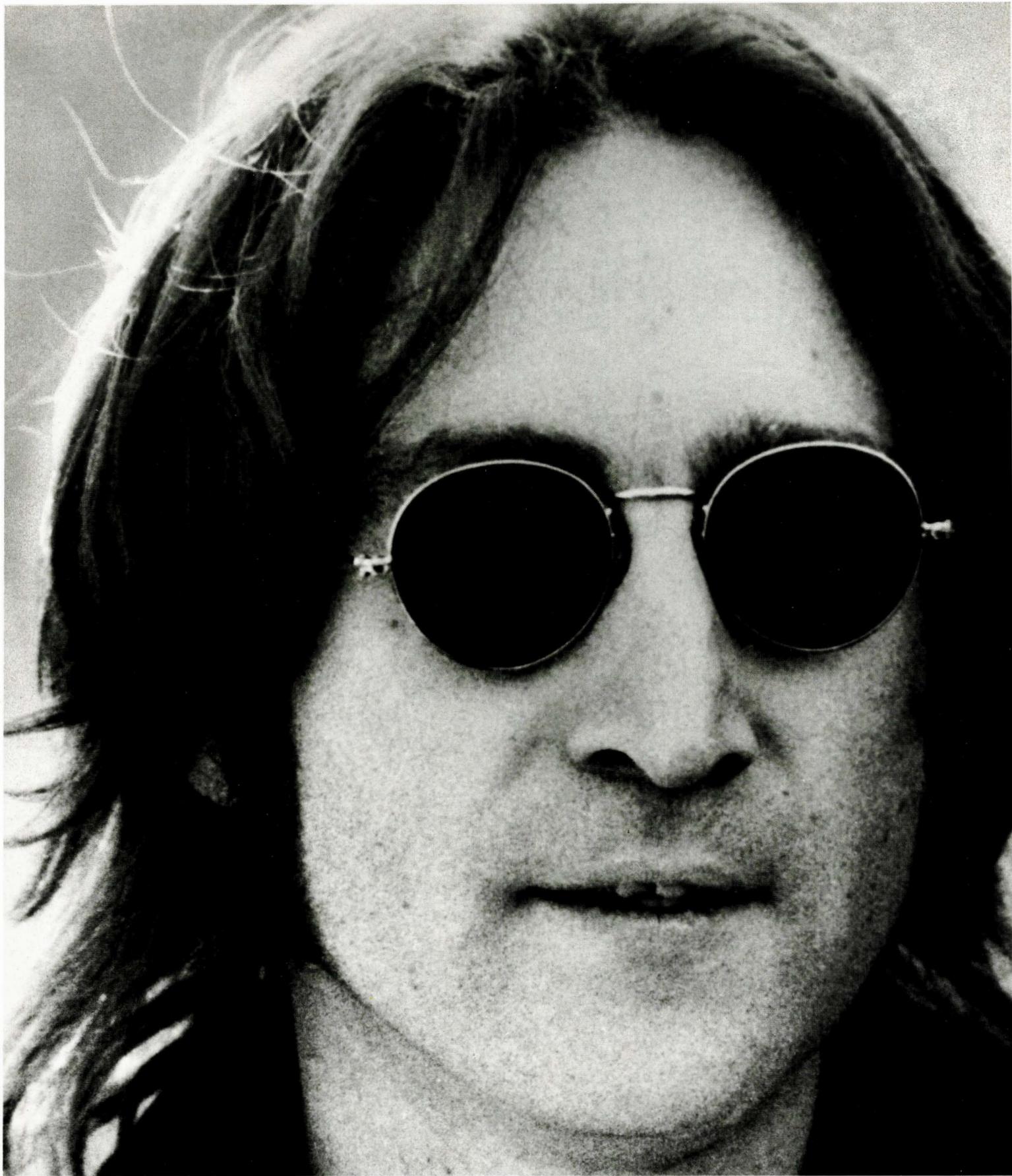
The intention of the article was to inform readers about the basics of valve amplifiers specifically triode ones, because of their superiority, and at the same time keep the articles accessible to the lay hi-fi mag reader. And for this reason some generalizations were made. I'm sure you will agree they were not confusing.

I know that the curves shown weren't exactly representative of a 2A3, this is because the curves were drawn freehand on a PC package and not corrected. I would argue that they are technically worse than most of the well known audio triodes (VT52 and 845 included). As regards the low grid sensitivity of the 845, the 211/VT4 is a much better choice for high power output with high grid sensitivity.

GUY ADAMS



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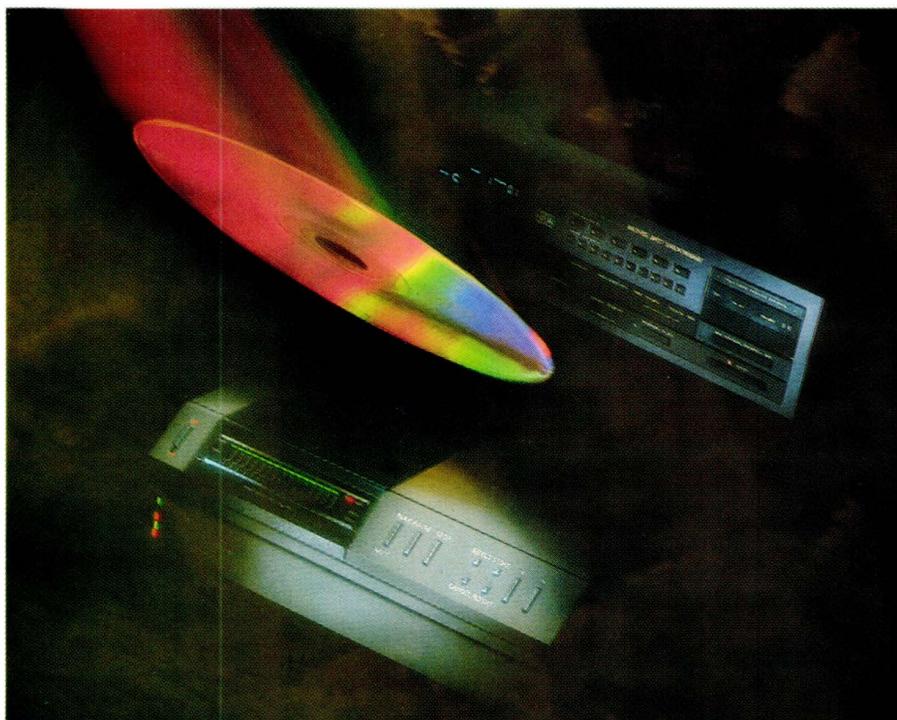
Unless you've been living under a bush for the last 12 months you could hardly have failed to notice that the CD 'numbers game' has entered an entirely new phase, a phase driven not by the relentless pursuit of more bits but by the sophisticated ideals of super-fast clock rates, noise-shaping and bitstream conversion.

Not to be outdone by the Jones' - who are Philips and Technics in this instance - Sony and JVC have recently introduced their own 'bitstream' or 'low-bit' CD players. You've heard of PDM and MASH/PWM, well now we have two more to cope with: Sony's HDLC (High Density Linear Converter) using ENS/PLM (Extended Noise Shaping/Pulse Length Modulation) and JVC's VANS/PEM (Variable-order Noise Shaping/Pulse Edge Modulation). The old 'more bits are better' argument seemed so much simpler!

Our reporting of 'bitstream' systems began back in September 1989 when *Hi-Fi Choice* explored the concept of Philips' PDM (Pulse Density Modulation) converter in what was then the Sony TA-F630ESD DAC-equipped amplifier. Since that introduction we've witnessed this high speed D/A conversion technology evolve into several parallel forms. There are now four proprietary digital systems vying amongst each other, despite all being allied to a single host technology - that of bitstream D/A conversion.

The two parent bitstream topologies are known respectively as PDM and MASH/PWM, the latter resulting from a joint venture between NTT and Matsushita (Technics). Both PDM (Pulse Density Modulation) and MASH/PWM (Multi-Stage noise Shaping/Pulse Width Modulation) DACs employ a single electrical source to build up the original music waveform from a stream of digital data. This is where the term 'bitstream' comes from, because the original 16-bit code must be distilled into a rapid stream of single bits to control the 1-bit DAC.

Bitstream DACs have no need for the precisely-matched 16 or 18 electrical sources employed by conventional multi-bit DACs so their reconstruction is (theoretically) that much more reliable and accurate. They're less sensitive to changes in temperature, and avoid the



# Keeping in shape

*Keeping you up to date with what's what inside today's compact disc players, Paul Miller explains the thinking behind Sony and JVC's recently introduced 'PLM' and 'PEM' low-bit digital-to-analogue converters.*

glitches and zero-cross distortions that plague conventional DACs.

Of course, as far as consumers are concerned, low-bit CD players neither look nor function any differently from the 16-bit players of old. They are entirely compatible with existing 12cm and 8cm compact discs and offer precisely the same comprehensive array of facilities. The only differences are in the manner by which the digital data is processed once it is extracted from the disc. . .

And, currently, that handling of digital data may be described by four proprietary processes: PDM and MASH/PWM which are now joined by Sony's ENS/PLM and JVC's VANS/PEM. Each of these digital technologies may be classified under the generic term 'bitstream'. This said, Philips still insists that *BitStream* be reserved as a trade description for its PDM process as distinct from PWM and its derivatives.

## Compare and contrast

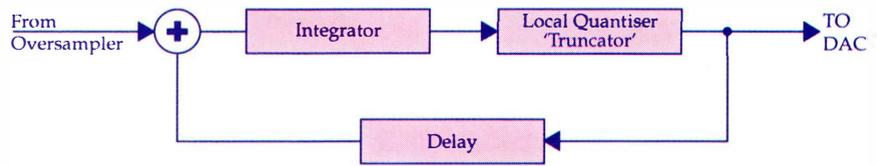
Let's examine the features common to all four systems (see table, opposite). For a start, all rely on increasing the 44.1kHz sampling rate via two or more stages of oversampling. Each system uses a different amount of oversampling so each

ends up with a proportionally narrower or wider sampling bandwidth. Next comes truncation where the oversampled 16-bit data is reduced to smaller bit-words and, once again, the degree of truncation varies from system to system.

Nevertheless, none can avoid the noise and distortion generated as a byproduct of truncation, so all utilise a form of digital feedback called *noise-shaping* to concentrate this residue near the middle of the sampling bandwidth and therefore safely away from the audio band. A simple first-order noiseshaper is depicted in Fig 1, highlighting the quantiser (or truncator), the inverter and the integrator (or accumulator). We'll come back to this a little later.

The degree or order of noise-shaping required depends upon the new sample bandwidth (and therefore the amount of oversampling) as well as the severity of truncation. In other words, truncation from 16 to 1 bit-words generates more noise than a reduction from 16 to 3.5 bit-words, so the former demands more noise-shaping than the latter. In practice, however, this requirement may be offset by a wider sampling bandwidth because this offers more 'room' to accommodate

Fig 1: Simple first-order Noise Shaper:



the unwanted noise (see Fig 2).

The corrected bit-words are then used to control the output of the bitstream DAC. In Philips' case the DAC output is realised as a series of positive and negative-going pulses which are fixed both in height (amplitude) and width (time). The accuracy of these pulses is linked to the sampling bandwidth while the desired music waveform is fully described by the density - or number - of these pulses per unit of time.

The Far Eastern approach uses these small bit-words to generate a series of equal-height pulses that can adopt a fixed number of possible widths. Once again, the amplitude of the music waveform is coded as a proportion of the widths per unit of time. However the reproduced accuracy of the narrowest pulse width is not determined by the sample bandwidth but by crystal clock reference of far higher frequency.

In all four systems the original music signal is recovered from the high speed analogue pulses by a process of integration or 'time averaging'. Remember, it's the amount of time occupied by the pulses per sample period which determines the amplitude of the final music signal.

That's the general theory, at least. We've covered Philips' PDM and Technics' MASH/PWM systems in great depth before, so in this instance we'll concentrate on the newcomers from JVC and Sony while exploring the pros and cons of noise-shaping in greater detail. After all, it's the symbiosis of oversampling and noise-shaping which lies at the heart of all bitstream converters.

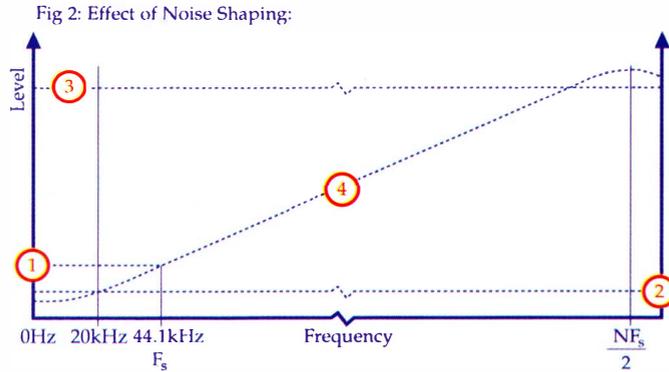
### The newcomers

Both Sony and JVC use separate 8x oversampling filters to compute seven extra samples between each original pair, thereby increasing the data rate from 44.1kHz to 352.8kHz. These re-sampled 16-bit words are then further oversampled in the main IC which also houses the

noise-shapers and bitstream DAC. Sony's CXD-2552 DAC includes a second 8x oversampling filter which pushes the total rate up to 64x and widens the sample bandwidth to 2.8224MHz. JVC's PEM DAC incorporates a 4x oversampling filter, yielding a total of just 32x and a bandwidth of 1.4112MHz.

There are differences in the severity of truncation too, with Sony opting for a wordlength reduction from 16 to an average of 2.81 bits. JVC on the other hand has erred on the side of caution, reducing the wordlength to 3.91 bits thereby generating less requantisation noise and improving the open-loop signal-to-noise of the PEM DAC. However, this means that while Sony's PLM DAC has only to manage some seven different binary values, JVC's PEM DAC must cope with up to 15. Furthermore Sony has twice the bandwidth to play with when implementing its noise-shaper.

Like Technics, Sony developed its noise-shaper in conjunction with NTT, which explains the similarity between MASH and ENS. Sony's combination of 64x oversampling and three integrators in the feedback network ensure that the



- 1: Noise level of original 16-bit signal.
- 2: Overall noise level after Nx oversampling.
- 3: Increased noise level following truncation from 16-bit to <4-bit words.
- 4: Noise-shaping concentrates (3) at half Nx sampling frequency, achieving a reduction of noise in audio range without changing overall level of noise. That is, area under line (3) is equal to area under curve (4).

benefits of noise-shaping are fully realised below 470.4kHz (one sixth of the total bandwidth). By the time frequencies as low as 20kHz (top of the audio band) are reached the requantisation noise is some million times lower or -120dB!

This betters the performance of Technics' mainstream MASH/PWM system despite using a similar 3rd-order noise-shaper. With Sony's ENS/PLM DAC, the peak of the shaped noise curve occurs at twice the frequency (ie 1.4112MHz instead of 705.6kHz), ensuring its skirt dives to lower levels before entering the audio band.

Interestingly enough, Technics does have a comparable 64x oversampled MASH/PWM system in Japan which also truncates to 2.8 bits. Sounds similar? But why not stick with lower rates of oversampling, a reduced sampling bandwidth and just increase the order of noise-shaping instead? This is JVC's approach and, after all, the order of noise-shaping simply determines the sharpness and amplitude of the curve (4) shown on Fig 2.

First or second-order shapers give rise to a more subdued 'bump' at NFs/2 and, due to their gentler slope, offer less effect

	Bitstream type	Oversampling	Sampling bandwidth	Word-length	Noise-shaping	Clock frequency
Philips	PDM	256x in 3 stages	11.2896MHz	1.00	2nd	11.2896MHz
Technics	MASH/PWM	32x in 2 stages	1.4112MHz	3.46	3rd	33.8688MHz
Sony	ENS/PLM	64x in 2 stages	2.8224MHz	2.81	3rd	45.1584MHz
JVC	VANS/PEM	32x in 2 stages	1.4112MHz	3.91	4th-2nd	16.9344MHz

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in the audio band. Philips gets away with 2nd-order shaping because its sampling bandwidth is so much wider, of course. Unfortunately, it is not a simple matter to increase the number of integrators and therefore the order of noise-shaping because the loop itself may lapse into instability.

Feedback, whether digital or analogue, can easily become unstable and lead to oscillation. In an amplifier, for instance, instability is precipitated when the inverted feedback signal lags the main signal by an additional 180 degrees. At this point the feedback component is no longer in anti-phase with the main signal and so begins adding to itself, rapidly increasing the amplitude of the output.

This is the point of catastrophic instability, occurring at the frequency where the closed-loop gain of the system  $>1$  and where a full 360 degree phase shift is met. Any feature of the circuit that steepens the feedback slope or increases the rate-of-change of phase may infringe upon the stability margins of the amplifier.

A similar condition can arise by the use of high-order compensation in noise-shapers. Here the 'digital feedback' may be treated as an ultra-high frequency (ie, MHz) analogue feedback, replacing continuous voltages with discrete (that is, sampled and quantised) voltages. The feedback or error signal is derived from each truncated 16-bit word. These are then inverted and combined with upcoming 16-bit words in an integrator. Duly compensated, the 16-bit words are then truncated by a local quantiser, thus generating the next feedback 'sample' in addition to the small bit word required by the bitstream DAC (see Fig 1).

Oscillation is more likely to occur with increasing orders of noise shaping because each additional noise-shaper requires an extra set of filtering coefficients to determine its integration characteristics. This in turn determines the eventual steepness of the noise curve (4) and so the eventual S/N ratio upon conversion.

With increasing numbers of coefficients, the mathematics of the individual integrators allow a 360 degree phase shift condition to occur more readily. Certain combinations of compensated data are also now more likely to trip the loop into instability. The frequency of oscillation can fall anywhere across the re-sampled bandwidth, but is most obnoxious at lower (ie, audio) frequencies where repetitive sequences of data give rise to audible drones. These are called idle-patterns.

It is also possible to overload the integrators if care is not taken in the mathematics of noise-shaping. When handling large error components, it is possible that the feedback sample plus the incoming 16-bit word will generate a new sample that exceeds the available  $2^{16}$  quantisation levels. A digital overflow is created which then saturates the integrator, causing distortion in the bitstream DAC.

This sort of overload is most likely to occur as the degree of truncation is increased. That is, Sony's 16 to 2.8 bit reduction generates a larger error component than JVC's 16 to 3.9 bit truncation. In practice, Sony achieves full stability by utilising a composite of 1st and 2nd-order noise-shapers in a similar fashion to Technics' MASH scheme.

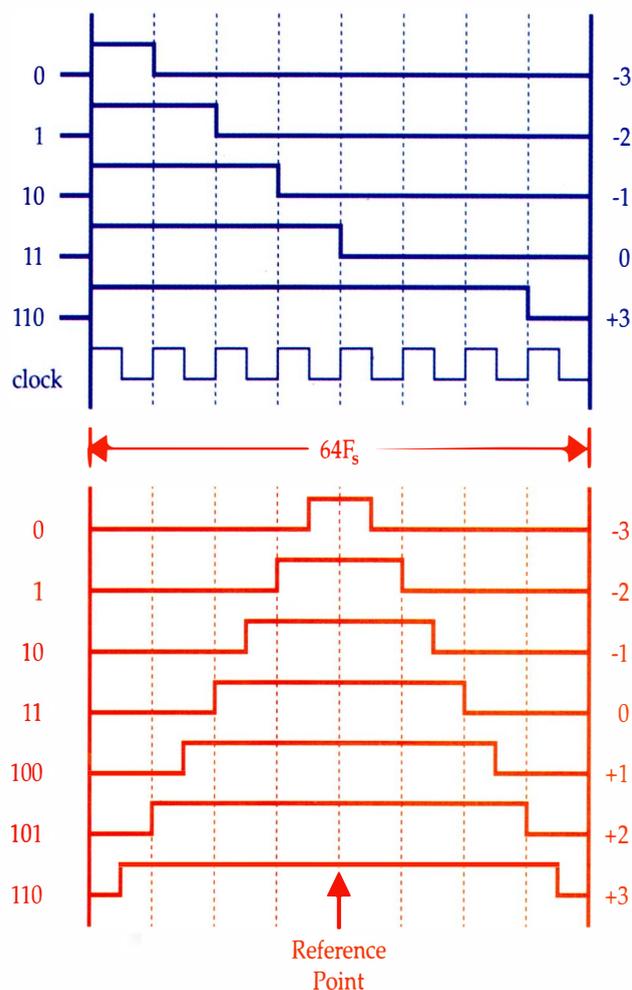
This combination of single and double-integral noise-shapers yields a 3rd order, 18dB/octave slope. However they have also facilitated a bypass between the 1st and 2nd integrators of the 2nd-order noise-shaper and the local quantiser of the main 1st-order noise-shaper. This sub-loop prevents the 1st integrator in the 2nd-order shaper from becoming overloaded.

## 'VANS' for short

JVC uses a lower level of truncation to reduce the possibility of overload within the accumulators while also maximising the DAC's S/N ratio under open-loop conditions. This has also encouraged JVC to aim for 4th-order noise-shaping, a feat that would result in approximately 20dB less noise than a 3rd order shaper at 20kHz. But such a loop would make instability and overload more likely because of the need for extra coefficients and because there is a lower rate of change of high level signals at high frequencies.

Yet JVC's modest truncation level has still enabled the company to develop an ambitious variable-order noise-shaper, called VANS for short. VANS maintains the advantages of 4th order shaping at LF, which is theoretically less prone to idle-pattern noise, but decreases to 2nd order towards 20kHz where digital overload is more likely to occur.

Fig: 3 Sony's 7-Step PWM DAC



But what of the bitstream DACs themselves? To all intents and purposes, Sony's system is just like any other Pulse Width Modulated DAC, it's just that Sony prefers to call it PLM or Pulse Length Modulation. This DAC interprets each of the seven different binary words as a pulse of specific width. So over a 2.8 bit range, the binary words include 0, 1, 10, 11, 100, 101 and 110 with 0 representing a pulse of smallest width and 110 a pulse exactly seven times wider. In decimal form these different pulses are labelled from -3, -2, -1, 0, +1, +2 and +3 (see Fig 3).

Any of these seven pulses could crop up per oversample period, so the DAC needs to be synchronised to a quartz crystal clock if it is to accurately trigger the beginning and end of the pulse 'edges'. Thus each 64x oversample period is subdivided into eight equal segments to accommodate any of the pulse widths plus one minimum 'wait period'. A wait or zero pulse is necessary to prevent successive pulse widths merging with one another. For Sony's DAC to accurately time the pulses, this demands a clock frequency of  $44.1\text{kHz} \times 64 \times 8 \times 2$  (up and down edges) = 45.1584MHz.

All PWM systems are sensitive to clock jitter because this will directly influence

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the size of the width and therefore the amplitude of the output. Sony appreciates the extra sensitivity imposed by its super-fast 45.2MHz clock and so has taken elaborate steps to synchronise the PLMDAC with an internal master clock. In fact, tests have shown that Sony's PLM DAC is actually less susceptible to jitter than competing PWM systems, despite its elevated clock rate.

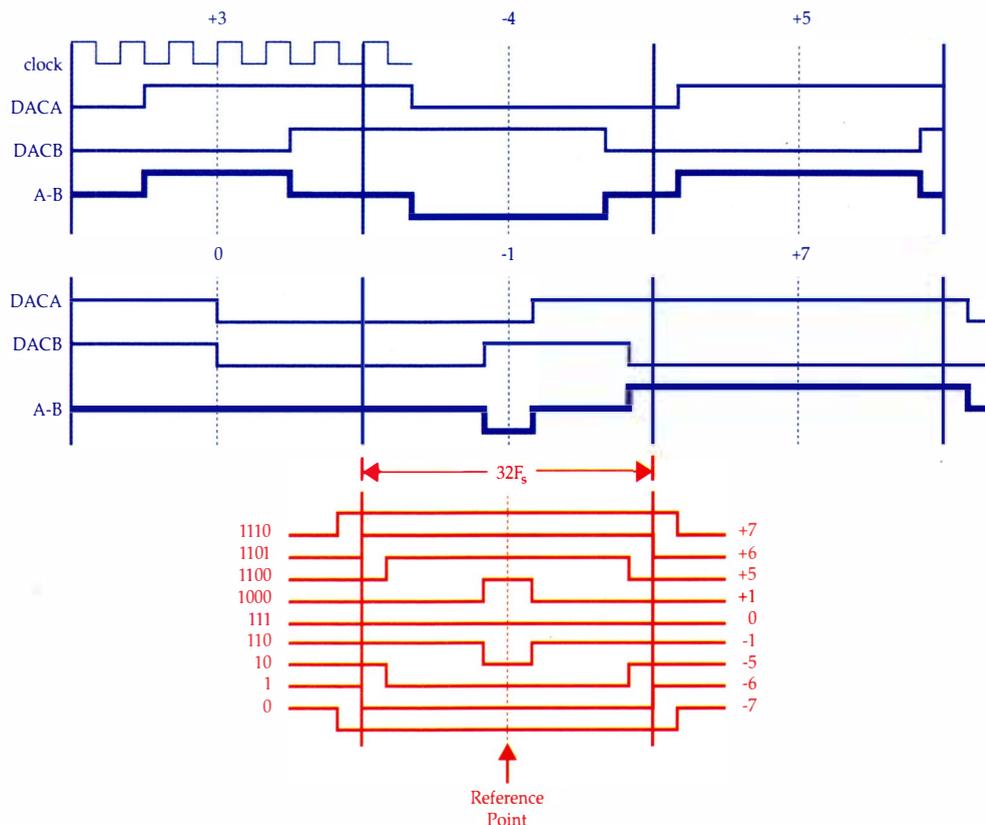
PDM systems are less sensitive to clock-borne jitter, by the way, because the number and amplitude of individual pulses is more important than their absolute width. Furthermore, the time-constant of the integrator is directly proportional to the oversampled clock frequency, outputting a +1 or -1 pulse in response to a digital 1 or 0 regardless of any peripheral jitter.

JVC's Pulse Edge Modulation DAC is actually constructed around two separate PWM DACs referred to, for the sake of expedience, as DAC A and DAC B. The 3.9-bit words contain up to 15 different binary numbers running from 0, 1, 10, 11, 100 . . . 1110. These 15 digital words are eventually responsible for up to 15 different output states from the PEM DAC and, in decimal form, are labelled -7, -6, -5 . . . 0 . . . +5, +6, and +7.

However, and here comes the tricky part, DAC A increases the width of the pulse in response to any positive input (ie +1 to +7), while DAC B decreases the width of its pulse by an equal amount. The opposite happens if a negative input (ie, -1 to -7) appears. The decision as to whether a pulse width is either reduced or extended is taken about a fixed reference point midway through the 32x oversample period (see Fig 4a).

As with Sony's DAC, this oversample period is accurately subdivided by a quartz clock so that a +3 input (1010) causes DAC A to increase its pulse width by 3 clock cycles about the reference point. At the same time, DAC B cuts short its pulse width by 3 clock cycles on the other side of this reference point. The difference between the A and B pulses (ie A-B) is used to derive a positive and negative-going PWM output which is time-averaged as usual to reveal the desired music signal (as Fig 2).

Yet not all is as it seems. Study Fig 4a closely and you'll see that there are only six full clock cycles (12 'edges') per 32x oversample period. However, to



**Figs 4a (top) and 4b: JVC's PEM D-to-A converter.**

accommodate the full-scale +7 or -7 'widths' requires some seven clock cycles (15 'edges' if we include one wait cycle). JVC has limited the number of subdivisions by sticking to a low 16.9344MHz clock frequency which is less sensitive to jitter.

Fig 4b shows the full range of outputs from the PEM DAC resulting from DAC A minus DAC B and clearly highlights how the maximum widths exceed the original 32x oversample period. Theoretically then, JVC's PEM DAC enables the full dynamic range of the 15 value datastream to be drawn upon while using just half the clock frequency of a conventional PWM DAC. By integrating the serial output of two rather than one PWM DAC it is therefore possible to tolerate pulse widths that transcend the original 32x oversample period.

But you rarely get something for nothing. In practice, JVC's PEM DAC must obey the same rules as Sony's PWM DAC, so successive pulse widths cannot merge, otherwise digital overload would result. As before, there should be at least one minimum 'wait cycle' separating the combined outputs of DAC A and DAC B. This means sequences of +/-6 or +/-7 are not permitted because the output widths would then overlap.

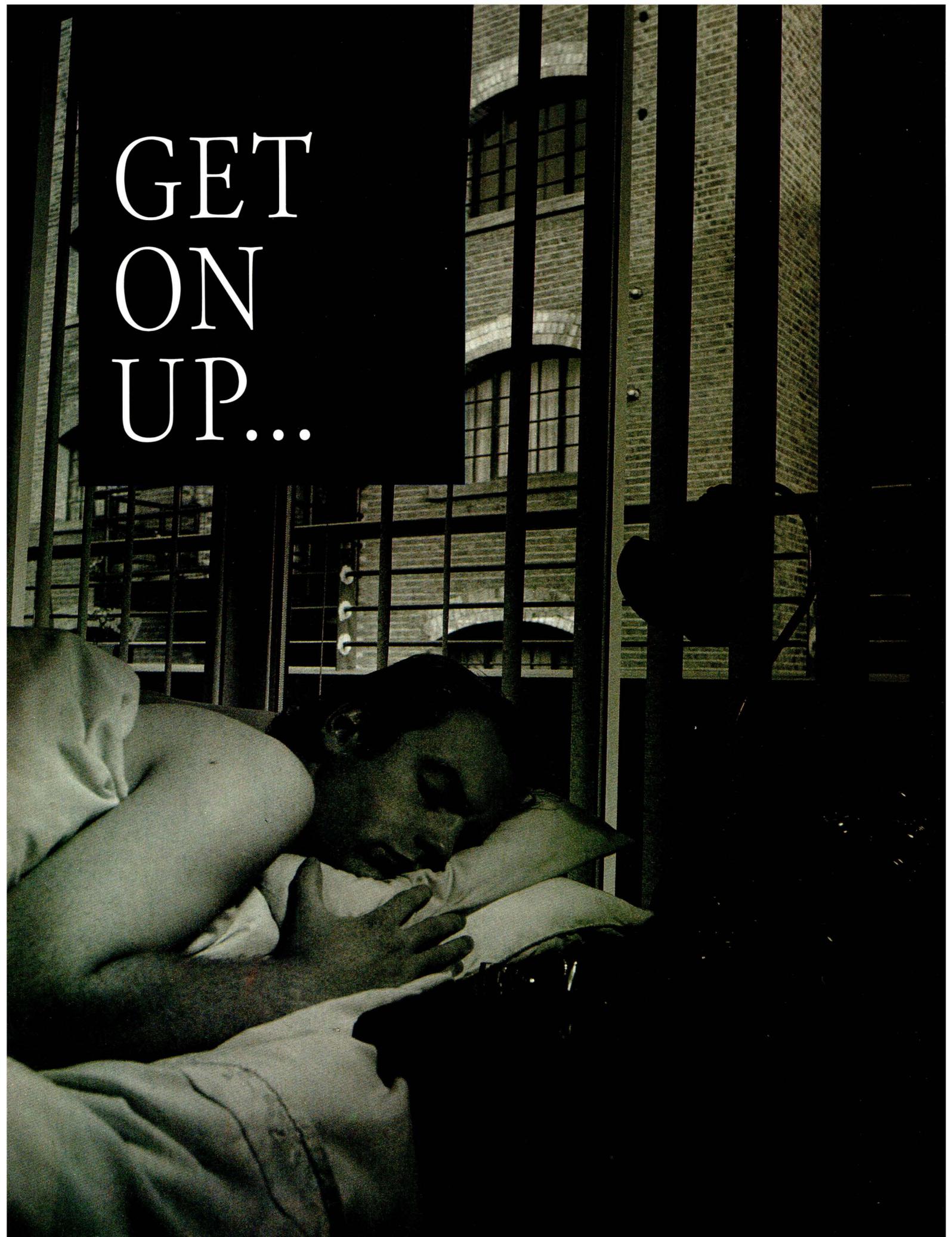
Yet instantaneous values of +7 or -7 are allowed, for example, so long as the next value is numerically lower than five. JVC ensures this by manipulating the coefficients of the two 2nd-order noise-

shapers in much the same way as they change the slope of the feedback at progressively higher frequencies. This all ties in with the overload phenomenon we discussed earlier because it's at these higher frequencies that illegal sequences of 7s and 6s are more likely to occur.

Ingenious though this system is, it remains sensitive to jitter just like a conventional PWM DAC. Even though the PEM process compares the edges of the A and B pulses there is no guarantee that jitter will affect DAC A and DAC B (which are simply switches) in exactly the same way. Consequently the differential operation of A and B will not cancel the effect of jitter, which, in turn, could lead to variations in the absolute width of the output pulse and therefore in the amplitude of the final music signal.

Nevertheless, both Sony and JVC deserve a firm clap on the back for broadening the scope of the bitstream concept. As to the future, well, it's possible to increase the rate of oversampling if not the degree of noise-shaping, thereby allowing truncation beyond the 2.8 bits managed by Sony.

Of course, if you take both PWM and PEM to their logical conclusion, with very high rates of oversampling and full truncation from 16 to 1 bit, you effectively end up with PDM. After all, a one-width PWM DAC is no different from a 1-bit PDM DAC and, to me at least, this still appears to be the most elegant technique of the bunch.



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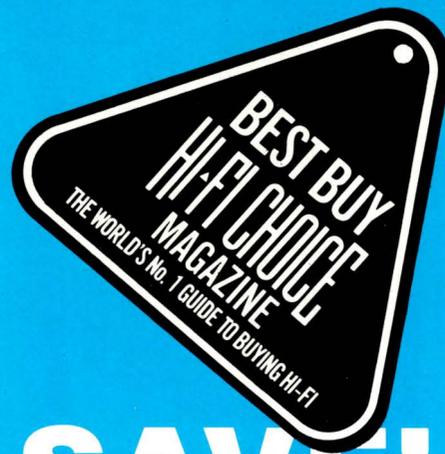
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David Clark—*Audio Magazine*

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BY HENRY KLOSS

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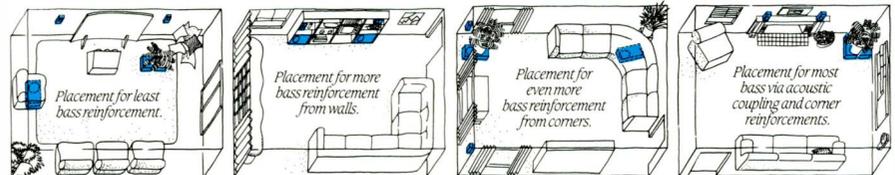
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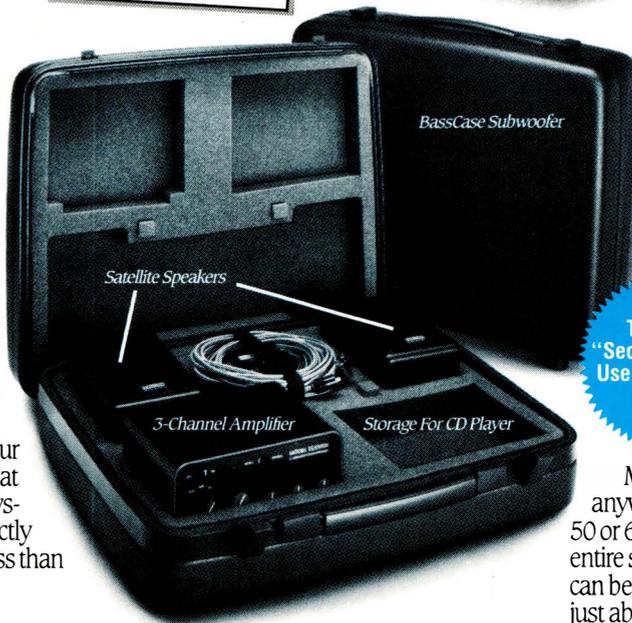


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BY HENRY KLOSS

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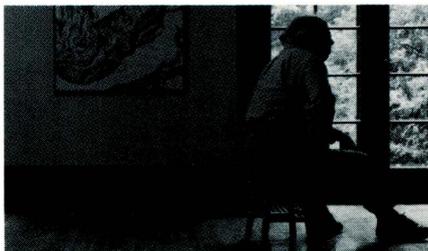
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Johnny Walker finishes his show at nine o'clock in the evening in the studio at Greater London Radio and packs his CDs into a lock-up valise while ringing home to his son Sam. "Hold on Sam will you, I've just got to do something on the radio." He waits for the end of the news, read in the adjacent studio, and hands over to the next show. A friend of similar vintage (45ish) has arrived wearing a pigtail and a Harley Davidson baseball jacket. He searches the ground floor of the deserted radio station looking for the coffee machine. "This is a real happening show," he tells me in a slight Welsh accent. He's Adrian and he works for RCA: "Would you like a copy of Deep Purple's new single?"

## Harley owner

"Right," says Johnny, appearing from the studio shrugging on a black leather jacket and carrying a black motorcycle helmet, valise under his arm, "fancy a drink?"

Ten minutes later finds a row of Harley Davidson motorcycles outside the Arizona 'pub' in Camden, North London. Outside, black leather and beards spill out onto the street as members of the

with regular day jobs - here to live out an easy-riding dream.

Johnny Walker got his name from a jingle advertising whiskey when he first started in radio on the pirate station Radio London in the Sixties. An alternative name could have led to an alternative career, he could have been called Boom Boom Brannagan. His real name is Peter Waters Dingley but he changed to Walker by deed poll after finding fame in the heady days of the pirates.

## Rock 'n' roller

A lifetime in radio has taken him through a two year stint on another pirate, Radio Caroline, to BBC Radio One, America, the West Country and back to Radio One from where he joined GLR in 1988. Recently he changed his GLR slot from a pre-lunchtime show to *Walker on the Wild Side* - a weekday show from seven to nine pm. He also hosts *This Family Business* - a current affairs chat show on Radio Five (the BBC's latest national station which took over the Radio Two medium wave frequency in August this year). The show is on air between 11am and 12.30pm on Mondays, Wednesdays and Fridays, with



space available. He agrees that by having both an FM and an AM frequency GLR is hogging the airwaves itself somewhat.

When he started, rock and roll radio was considered subversive by the official establishment. "The only BBC pop programme was the Light Programme which broadcast for two hours on Saturday or Sunday morning. The Stones, The Beatles and The Animals were all on the Pirates," he told me. "With the current licensing of the incrementals it looks on one hand as if everything's happening. But

on the other nothing changes. Look at America. There are 120 radio stations in LA alone, and they're all surviving. The Government was very quick to make Sky TV and BSB possible but it hasn't been so quick to open up radio. Maybe they want

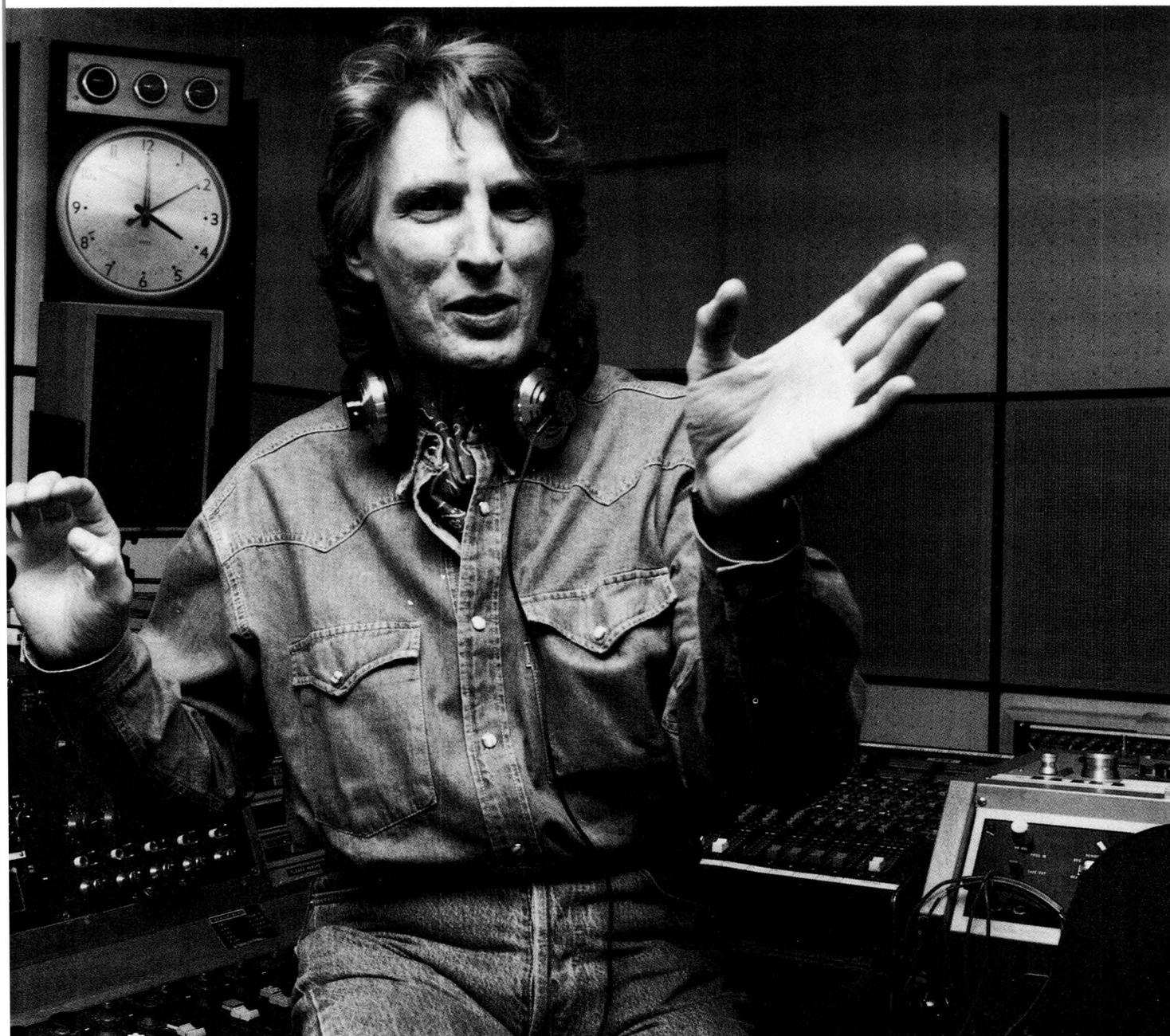
# Johnny Walker

*One time pirate presenter and master of the radio chat show Johnny Walker talks to Dan Houston about radio and why he doesn't have an aspirational hi-fi system. Photographs by Chris Richardson.*

Chelsea and Fulham chapter of the Harley Owners Group (HOG) gather to discuss the aesthetic and technical merits of their machines, parked into the kerb. It's a sight that quickens the pulse, but most of the owners are established professionals

edited highlights broadcast on Sunday mornings (9.30 to 10.30).

As a presenter he has seen many changes over the years, but criticises the lack of choice in British radio with a limited number of stations compared to the air



a more passive population." He sees the government's reluctance to open up the airwaves as censorship and regards it as folly. "The old order can't just go creaking on and on. It's not going to happen, people are too impatient and want something which addresses life in the 1990s. And because there aren't enough stations you can easily influence those that exist. If you're really confident about what you're doing and if you really believe you live in a democracy you shouldn't worry about someone occasionally running down what you're doing."

### Freedom rider

He also feels that British radio presenters are repressed, albeit tacitly. "There's no question about it. Personally as an individual and broadcaster I feel a lot more free in the US. And they are quite happy to licence a large number of radio stations and let them enjoy real freedom of speech. In this country there is an

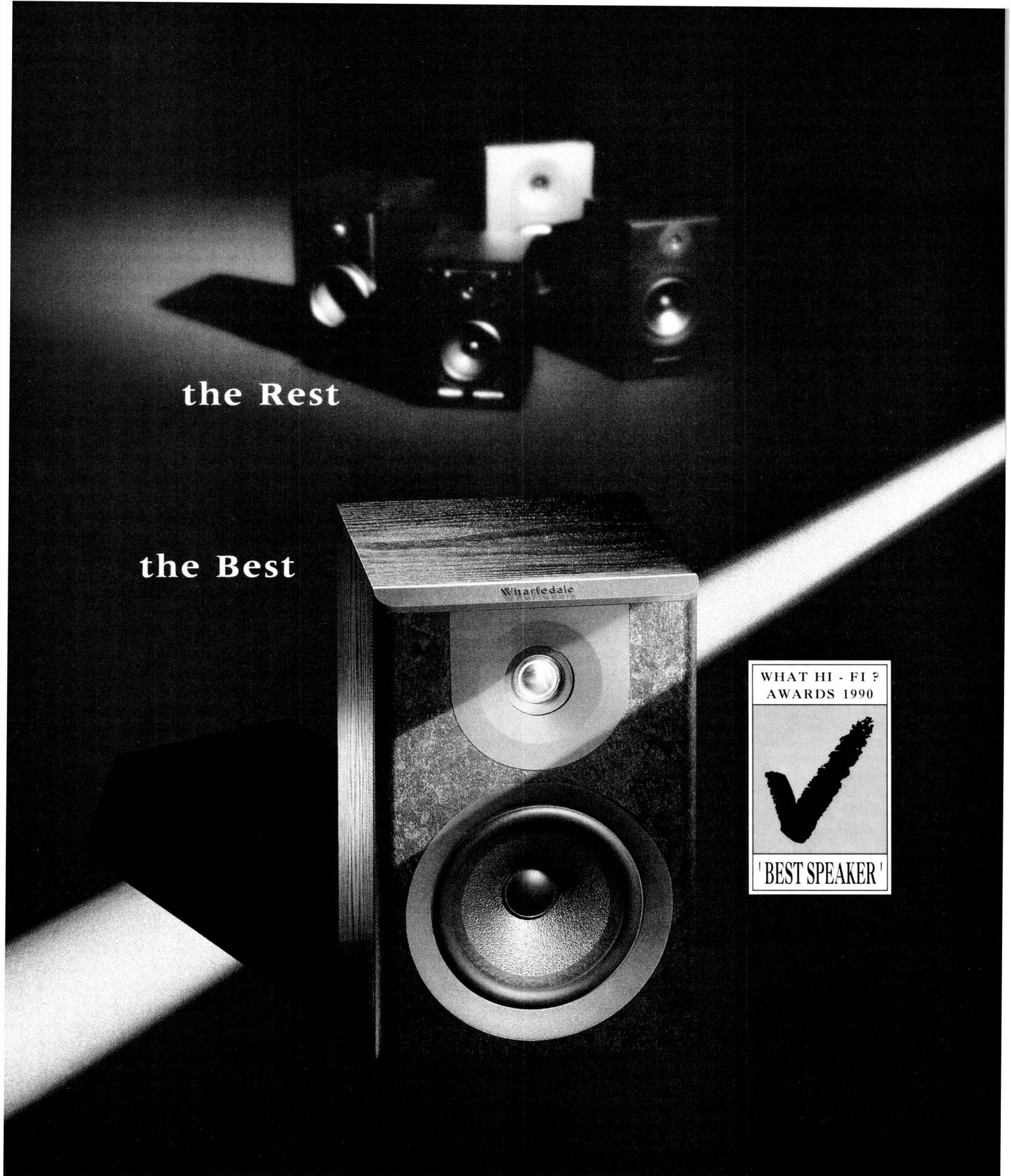
underlying feeling of being suppressed, but the crazy thing is you know the audience would love you to be a bit more free.

"Something like the James Whale show on TV owes its success to the fact that it's pushing the barriers a bit - but it's only contrived freedom. You can only do it as a form of comedy. What is really going to be needed is more outlets for the new music that is going to come through and for people to go on air and really talk about what they are thinking about. Phone-ins should be people talking freely. Phone-ins aren't so much censored as having a feeling on the part of the presenter that you can't be too controversial, the environment isn't there where you can be yourself. ... and that filters through to the public. I'm not saying that you should have dangerous radio 24 hours a day, but you can have the situation where it can happen any time."

JW seems to be one of the few presenters

*JW at GLR: "The old order can't go creaking on and on."*

trying to change this at the moment, but maybe that's because he hasn't got a ladder to climb. His evening show is a mix of music and telephone mayhem. Asking everyone to hold on he goes through the switchboard taking requests and comments and lets people talk to each other on air, or gets rid of them with his own special type of friendly put-down. The odd garbled voice comes on asking for some esoteric sixties track: "Stoned again mate," Johnny replies and goes to the next caller. "You can usually tell if they're going to come out with foul language - there's no room for that on air." When he feels there is enough energy built up from the telephones, Johnny switches back to music. While he's answering the 'phones he's constantly changing discs to find the right track to lead out of the phone-in. "It really gels



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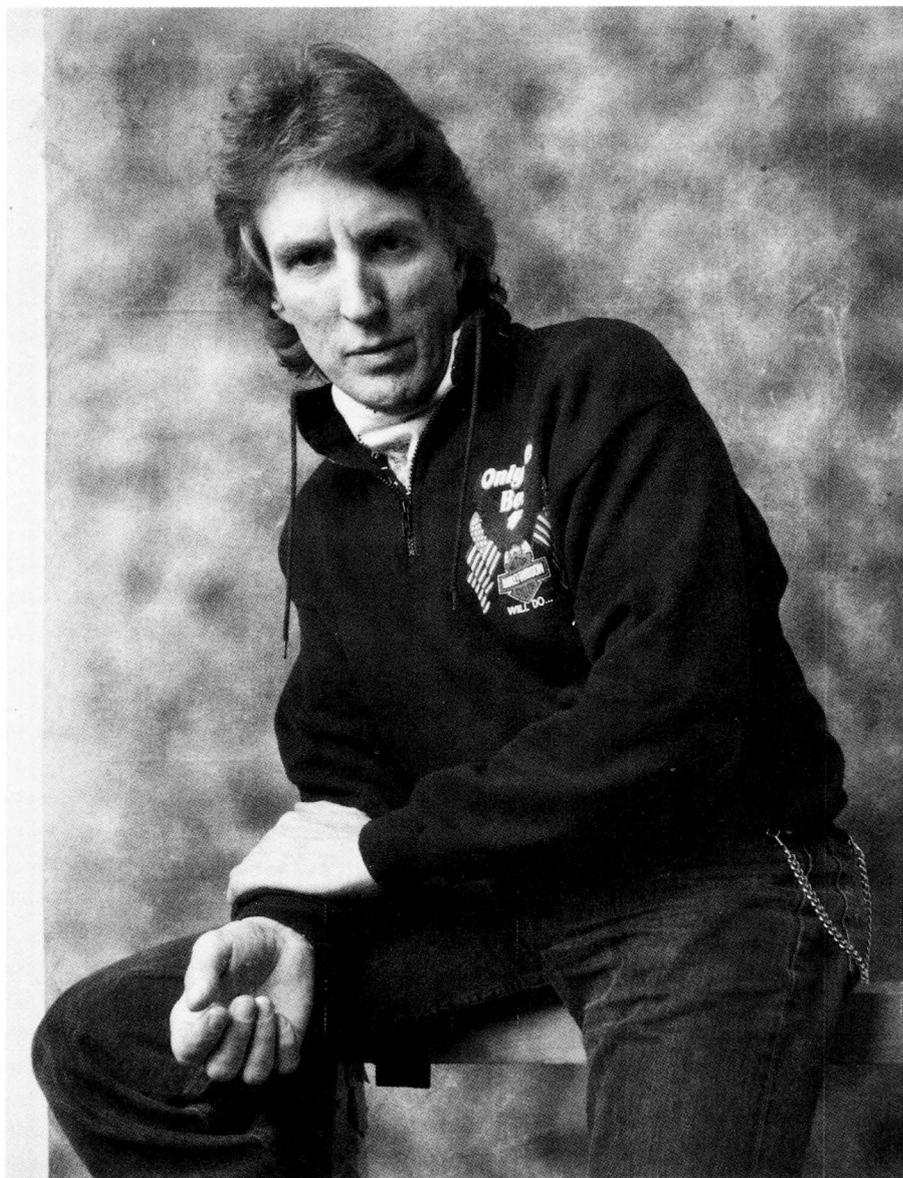
sometimes," he says, "you can get a great atmosphere from people ringing up and then go straight into a triple decker" (three tracks). The idea is to get a walk on the wilder side of radio and the success of the formula is seeing a switchboard full of lights when the lines are open. If there's a request for music that he hasn't got in his own portable library (relied upon when the station's is locked) then it's noted down for the following week. The week before he so wanted to hear a request himself that he asked if anyone in the vicinity had it. A taxi driver delivered the disc to the studio post haste. The approach gives the show a reality that isn't apparent on many slicker programmes, and listeners are forced to become involved. *Time Out* called it 'see through radio'. Needless to say the show already has a dedicated following and its telephone regulars.

## Aiwa owner?

As this issue of *Choice* hits the news-stands GLR will be coming up for its three yearly review. The station has a difficult image to portray being the Beeb's local radio station in the capital, and rumours of closure surface from time to time. "The whole situation of local radio is more suited to regional and rural areas where they serve the community, and some of GLR's problems have stemmed from that," Johnny Walker said. "You don't need local radio so much in London, local issues are also national issues. Radio Four and Radio Two are already very popular

*'Johnny Walker's interest in hi-fi is limited to being almost professional, in spite of having a record collection which spans the history of rock and roll'*

in the capital, what other London listeners want is a music station." He's found his medium at the station, maintaining that "the bigger the audience and the more money you get, the less involvement and creative satisfaction you get from the job." He chooses his own music and is one of a team of four - with producer John Myer,



*Proponent of live, or 'see-through' radio, Walker uses a midi system at home.*

editor Luke Gavin and assistant Mary McLeod.

Johnny Walker's interest in hi-fi is limited to being almost professional, in spite of having a record collection which spans the history of rock and roll. Hearing of the controversy among audiophiles about the sonic merits of CD sound versus vinyl replay systems, he hosted a show on

the subject, and borrowed a high flying system from Audio Innovations to see if he could appreciate the differences for himself. Afterwards he returned to his

Aiwa midi system with graphic equaliser (for that extra bass) which must have mildly shocked the lads down at AI to say the least. "Listen, I thought that system was great, and people who came round to the flat couldn't believe that the amplifier was a working model. When I went back to the midi-system a mate came round

and said that what I was listening to was crap, and he may be right. But it's got a twin cassette deck which I like and there's the timer and remote control - I can record something off air when I'm not there. The sound isn't that good but the things it can do are what turn me on about it."

He isn't always so complimentary about new technology when he's broadcasting. He's often heard to bemoan a CD skipping or sticking on a scratch and saying that it would never have happened in the good old days (of Stanton cartridges and Technics SL1210s).

At the end of the night the Chelsea and Fulham HOG is ready to ride out. The Walker machine is a year-old 1340cc *Low Rider*, with high lift cam and Screamin' Eagle carburettor (these things are important to mention, he tells me). "I'm off now, gotta pick up the missus," he says, looking like he's about to ride into hell with his two-wheeled colleagues. As the bikes roar off down Camden High Street you can feel the throaty exhausts through the tables.

Happening bass.

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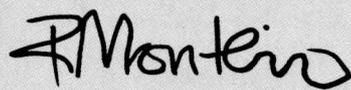
Having embarked on the daunting task of looking for the right music system I visited many Stores and purchased a lot of literature. I was attracted by your advertisement in What Hi-fi magazine. First class sound quality was my top priority and from another article in the same magazine I had made up my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

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Mrs. F. Monteiro



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# Choosing and Using . . . CD based Midi Systems

*Complete stereo systems offer the promise of a genuinely hi-fi standard of sound reproduction, in a convenient and domestically acceptable package.*

*While the shape, size and performance varies widely, the basics are similar.*

*Here we look at the 'building blocks' of hi-fi.*

Music is easily recorded and reproduced using our century's technology, yet is also easily corrupted in the reproduction. Our memories for sounds are good in many ways, yet extremely feeble in others, and in the absence of the 'real thing' we may be quite able to accept a poorly-contrived fake.

By itself this hardly seems important. If we're that easily fooled by the faking process – if we can 'hear through' failings in the reproduction process to the music beneath – why do we need to worry about the quality of the reproduction?

First, although we may not find it easy to pick out the specific faults with reproduced sound, the fact remains that poor sound soon becomes tiring and unrewarding to listen to. Second, poor sound usually means incomplete sound. If musical information is missing, we're simply not hearing all the music, and again the act of listening becomes tiring and unrewarding.

It is for these reasons and these reasons alone, that pursuing audio excellence is a worthwhile exercise. For countless thousands of people, a 'hi-fi' midi or rack system has become merely an ornamental centrepiece of the house rather than a tool for playing music, because after the initial excitement had passed, there was little joy left in listening to music. This is the effect of poor sound-reproducing equipment. But there are hi-fi systems which will give you musical enjoyment and enduring pleasure.

For many people interested in listening to music in the home, a packaged audio system of the type usually referred to as a midi system is the obvious choice. There is no doubt that choosing your

own separates to make a working system has its satisfactions, and under ideal conditions will provide the most worthwhile and musical results. But it is also liable to end up with a rather Meccano-like appearance and wired up with 'a plateful of spaghetti', to use Sony's memorable description.

The integrated system avoids these problems, with components of matching appearance, sometimes with a piece of furniture to subdue the 'hi-tech' look of bright chrome, control knobs and displays. Choosing a one-make system might appear to guarantee optimum electrical and mechanical matching. But appearances can be deceptive and many apparently well-matched systems (in the technical sense) are anything but.

Increasingly, integrated systems are physically smaller than in the past. Typical component widths have reduced from 43-44cms to 33-36cm now, and this review concentrates on the latter – hence the midi in the title.

## Compact disc player

The digital compact disc is a fairly recent development in audio – a means of storing information in digital form on small (8 or 12cm) discs, recorded on one side only and giving continuous playing times, extending to over 70 minutes in some cases.

The information is stored in a spiral arrangement of 'pits' which are read by a laser which follows, but does not touch the surface of the disc. Very low background noise and great linearity of frequency response (up to the cut-off point near 20kHz) are the hallmarks of the system, together with a degree of

robustness not associated with conventional records. Small scratches, dust and fingerprints should not affect sound reproduction. CD reproduction is free of the 'pops and clicks' which mar LP sound.

In the few short years compact disc has been on sale, it has grown in strength to the point where it is beginning to rival the more traditional sources in popularity. Most systems (including all those reviewed) are now available with compact disc, and there are cases (eg Proton) where CD is pushing the traditional record player off the scene altogether.

Compact disc is the easiest source of all to operate. All a CD player needs is a mains feed and one of the inputs on the system's amplifier.

## Turntable

The usual type of system turntable is a simple design which includes auto-return at the end of side, and a magnetic cartridge. Recent design trends look worrying; there is an almost universal use of flimsy plastic mouldings in areas of structural importance (eg headshells) whilst the weight and build quality of the turntable chassis has tended to become lighter and stay static, respectively.

A declining number of turntables incorporate the new T4P or 'P'-mount cartridge fitting, where the cartridge plugs into the end of the arm using the terminal pins. These cartridges all have a common specification which means no alteration to any of the arm settings is required no matter what cartridge is fitted. With most low-cost turntables of the type typically supplied with midi systems, cartridges are not interchangeable at all, and where this is the case, it's

indicated within the reviews. The ability to change cartridges provides an easy, if limited route to improving system performance at a later date.

There is a remarkable uniformity in the types of cartridges fitted. Nearly all are standard magnetic designs, bearing the rack maker's name in most cases, but often recognisable as coming from Audio Technical.

## Cassette deck

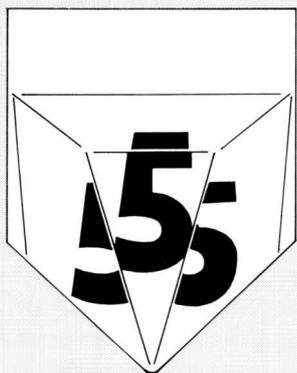
There have been changes in the cassette decks supplied with systems too, especially in peripheral areas like transport control and record level meter designs.

Ignoring the sub £450 systems for a moment, the archetypal cassette deck looks something like this. It will have two transport mechanisms, one for recording and playing back in the usual way, the other for playback purposes only. Using the two in combination allows tapes to be dubbed, or played back from one deck and recorded on to the other, and played back one after the other (often known as sequential play or – perhaps confusingly – as continuous play). The dubbing can be done in real time, that is at normal playback speed, but some also allow double speed dubbing. However, there are trade-offs when using this high speed alternative, and sound quality always suffers severely.

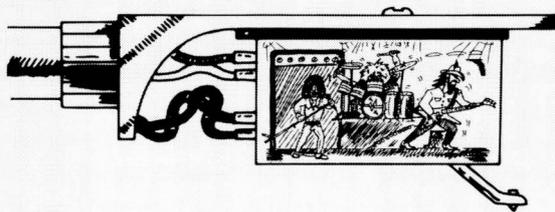
Cassette decks may also have a range of buttons to operate the transport, a number of controls to set the tape type, the recording levels (with the aid of record level meters), and the noise reduction system.

Better sound quality is the aim of the Dolby C noise reduction system which works very much like the

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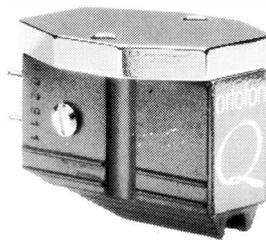
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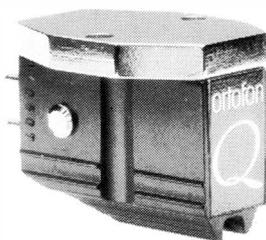
Paul Miller - High Fidelity - Dec 89



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*"Outperforms many a more expensive moving coil."*

Jimmy Hughes - Audiophile - June 90

*"Excellent delicacy, highly competitive."*

Richard Black - HiFi Choice - July 90

*"Tracks like a dream."*

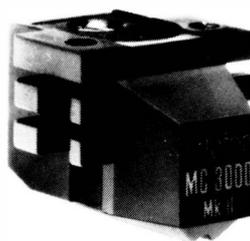
Jimmy Hughes - HiFi Answers - April 90



M C 2 0 0 0 M K I I £ 5 9 9 . 9 5

*"Absolutely exemplary, a thoroughbred cartridge capable of the finest quality sound."*

Jimmy Hughes - What HiFi? - May 90



M C 3 0 0 0 M K I I £ 8 4 9 . 9 5

*"Quite outstanding, breathtakingly neutral."*

Jimmy Hughes - Audiophile - June 90

*"Must be heard to be believed."*

Richard Black - HiFi Choice - July 90

*"An audiophiles' dream."*

John Bamford - HiFi Choice - Feb 90

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familiar Dolby B but with twice the noise reducing effect. Dolby C is fitted to the more expensive decks whilst Dolby B is almost universal as it is needed to replay pre-recorded cassettes which are invariably recorded to the B format.

Instead of manually instructing the deck as to what kind of tape you've inserted, cassette decks are learning to recognise tape types for themselves using the notches on the rear of the cassette housings for the purpose. Another much less welcome trend is automatic record level control, or ALC. This means no record level adjustments and is an undoubted boon from the convenience point of view. But the trade-off can be severe, taking the form of a loss of dynamics and increased background noise; this is because the ALC shunts the record levels up and down continuously in an attempt at making everything sound the same volume!

Elsewhere cassette deck design has become relatively static. The most popular feature is one or other variety of programme search where the deck 'listens' for gaps between tracks when in fast wind/rewind mode, switching through stop to play when it finds the gap. This is of obvious use with popular rock music (or when tapes are used to store a number of computer programs!), but the system tends to break down when presented with material with built-in gaps or long, quiet passages. Speech and much classical music are examples of such programme-search-busting material, and for this reason we were disappointed to see the eclipse of normal memory search features linked to the tape counter.

Tape acceptance in most cases is standardised for the three major types: ferric (or standard bias, Type I), chrome (or high bias, Type II) and metal (Type IV), though some are limited in the types of tape they'll accept.

## Tuner

The tuner provides the means of listening to radio broadcasts, and is commonly capable of reception over the three main broadcast bands of interest to UK listeners –

FM, MW and LW.

Only FM broadcasts on VHF are inherently capable of high-quality results in stereo. FM can give a smooth, even frequency response to about 15kHz, which is close to the limit of most people's hearing. FM is also the only band where stereo broadcasting takes place. The snag with FM, apart from the relatively complex circuitry necessary to make it work effectively, is the fact that it is a short distance medium with a typical range of only 30 miles or so from the transmitter. Although indoor strip (wire) aerials are usually provided for FM reception, the use of such devices tends to be unreliable if good, hiss-free reception is required. This comment holds especially in the case of stereo reception which typically requires ten times the signal needed for good mono reception. So where a portable (mono) radio may work perfectly adequately with a rod aerial, a stereo tuner will normally benefit from a multi-element (typically four or more elements) aerial mounted on the roof – or something similar. It's worth taking some time and trouble over the aerial, and employing a specialist local aerial erector who knows the neighbourhood reception problems. Aerial fitting is not usually expensive; note that even a high-quality, expensive tuner will not give of its best from an inadequate aerial.

A good aerial will provide more than just quiet, hiss-free reception. It will also provide a generally more reliable result, free from impulsive 'crackling' interference and other problems.

The two AM bands, medium and long wave, offer longer distance reception and provide the only way of listening to BBC Radio 4, for example, when the VHF band is given over to educational broadcasting. However, AM sound quality has very limited treble, and a generally uneven, closed-in kind of sound. The aerials supplied with the tuners – usually a ferrite loop or rod – are about optimum. They may need to be swivelled for the best reception, but attempts to increase the

signal level by adding an external long wire aerial are often met with increased interference too. Although reception and sound quality on AM are 'iffy' at the best of times, there turned out to be quite remarkable differences between the best and worst of the tuners tested.

The tuners tested were nearly all of the commonly found digital or quartz synthesiser type which lend themselves naturally to convenient preset tuning. Digital tuning can also mean more accurate tuning into each station, though there was evidence from the tests that this was not always the case.

Many synthesiser tuners also had other problems, in particular background whistles and buzzes in the less well engineered examples. The better synthesiser tuners were free of this defect, however, and were particularly easy to use in preset mode.

## Amplifier

Aptly thought of as the heart of any system, the amplifier accepts the low-voltage outputs from the turntable, CD player, cassette deck and tuner, and boosts them to a level suitable for driving loudspeakers. It also performs a variety of subsidiary functions such as tone controls, filtering, etc.

Although the amplifiers built into the systems came in a wide range of power outputs, this was usually related to price, the more expensive ones generally going louder – though not necessarily sounding better! Where loudspeakers were supplied with lower price systems, their high sensitivity generally made up for the limited power of the amplifier, so that the maximum available volume was still quite adequate.

A pair of conventional high-fidelity loudspeakers was also used during the listening tests, (Heybrook *Point Five Series Two*) and in most cases the systems were fully able to drive these to high enough volumes to satisfy most requirements. The moral of this is obvious enough – it usually makes little sense to choose a system simply on the basis of its power output unless you've an unusually large

room to fill with sound, or you throw a lot of parties!

Sound quality and power output apart, the more up-market amplifiers tended to accumulate additional input facilities and more complex tone controls, often described as graphic equalisers. But many of the features on offer are less than they seem. Leaving all theoretical considerations aside, a system that works well in the first place will not benefit greatly from using tone controls. Graphic equalisers, which are effectively a number of such controls, each responsible for a narrow band of frequencies, are merely gilding the lily.

## Loudspeakers

The loudspeaker is not, as is often thought, the determining factor for sound quality – the system as a whole is as good as its weakest link, no more. But the loudspeaker does have the crucial role of translating the electrical signal from the amplifier into the vibrations in the air we call sound. The simplest loudspeaker consists of a box housing a single drive unit, but most of them divide the sound into two bands, and channel the low bass frequencies to a large coned unit capable of moving large quantities of air, and the high frequencies to a smaller unit capable of responding quickly. A third midrange unit of intermediate size is sometimes used as well, but it's worth making the point that it's extremely difficult to make a three-way loudspeaker work as well as an equivalently-priced two-way one.

There is one crucial factor that determines how well a loudspeaker auditions – and this is how it's used. It is important to support loudspeakers properly, preferably on tall, open stands of the type stocked by most specialist hi-fi dealers. It's equally important to place them correctly, which often means well away from walls and other obstructions. Occasionally shelf (or wall bracket) mounting gives good results – let your ears be the guide – but placing loudspeakers on the floor and/or behind furniture is a virtual guarantee of unsatisfactory sound.

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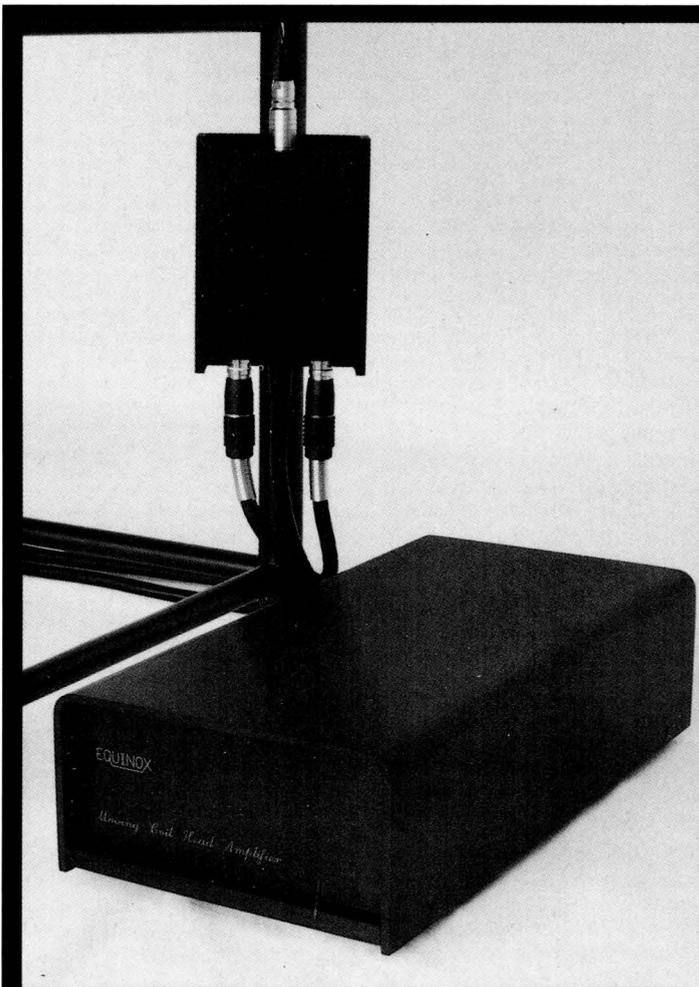
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# Aiwa NSX-800

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The NSX-800 is an example of the comparatively recent trend in the systems market away from standard midi systems to so called mini systems, a drift that is likely to become an avalanche if manufacturers can convince the buying public that compact dimensions don't inevitably mean a loss of musical stature. The NSX-800 is the least expensive mini in this project (the others are from Pioneer and Yamaha), and comes complete with full remote control and a built-in clock and sleep timer.

Finish is the grey textured type that seems to be de rigueur with this type of equipment. Positive first impressions are slightly spoiled by the rather crude styling and a set of controls which are poorly disposed and which in some cases feel rather cheap. The display area looks good from a distance, but again suffers from poor detail design.

## CX-800 main system unit

The range of features on offer makes no obvious concession to the moderate pricing, and is heavily tape oriented.

The tape deck itself is a dual auto-reverse mechanism with one record transport and one for playback purposes only. Recordings can be made on Type I or II tapes (ferric or chrome type) with automatic switching between them, but metal tapes can only be used

for playback. Recording levels are set automatically and Dolby B reduction is fitted. Tape to tape dubbing can be performed at normal or double speed, the latter being a small defeat for common sense, not to mention musical integrity. A simple microphone mixing feature is also available. Taken together this list implies that the deck is oriented primarily towards convenience and flexibility rather than quality, and the high wow and flutter levels and high level of drop-out in the playback only frequency response merely confirm that this is the case.

Supporting the tape deck is a powerful suite of software based features, which amongst other things allow various forms of synchronised recordings to be made from CD, with tape sides filled and tracks not split across sides. Multiple CDs can be recorded ('continuous edit') which is especially applicable with CD singles, and track editing is allowed. The Aiwa will also record off air at prearranged times programmed into the timer. Two such memories are available, one for repeat programming, the other for one off recordings.

The tuner and CD player are much more straightforward. The former operates on FM, MW and LW, and provides 10 FM and 10 AM presets, plus mono switching to help cope with weak sig-

nals. The front loading CD player offers basic (but adequate) features such as programming for up to 24 tracks, random and repeat play. Cueing is available, and without the nonsense of having first to invoke pause.

On the face of it, the amplifier section looks straightforward. Highlights are auto source selection, a four band equaliser and a spare tape circuit which doubles as a line input – there is no phono input – but it manages to include the odd proprietary tweak to imbue the system with a little individuality (not much mind – just a little). One such stroke of originality rejoices under the unlikely title of BBE.

BBE, which is implemented here as a rotary control with extremities marked 'min' and 'max', is designed to counter what Aiwa describe as the 'lowering' of higher harmonic components and the phase shifts that occur in various parts of the audio passband, for example, near the bass rolloff point. BBE is said to render ambience clearer, bring vocals and instruments closer and help them sound fresher. It is also supposed to improve reproduction of subtle nuances as a result of shortened rise times, and to correct the mid to high frequency balance dynamically 'so that a highly ambient, rich sound is produced without impairing . . . naturalness.' Phew. For

more on how the BBE feature hardly makes a dent on the Aiwa's shortcomings, read on...

## SX-800 loudspeakers

The compact but *not* miniature loudspeakers supplied with this system are 2-way bass reflex designs, with two rather simply engineered drive units, both cone units, and a large, slot shaped front facing port. Measurements show a surprisingly broad, flat midband and treble, and a very thin, curtailed bass. And this is pretty much how they sounded...

## How it performs

In the introduction, I suggested that the acid test of any mini system is whether it can be shown to equal the performance of an equivalent midi system.

The *NSX-800* is assisted in this by the sheer awfulness of many comparably priced midi systems. Even those rated as good in this project would be hard pressed to compete with a respectable hi-fi system at the same price level, though the packaged version will certainly be more versatile. At the same time, the mini case is not exactly helped by the price premium that miniatures seem to attract. In the Aiwa's case, the higher spec *X-81* system costs precisely the same as the *NSX-800* at £550.

It is frequently impractical to sum up the performance of a complex system such as this one with a simple yes/no judgement, but this is not the case here. Even making due allowances for price (but not size) the performance of this system is clearly heavily manipulated by such circuits as BBE, which has scant effect on the sound other than slightly lightening and separating midband textures, much as promised.

Much the same applies with the Aiwa's 'Super T-bass' system, which is designed to overcome the perceived disadvantage of small loudspeakers, but which in reality turns out to be a partic-

ularly brutal and obnoxious sounding shelf boost in the bass which adds clouds of cloying gunge and confusion to the bottom couple of octaves.

But even with these circuits neutralised, the sound of the system lacked clarity and detail. Stereo soundstaging was notable only for its crudeness, and much of the fault appears to lie with the amplifier and not as so often with the loudspeakers (which, when assessed on a test hi-fi system, sounded quite acceptable). The CD player and FM tuner sounded a little grainy and synthetic, but worked adequately in context, and certainly better than other parts of the system.

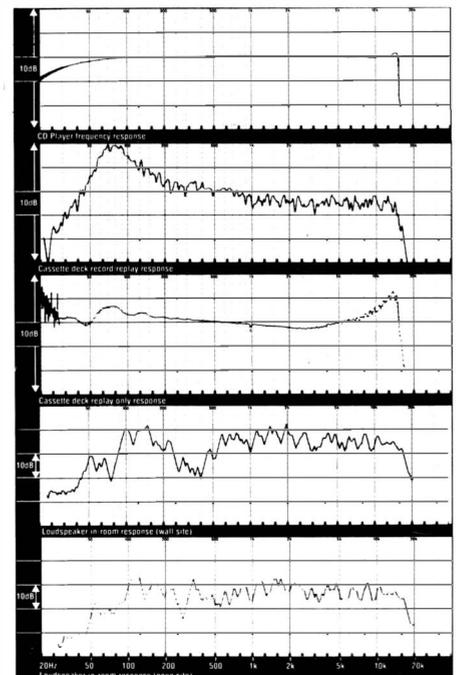
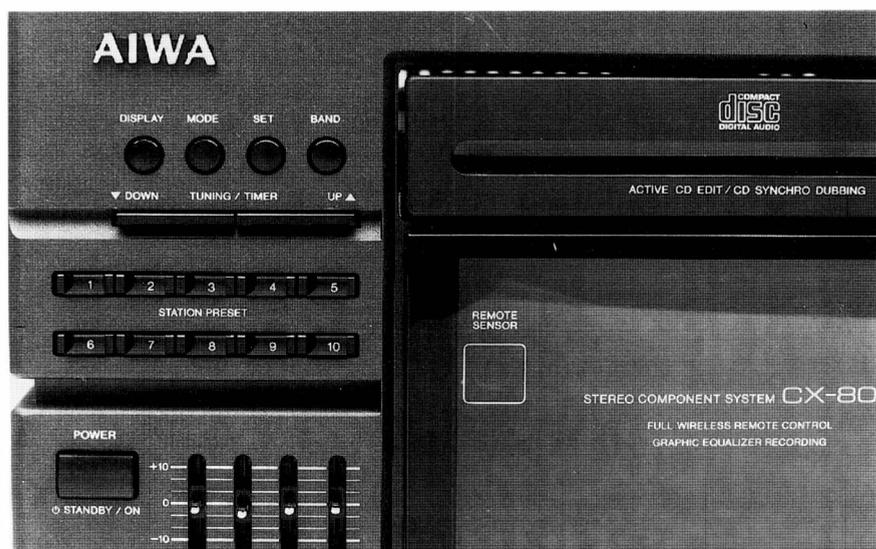
The real problem, however, occurred in the one area where I expected the system to shine: the cassette deck sounded foul with anything other than speech or audience noise or other material where pitch integrity means little. Audible wow was offensively bad; far worse than the weighted test figure implies. Even leaving this to one side, reproduction was rough and flat, and closer to the world of portables than the world of high fidelity.

## Verdict

This superficially attractive and well equipped system earns a clear thumbs down. The Aiwa is sophisticated and flexible, but fails the essential musical tests on a number of grounds. Prominent are the chronic lack of pitch integrity on the part of the cassette deck - normally regarded as a particular strength of the marque - and the fact that Aiwa has attempted - and failed - to cover intrinsic shortcomings with bolt-on circuits such as Super T-bass and BBE. Even a superficial examination of the problems will show that this type of solution can stand no chance of doing what the system clearly requires, and without at least half way decent quality off tape, what use are all those fancy dubbing aids?

## TEST RESULTS

Cost with speakers	£550; without n/a
Options?	none
Size main unit	lid open, w/o projections 31 x 29 x 30cm (h x w x d) 30 x 19 x 22cm (h x w x d)
Size loudspeakers	
<b>TUNER</b>	
Sensitivity	fair
Signal/noise	good
<b>CASSETTE DECK</b>	
Wow & Flutter (wtd)	0.3%
Signal/noise ref 0dB Type II	n/a *
Distortion 0dB Type II	n/a *
* auto level control	
<b>COMPACT DISC PLAYER</b>	
Signal/noise (measured at amp Tape Out)	>95dB
<b>AMPLIFIER</b>	
Power output/channel (8 ohms)	45 watts
(20Hz, 1kHz, 20kHz both channels driven)	
<b>LOUDSPEAKERS</b>	
Efficiency	medium



# Akai FX 800CD

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Usually the primary design goals that inform and underpin midi systems appear to be couched in such terms as 'make sure that no buyer can possibly be alienated, no matter what his requirements.' This recipe inevitably leads to musical blandness and an excessive feature count. The *FX 800CD* doesn't rewrite the rulebook, but it makes a damn good start.

This is a system of musical standards. Genuinely ambitious. There is more than the usual notional attempt at musical integrity and this system can, just occasionally, startle with the clarity and forcefulness of the insights it provides.

Then, there are the visuals. First impressions here were decidedly negative. What little metalwork there is looks like an oversight, and there appears to have been a rather superficial stab at making the system user friendly. The sides of the components gently fall away like a Fifties Odeon cinema but without the class. The squat appearance is emboldened by large and prominent shock absorbing feet. The effect is dangerously close to tacksville. It certainly doesn't look like £700's worth.

But this is a cleverly contrived system. There are remarkably few controls. Certain minor amplifier features are grouped behind a flap, but even so the Akai has roughly half the button count

of some comparably equipped systems without loss of functionality. A number of minor features appear only on the remote control handset, but the temptation to turn the latter into a button festooned monster has also been avoided.

Curiously, although auto source selection operates for CD and tape, the tuner is excluded. And so, of course, is the record deck. However, the remote control has so-called 'intelligent operation' selectors for tuner, CD and tape which get the ball rolling in a single operation.

## AP-M600 turntable

Integrating the turntable into the Akai's control system would have put the icing on the cake, but the deck is at least automatic, which after all involves no additional technical compromises over auto-return operation. The cartridge is tonally flat, bar a nice big resonant peak near 15kHz which should render sound quality reasonably exciting.

## AT-M600 tuner

Like many modern systems, the Akai is equipped with a clock and timer, with two timed on/off cycles (daily or once only) which can be used to record off-air at preset times or used as a wake-up aid. A sleep timer is fitted.

The tuner has 24 random presets which can only be directly accessed

through the remote control though preset scan is available locally. Off air FM performance is verging on good, but AM sound quality is thin and dry, and interference suppression is unusually poor.

## HX-M800W cassette deck

Convenience rules here as elsewhere, so record level settings are made automatically. Recording can be made using any of the three main tape groups, with or without Dolby B or C - and on either transport. Despite the model name, however, the deck does not include Dolby HX Pro circuitry. A range of normal and some abnormal dubbing modes are provided, plus track search and so on, yet the control count is extraordinarily low, due partly to the fact that the main transport control section can be assigned to either transport. The switching logic is not perfect however, with one tape inserted you can select the 'wrong' transport and the deck remains blissfully unaware of the mistake.

## CD-M600 CD player

Strictly speaking this is not a player, but a transport which is interfaced optically with the amplifier which contains the necessary digital converter stage. Standard play and trick play facilities are offered, mostly through the remote.

## AM-M800 amplifier & SR-U800 loudspeakers

The only visible amplifier controls are a pair of selector switches which toggle through the available options, a kind of glorified loudness control that is supposed to widen the apparent stereo stage switch (it does, but at the cost of excess tonal warmth and image precision) and a volume control. The flap mentioned earlier hides a few more, including switching for two pairs of loudspeakers. The Akai also has a wide range of additional socketry, including an auxiliary input, a second tape circuit and two electrical digital inputs (32, 44.1, 48kHz supported) and one output (for DAT) in addition to the existing optical CD input. The DAC is an 18-bit type with 8x oversampling.

Ostensibly straightforward, if capacious and well finished, the 3-way cone loudspeakers were evidently designed by Goodmans, which is a better pedigree than most in the world of packaged audio, though the brief was clearly a tightly costed one. The frequency response plot run with the speakers clear of walls and other obstacles has produced a competent looking curve.

### How it performs

When I played my first piece of music – from the CD of Bob Dylan's *Blood on the Tracks*, I practically fell from my seat as Bob's voice hovered a few inches in front of my startled proboscis. It was so exquisitely lifelike and detailed, I knew I was listening to something out of the ordinary. And I was. The system genuinely is special, though, as usual, there is room for criticism.

The record deck makes no pretence at fidelity, but it does have a kind of cheerful presence. It makes more energetic noises than many system turntables, and the bass is less overhung and coloured than usual, partly because there wasn't much bass to start with.

Unfortunately, there wasn't too much speed stability either.

The main sources – the CD player and the FM tuner – performed adequately, in neither case well enough to be of serious concern to Akai's rivals, but not badly enough to attract censure. They both sounded vaguely synthetic, and they both gave slightly bright presentations with some flatness of stereo soundstage information and a hint of edginess when stretched. But they also offered real clarity, and helped make the most of the rest of the system.

The real surprises came with traditional weak areas like the cassette deck, which despite some gain riding from the auto-level control, sounded unusually stable and accurate, with no noticeable holding back of powerful piano transients. This suggests that the ALC has suitably long time constants. The amp contributes a solid sense of grip and plenty of power, and the loudspeakers . . . well, the loudspeakers work, which only goes to show that if you give a real loudspeaker designer a pile of wood shavings and some reject tin foil, he can make something worth listening to. There was some edginess in the treble, and some HF phasiness which is the real reason for the surprising projection of Bob Dylan's voice. Well, all good stories have to end.

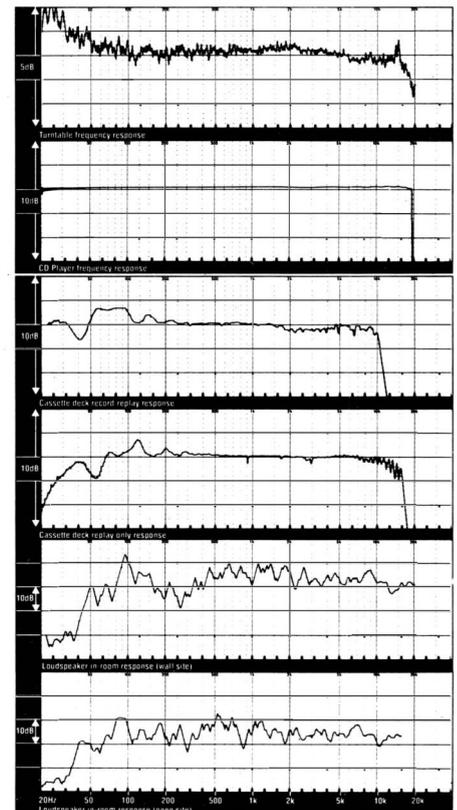
### Verdict

Of all the systems in this test, the Akai is the only one in real danger of transcending the bland generalities and limitations of the breed, and this justifies a Best Buy. We have seen that this is musically an extremely strong package. It is more of a system than the average midi, which is merely a collection of disparate separates with uniform styling. Akai has clearly put much thought into how the system operates as a whole, and the result is a system that doesn't lack for features, yet which is unusually approachable and, yes, user friendly.



## TEST RESULTS

Cost with speakers	£699
Options?	EA M800 graphic equaliser £130
Size main unit, lid open, w/o projections (h x w x d)	80x 36x 39
	67x 27x 25cm
Size loudspeakers (h x w x d)	
<b>TURNTABLE</b>	
Wow & Flutter (wtd)	0.2%
Drift	low
Speed accuracy	+1%
Arm/cartridge resonance	OK
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	1dB
Cartridge channel separation	28dB
Cartridge tracking ability	80µm
<b>TUNER</b>	
Sensitivity	good
Signal/noise	good
<b>CASSETTE DECK</b>	
Wow & Flutter (wtd)	0.15%
Signal/noise ref 0dB Type II	n/a*
Distortion 0dB Type II	n/a*
* auto level control	
<b>COMPACT DISC PLAYER</b>	
Signal/noise (measured at amp Tape Out)	-80dB
<b>AMPLIFIER</b>	
Power output/channel (8ohms)	48 watts
(20Hz, 1kHz, 20kHz both channels driven)	
<b>LOUDSPEAKERS</b>	
Efficiency	low



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player can select the playing order of up to 24 tracks, play the tracks in random order or scan the introduction of each track.

A computer is also employed on the twin auto reverse decks, allowing you to 'Backskip Edit' when you're recording from CD.

Ingeniously, when the tape on one side runs out, the deck skips over and starts the track from the beginning on the new side.

There's even a 'Fade Out Edit' so

that music doesn't stop abruptly.

And the tuner has no less than 36 pre-sets which you're going to need for all the new radio stations.

Finally, the whole system can be controlled using a 48-key remote.

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*For information on all products in Sanyo's hi-fi range, please write to Anne Branton, Consumer Affairs, Dept 101, 6 The Business Village, Wexham Road, Slough, Berks. SL2 5HF.*



# JVC Midi-W53

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



Playing idly with this system prior to formally starting work on it, I came to a tentative conclusion that it cost about £700 and that it had very bad loudspeakers. The very bad loudspeaker bit is absolutely true, but the price is £500, which makes it a much more interesting proposition, and which even provides an excuse, however feeble, for the loudspeakers. The system is interesting enough in fact to make it worthwhile donating the speakers to a charity – I'd suggest one in favour of the deaf – and investing £100 in a new pair.

Build quality is an essentially meaningless term when applied to midi system record decks and loudspeakers, not just for JVC of course, but for just about every manufacturer in the business. But the JVC system is really rather well finished. Control feel is excellent, and the displays – of which there are plenty – are rather sexy.

The *Midi-W53* (such a catchy title) is strong on the automation side. It has automatic source selection (but not, of course, on phono) and a number of other powerful microprocessor driven features, some of which (I am compelled to point out) veer on the brink of gimmickry. It also comes with one of JVC's monster remote controls, a really impressive if fearsome instrument with no less than 67 gap keys.

## AL-E31 turntable

The good showing of much of this system doesn't apply to the *AL-E31*. Even the platter is plastic in a shoddily built deck that features an auto-return arm mechanism and a fixed cartridge assembly. The cartridge has a measured mid-band prominence and recessed treble; other test results are unremarkable.

## XL-E34 CD player

Whilst JVC's hi-fi separates are making a splash with low bit converter techniques, the *XL-E34* uses tried and tested multibit technology. It has a neat display and entirely straightforward play features whose high point is memory programming for up to 32 tracks. The deck is of most interest to those who intend to dub CDs onto cassette and who will therefore make good use of the ability to produce synchronised recordings, to perform edit recording (which shuffles the tracks to fit the tape length specified), and to do similar tricks with preprogrammed tracks.

## DR-E53L main system unit

Setting the tone for the system as a whole, the tuner presets can store no less than 40 frequencies on the three available wavebands. To make the task a little more palatable, the presets can even be set up automatically. These

hefty features are backed up by good RF and AF performance. The AM bands sounded satisfactorily clean and intelligible, with adequate suppression of most forms of interference. The FM side offered low noise levels and freedom from interference.

The cassette section consists of an auto-reverse recording deck and a unidirectional one for replay use only. Trick play features include track skip; with JVC's usual eye for excess, it can skip up to 99 tracks in either direction. All three tapes types can be used for recording. This includes metals, though there's scant advantage to be had from these considerably more expensive tapes over a good Type II/chrome bias tape in this system. Recording levels are set automatically, which means comparatively high levels of background hiss during very quiet passages and unnaturally restrained climaxes.

The cassette playback response shape suffers from an odd peak apparently caused by incorrect replay equalisation, whereas the deck's intrinsic record/replay response is revealed in the record/replay plot which has restrained frequency extremes. The wow & flutter figure is excellent.

The most intriguing part of this system is the amplifier. More correctly, it is the plethora of circuits tacked onto and

around the amplifier. One of these is a familiar old favourite, SEA (Sound Effects Amplifier), which in effect is neither more nor less than a graphic equaliser. The SEA circuit is electronically controlled, which has allowed JVC to build in a programming feature, and to include five preprogrammed response shapes, all of which can be called up by pressing a single button.

The amplifier has an extra tape circuit labelled DAT/VCR on the front panel, and circuitry designed to give a 'surround sound' effect when used with two extra loudspeakers. As usual, this is not a serious attempt at providing a genuinely three (or even two) dimensional soundstage, but simply a way of messing up normal stereo so that instruments sound as though they are coming from several points of the compass simultaneously.

A feature called CSRP memorises control settings such as volume, SEA equaliser settings and surround sound status. Each source can then be programmed with its own CSRP setting, which is involved each time that source is selected if the CSRP button has been switched on. Finally, the JVC is fitted with a clock which controls two independent 24 hour timers, which allow the system to make absentee recordings off air. There is also a wakeup timer which operates after a specified time interval, and a sleep timer to match.

### SP-E73 loudspeakers

Another depressingly over-endowed, under-engineered system loudspeaker; the JVC SP-E73 has three drive units mounted behind an almost totally transparent stretched cloth cover fitted to a lightweight and resonant box. The response shape defies ready appraisal. It is however undeniably messy.

### How it performs

The speakers sound raw and edgy, and also extremely phasy. The phasiness is

so obvious and so unpleasant – it leads to a grating combfilter-like effect especially apparent with female voice, and some startling spatial anomalies – that I was led to question whether they have ever been properly auditioned.

Whilst the loudspeakers were busy trying to make the rest of the system sound bad, close auditioning the system with Heybrook *Point Five* loudspeakers and also with headphones led to a very different assessment of the JVC's capabilities. Although still well short of standards that would be generally accepted as high fidelity, the JVC worked more than adequately well on CD, radio and cassette through an amplifier which sounded reasonably tight and tidy despite the excess of features.

In particular, the JVC turned out to be just what a comparably priced system, the Sharp *System 320E* (reviewed on page 108) was not. It was detailed and assured, with an easy and natural response to loud passages and overall presentation that is perhaps best described as clean and articulate. The cassette deck was particularly praiseworthy in coming close to equalling the standards set by the tuner and the CD player. Even when used with the superior Heybrook loudspeakers, there were still shortcomings, not least a rather thin, shabby bass from the CD player and tuner, and a lack of precision at the bass and treble extremes in the case of the cassette deck. The CD player was subject to noticeable low level hum pickup, and the turntable cartridge sounded edgy and distorted.

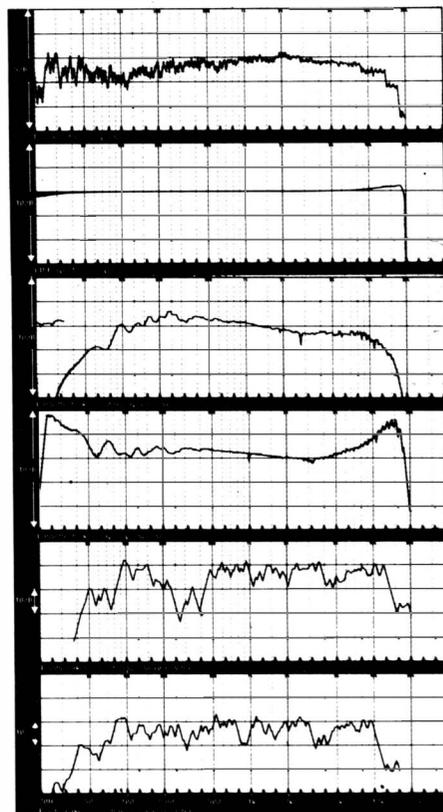
### Verdict

This system fails to attain recommended status on the grounds that the loudspeakers are spectacularly awful. Loudspeakers aside however, the system has much to recommend it, the CD, radio and cassette performing more than adequately. Well worth considering if you are willing to fork out for another pair.



## TEST RESULTS

Cost with speakers	£555; without n/a
Options?	w/o CD player - W53 - £422
Size main unit	lid open, w/o projections 89 x 36 x 31cm (h x w x d) 44 x 27 x 20cm (h x w x d)
Size loudspeakers	
<b>TURNTABLE</b>	
Wow & Flutter (wtd)	0.2%
Drift	average
Speed accuracy	-0.5%
Arm/cartridge resonance	too low
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	0.1dB
Cartridge channel separation	24dB
Cartridge tracking ability	60µM
<b>TUNER</b>	
Sensitivity	good
Signal/noise	good
<b>CASSETTE DECK</b>	
Wow & Flutter (wtd)	0.13%
Signal/noise ref 0dB Type II	n/a*
Distortion 0dB Type II	n/a*
* Auto level control	
<b>COMPACT DISC PLAYER</b>	
Signal/noise (measured at amp Tape Out)	79dB
<b>AMPLIFIER</b>	
Power output/channel (8 ohms)	38 watts
(20Hz, 1kHz, 20kHz both channels driven)	
<b>LOUDSPEAKERS</b>	
Efficiency	medium

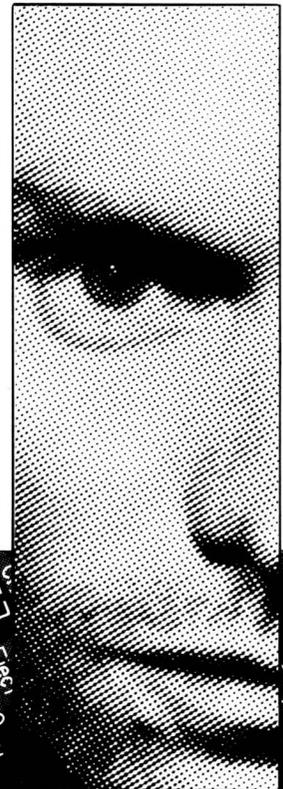


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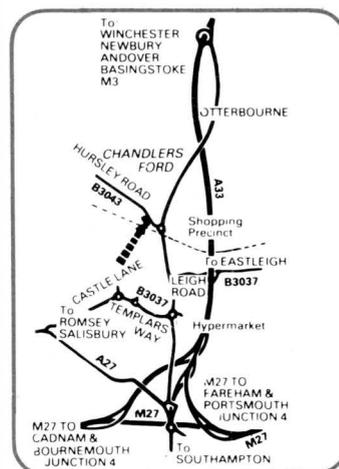
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# Kenwood M-54CD/CDS **R**ecommended

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WATFORD, HERTS WD1 8ED. TEL: (0923) 816444.



The system reviewed here is available in two forms. As the *M-54CDS* it is a complete system with loudspeakers, but it is also available at a reduced price as the *M-54CD*, which is completely identical except for the fact that it comes without loudspeakers.

The *M-54* is a component based system. Interconnections are made with a combination of phono leads and a spider's web of flat ribbon connectors which relay instructions round the system as required. Additional (unassigned) circuitry on the back panel includes a second set of loudspeaker terminals (wired in series with the main set, which means some deterioration in available power output and sound quality), an auxiliary input and a second tape circuit which can be used for a Dolby Pro-logic processor. Full auto source selection is offered, along with auto startup when any source is selected – except in the case of the turntable.

## **P-25 turntable**

The *P-25* is a perfectly standard system turntable with belt drive, auto arm return, and a metal platter – and the usual plethora of hollow and flimsy plastic mouldings. The cartridge is a simple, fixed magnetic which explains the fairly smooth response shape shown in the graphs.

## **T-74L tuner**

Setting the tone for the rest of the system, the tuner is quite a box of tricks. It can store a random selection of up to 30 frequencies from the usual three wavebands – FM, MW and LW. The presets are arranged in three banks of 10, labelled A, B and C, which could perhaps correspond to his, hers and theirs. A preset scan feature is provided, and each of the presets can be permanently labelled with a four digit alpha-numeric label. Off air performance is first class, the AM bands being very clean and lively, and free of interference.

The tuner also doubles as a system timer, but certainly not like any timer you've seen before. This one stores up to six sets of on and off times within a seven day period. Any source can be programmed, or a tape can be recorded off air. Any timer on instruction can also be made to increase the volume in three steps (for wakeup purposes), or play two tracks from a CD followed by a handover to the radio. A sleep timer is also included, along with a one-touch facility to give a wakeup call within 12 hours. Programming this monster of a timer (which must make it the most sophisticated bedside clock/ radio yet) is greatly helped by a series of explicit instructions which appear as a rolling readout in the tuner display area.

## **X-54 cassette deck**

A rolling display like the one in the tuner makes an appearance here too. It guides the user through most of the functions with a series of explicit and perfectly understandable messages, and even provides error messages when required. This, together with a very clever control disposition helps make light of a complex and very well equipped deck whose highlights include (breathe in. . .) twin auto-reverse mechanisms (one records) with Dolby B and C, auto biasing of Type I and II tapes (it takes 45 seconds), manual record level and the usual dubbing and sequential play facilities. The deck has full track search, skip and repeat options, and can accept instructions for up to 16 tracks in either direction. Tape type selection (for type I, II and IV) is automatic.

The deck will even record at double speed from CD and needless to say it has a complete suite of dubbing facilities, with optional fades and track editing of the most sophisticated kinds. Measured performance is not quite as good as its sophistication in other areas might lead you to expect. It must also be pointed out that the somewhat bright record/replay test response was run after adjustment with the auto-bias circuit.

## DP-840 CD player

Although a standalone player, many of the facilities only work in conjunction with other system components (mainly the cassette deck and the tuner) and are used for setting up the various timer led and linked operations already described. But it's notably well equipped in its own right. It has a full calendar style display and an acre of buttons for track selection on the main unit and not the remote handset, which on balance might have been more useful.

## A-54 amplifier & LS-54 loudspeakers

The bass reflex loudspeakers look less anonymous than usual. Some of the detailing is quite neat, but the three cone drivers are well hidden behind a thicker than usual front cover. The frequency plot looks respectable enough bar a shallow but wideband plateau in the midband and a premature treble rolloff – yes even with three drivers.

## How it performs

The loudspeakers are a big no-no. The bass end sounds quite pleasant, but as the applied frequency is increased, sound quality begins to deteriorate. The midband and treble lacks clear articulation and separation. They tend to shout and the sound is extremely hard when stressed at higher frequencies. At very high frequencies, there is little presence at all as the rough and ready tweeters start to shut down. The result then is a rather compressed range of dark tonal colours and a severe lack of detail.

The silver lining in this cloud is that this is one of the few systems in its class that can be purchased without loudspeakers. Good quality designs are available for about £10 more than the price differential between the system with and without (which is £70) from Goodmans, Wharfedale and JPW. £100–£110 brings in a range of alternatives from the same and other sources

such as Mission and Celestion.

Improved loudspeakers are not a complete cure to the problems of this system, though they will make a very substantial difference. There is a residual graininess and aggressiveness in the Kenwood's electronics, which substitution showed to be largely caused by the amplifier. By high fidelity standards it is very thin and raw, with little sense of solidity or presence. The CD player is also somewhat marginal in performance, and in broadly similar ways. Anyone who already finds that compact disc sounds crude and aggressive will only be confirmed in his or her beliefs by this player. Tracking performance is marginal too: this is another CD player which demands little short of absolute optical perfection to avoid groove skip or (more often) lockup.

The turntable suffered shortcomings which are typical of the breed, but sound quality was nevertheless gratifyingly clean and stable. The cassette deck also worked well. It is roughly on a par with a decent budget hi-fi deck. Pitch stability appeared good, and recordings on Type I and II tapes alike offered fine resolution and little of the losses at the frequency extremes noted with many system cassette decks. It was the tuner that proved most impressive however. On both FM and AM bands, it performed well above average standards musically. Given the right kind of broadcast, radio reproduction sounded very accurate, with good detail resolution and strong soundstage depth.

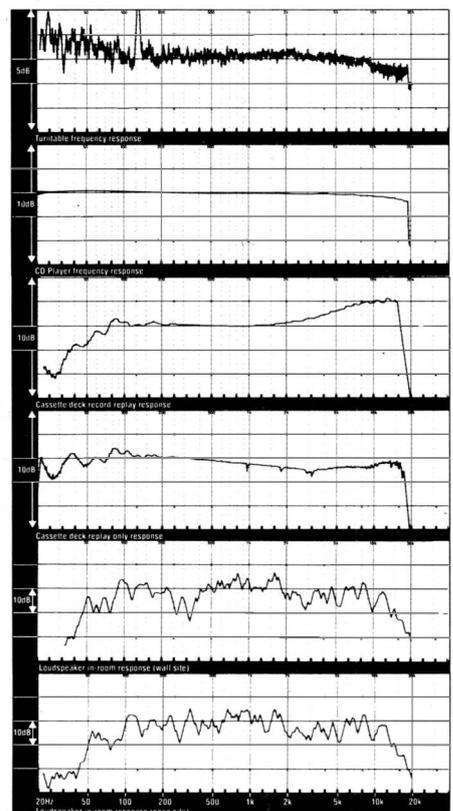
## Verdict

The high facilities count has certainly resulted in some skimping under the skin. I would cautiously recommend this system if you buy without loudspeakers, as the Kenwood M-54CD could sound better, but is a joy to use and astonishingly flexible. The recommendation does not extend to the version with loudspeakers.



## TEST RESULTS

<b>Cost with speakers</b>	£600; without £530
<b>Options?</b>	band equaliser £100; 14 band parametric equaliser/analyser £15
<b>Size main unit</b>	lid open, w/o projections 79 x 36 x 40cm (h x w x d) 48 x 25 x 20cm (h x w x d)
<b>Size loudspeakers</b>	
<b>TURNTABLE</b>	
<b>Wow &amp; Flutter (wtd)</b>	0.2%
<b>Drift</b>	average
<b>Speed accuracy</b>	+0.2%
<b>Arm/cartridge resonance</b>	OK
(<10Hz too low, OK, >14Hz too high)	
<b>Cartridge channel balance</b>	0.1dB
<b>Cartridge channel separation</b>	25dB
<b>Cartridge tracking ability</b>	80µm
<b>TUNER</b>	
<b>Sensitivity</b>	very good
<b>Signal/noise</b>	very good
<b>CASSETTE DECK</b>	
<b>Wow &amp; Flutter (wtd)</b>	0.35%
<b>Signal/noise ref 0dB Type II</b>	51dB
<b>Distortion 0dB Type II</b>	>3%
<b>COMPACT DISC PLAYER</b>	
<b>Signal/noise (measured at amp Tape Out)</b>	90dB
<b>AMPLIFIER</b>	
<b>Power output/channel (8 ohms)</b>	50 watts
(20Hz, 1kHz, 20kHz both channels driven)	
<b>LOUDSPEAKERS</b>	
<b>Efficiency</b>	medium



# Memorex System-550

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



As many readers will know, the Memorex brand is associated with the Tandy group. This system started life costing £649, but was later reduced to a rather more competitive £499. Whilst this review was being prepared, however, Tandy was offering it for £399.

*System-550* includes a fair amount of native intelligence. Source selection is fully automatic – just touch any of the main control keys on any of the sources and the amplifier switches over to that input. The sole exception, as on many other systems, is the turntable.

The system is also fitted with a clock and timer which will make it function as a wake up alarm and can also control absentee off-air recordings. A compact remote control handset is supplied. It covers all basic play and search functions, plus record for the cassette deck, volume and power on/off.

## LAB-550 turntable

Basically a perfectly standard system component, this belt drive unit has a crude pivoted arm and a fixed moving magnet cartridge, and operates manually with auto-return at the end of side. As is usual with this type of player, it makes extensive use of flimsy plastic mouldings. The one welcome surprise was to find that the deck is fitted with an almost adequate alloy platter where

a number of competing models use wafer thin aluminium or even plastic. This said, anyone used to normal hi-fi practice would be hard put to recognise the platter as adequate.

## ST-550 tuner

Like the turntable, the *ST-550* tuner is a standalone product. It has a total of 24 random presets and three wavebands – FM, MW and LW. The various peripheral controls work well and are easy to understand, whilst the simple display is of good quality. The tuner also doubles as the clock and timer already mentioned. In its clock/radio role, it has a snooze function and will operate on an everyday basis if required. The timer controlled recording function, though, must be reprogrammed after use.

## System 550 main system unit

For some unfathomable reason, each separate subsection of the one-box main system unit has its own model number. Thus the equaliser section is called the *EG-500*, and the cassette deck is the *SCT-550*, as though they had an independent existence, which of course they don't. Most odd.

The cassette deck offers two auto-reverse mechanisms, one of which is a recorder, supported by Dolby B, auto record level and the usual dubbing and

sequential play amenities. It can be used with Type I and II tapes only. The measurements indicate a very strong performance, wow & flutter being low and the record/play frequency response very accurate. The play only response, however, indicated a rather dull sound (later confirmed). Incidentally, the glitch in the curve at 3kHz occurred because the deck mangled the test tape, which could not be replaced at short notice.

The CD player is a simple multidisc design. It has two separate loading drawers and can play two discs in one operation, which has obvious applications for parties or when listening to long (multi-disc) works. Play facilities are rudimentary. Finally, the amplifier section is equipped with a five band equaliser, and one spare line level input.

## System 550 loudspeakers

Two cheap cone drivers and a port dressed up to look like a third are the active ingredients of this lightweight loudspeaker. The frequency response trend is extremely ragged, and this simple fact tells all. . .

## How it performs

As suggested above, the loudspeakers are an all too obvious problem area in this system. They sound ragged, boxy and thin. There is no bass as such: the

subjective reality ties in closely with the measured fall in output below 80Hz, but what is there takes one of two forms. Either it is largely composed of a hollow, boxy type of coloration, or at lower frequency still it kind of growls. String tone is raw and edgy to put it mildly, and female vocals are plainly coloured and often sibilant due to some obvious phasiness in the treble, though extreme treble is apparent mainly by its absence. I would recommend turning the speakers into orange boxes and buying a new pair of cheap hi-fi speakers to replace them. Wharfedale *Delta 30s*, Goodmans *Maxim* or JPW *Minim*, all of which cost about £80 a pair, would be entirely suitable.

The rest of the system is not altogether bad. Quite unexpectedly it was the turntable that turned out to be the star of the show. It achieves this distinction partly on merit – speed stability for example, is quite good, and despite a certain edginess and lack of ‘body’, the cartridge is detailed and essentially uncoloured. Due to a sympathetic combination of resonances, the deck is practically unresponsive in the 20–50Hz (approx) region that causes so much difficulty to other system turntables. There is no deep bass, but equally there’s no great susceptibility to knocks, bumps and feedback either.

This explains why it didn’t misbehave, not what made it so good in the first place. This must be put down to sheer talent. From the first, it was apparent that the record deck sounded articulate, expressive – more together if you like than the other source components. The midband had more flesh on it than the rather raucous sounding CD player managed, and the system was capable of a meaningful sense of image scale and presence in addition to the positioning accuracy available from the CD player and radio (when the music permits). Of course the level of detail from records was less (though the

amount of useful musical information if anything seemed improved) and they were constantly susceptible to surface noise and the other well known cosmetic failings of the medium. But these minor failings scarcely dented the record player’s good showing.

The cassette deck has good and bad points. Dynamics were as badly steam-rolled into submission by the auto gain control circuit as usual, but despite the good wow & flutter figure and the excellent tonal quality, the deck was prone to a ‘burbling’ effect believed to be due to poor tape to head contact, and occasional erratic flutter artefacts which could be heard quite frequently through prolonged notes on woodwind (and other) instruments. There was also significant deterioration in the form of loss of clarity and separation when tapes were driven hard – and there’s no input level control to provide a cure.

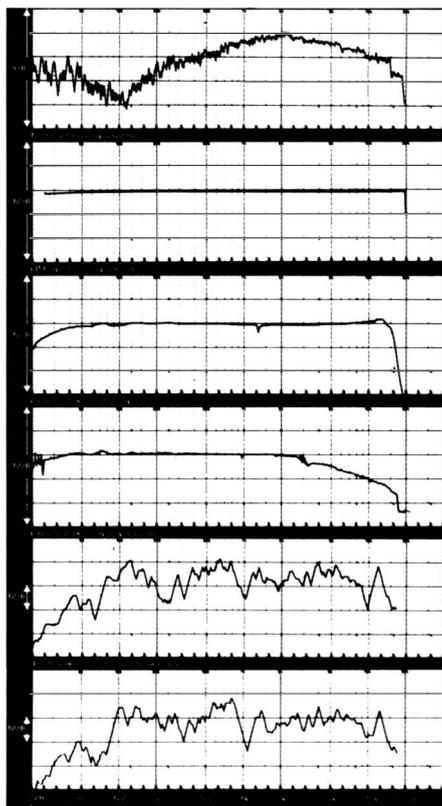
The rest of the electronics performed adequately. The tuner was clean and accurate, and made a fair stab at some live broadcast Radio Three material sampled during the course of the test. The amplifier made up in enthusiasm for what it lacked in sophistication, but it was able to drive the Heybrook *Point Five* test loudspeakers to more adequate volume levels.

## Verdict

If the Memorex system were to be dropped to the £399 special offer price current whilst this test was being prepared, it would warrant a strong endorsement. At its official £499 it’s not unreasonable but is considerably less of a bargain, especially when allowing for a new pair of loudspeakers to replace the awful pair supplied as standard. It’s this that finally precludes a formal recommendation, but the *System-550* remains an interesting system with a number of important positive features. It is well worth shortlisting even at £500.



TEST RESULTS	
Cost with speakers	£500; without n/a
Options?	none
Size main unit	lid open, w/o projections 77 x 36 x 38cm (h x w x d) 45 x 26 x 19cm (h x w x d)
Size loudspeakers	45 x 26 x 19cm (h x w x d)
TUNER	
Sensitivity	fair
Signal/noise	poor
CASSETTE DECK	
Wow & Flutter (wtd)	0.19%
Signal/noise ref 0dB Type II	n/a *
Distortion 0dB Type II	n/a *
* auto record level	
COMPACT DISC PLAYER	
Signal/noise (measured at amp Tape Out)	80dB
AMPLIFIER	
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(20Hz, 1kHz, 20kHz both channels driven)	
LOUDSPEAKERS	
Efficiency	high



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# Pioneer P500

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The Pioneer *P500* represents a new and increasingly powerful trend away from the pseudo stacked hi-fi separates approach of the rack and midi system world, towards more compact, better integrated and more user friendly systems which are increasingly making their presence felt. The Pioneer is a one piece system (plus loudspeakers of course) of unusually compact dimensions and with more than a hint of Yamaha *Astarte* about it. There is no amplifier/loudspeaker symbiosis of the *Astarte* type to increase bass depth however, (though a lack of bass is not an obvious problem – see later), and of course this is a significantly less costly design than Yamaha's *YST-C11*.

There is no pretence to portability here. Although the system is extremely compact and can therefore be carted from A to B easily, there are no carrying handles, and the speakers don't clip to the side of the system. It's an ordinary – or extraordinary – system in miniature, complete with a full function remote control 'designed by Pioneer for the way we live today'. And I was hoping it had stopped using slogans like that.

## XR-P5000 main system unit

The hardware is less innovative than some aspects of the control system, which will look unfamiliar at first,

though good control differentiation and a low control count remove much of the sting. One interesting development is that the usual tone or graphic equaliser controls have been banished in favour of a bank of three switches offering three different tonal characteristics. The first, called BGM (BackGround Music, would you believe), offers a loudness-type contour with reduced output at the frequency extremes to eliminate the 'tininess' that those used to old fashioned, poor quality audio systems often accuse modern equipment of, and a 'stereo wide' feature which increases apparent stereo soundstage width by mucking about with the phase relationships between the two channels. This last feature sounds even worse in real life than it does on paper. The next, called Excite, offers greater bass, treble and, er, excitement. It makes a different man of Barry Manilow, though you might not want to know that. The final position, used for virtually all the listening and of course all the measurements, is called Direct and bypasses all tone control networks and other peripheral circuits.

A further group of keys extends the capabilities of the user interface. Pioneer has provided two user memories which can store a number of parameters for instant recall. Parameters stored this way include the sound source, sound

character (using the aforementioned BGM, Excite and Direct keys), volume, tuner or CD selection and the status of the repeat play switch (where appropriate). The applications are obvious, especially where two people regularly use the same system for their own habitual purposes – one for CD, and another for Radio 4, for example. The Smart Operation feature can also drive a so-called Smart Programme Timer which includes a sleep timer facility, followed by an hour of operation at a specified time using the settings specified under the Smart Operation program. Timer controlled recording off air is also possible.

The various sources can be toggled through with a single switch, or selected directly. Touching the waveband switch, for example, will connect the tuner to the loudspeakers, which makes day to day operation an absolute doddle.

Long Wave is not available on the tuner. In other respects, however, the Pioneer is well equipped with a full 24 random presets, a memory scan feature and mono/stereo switching. The CD player is a front loader of comparatively simple design (note the 'power bulge' at the top) with a standard range of features – 20 track programming, music scan which samples tracks away from the introduction (the time delay is user-programmable), random and repeat

play, etc. Track cueing is clumsily designed, being inaudible and available only via pause. Various methods of recording from CD are available, in all cases with a high degree of automation. The digital converter is a fairly basic 16-bit with 2x oversampling design.

The emphasis with the cassette deck is on keeping things simple, which means no Dolby C and automatic record level setting. Only one of the transports is capable of recording, but they're both full auto reverse mechanisms with excellent logic buffered controls. Metal tapes can only be used for playback purposes, but automatic tape type selection is available for the remaining two tape groups. There are few special search facilities beyond the very useful inclusion of a real time tape counter.

The amplifier has one spare line level input labelled 'video' and is rated at 31 watts/channel – it was measured at 30 watts. The headphone outlet is a 3.5mm socket, which is annoying, but appropriate for the *Walkman* generation.

## S-P500 loudspeakers

The loudspeakers, whilst compact, stand a little proud of the main system unit if placed alongside it (which in reality is not a good idea). Finished in a grey textured Nextel like coating similar to the one of the main unit, the speakers are nothing if not well put together. The active complement includes a cone bass/midrange driver, a cone tweeter and a front facing slot which functions as a port. Bass boost circuitry, which appears to be under the control of a servo arrangement within the amplifier, feeds the speakers when the latter is switched to the 'Excite' setting.

## How it performs

Operationally there were no problems except rather slow responses to many control commands. The delays were no more than a fraction of a second, but this was enough to make control res-

ponse uncertain under some circumstances.

Musically, I found the Pioneer both interesting and creditable. Two features of the *P500* proved particularly impressive. One was a surprising consistency of sound between the various inputs. It's not just that the FM tuner and the CD player sounded fairly similar, which they did, but that the cassette deck did too, which is very much less common. Although close listening revealed that the cassette deck has bass which is slightly fluffy in tone, and although there is a hint of imprecision, of holding back and hardening of the percussive leading edges, it was often quite hard to hear these things.

The combination of amplifier and loudspeakers, on the other hand, offered a highly distinctive sound. The rather strange bass/midrange balance revealed in the frequency response trace turns into a quick and quite deep bass performance which worked well with many typical rock recordings but rather unevenly elsewhere. At the same time, the amount of bass energy in the system was obviously too high, leading to exaggerated image scale and emphasised ambient clues. Bass aside, the system had a highly explicit, dynamic quality, with tremendous midrange energy and transparency which helped make music engaging and enjoyable even when it wasn't wholly believable.

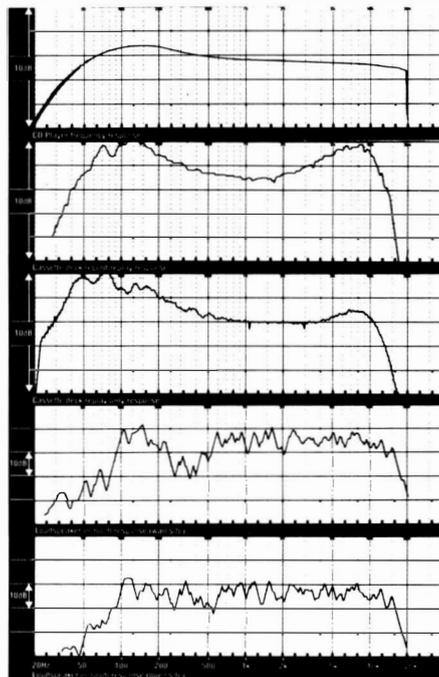
## Verdict

The Pioneer is excellent value for money, capable and enjoyable, with excellent scavenging of ambient information and a large image scale. The outgoing midband quality is the other obvious point that helps to set this system apart from its peers musically. The consistency of the various sources provides the essential underpinning – and the control system, though not entirely free of gimmicks, must be counted a success. Best Buy.



## TEST RESULTS

Cost with speakers	£400; without n/a
Options?	none
Size main unit	lid open, w/o projections 25.5 x 30 x 24.6cm (h x w x d) 28 x 16 x 21cm (h x w x d)
Size loudspeakers	
TUNER	
Sensitivity	very good
Signal/noise	very good
CASSETTE DECK	
Wow & Flutter (wtd)	0.18%
Signal/noise ref 0dB Type II	n/a *
Distortion 0dB Type II	n/a *
* auto level control	
COMPACT DISC PLAYER	
Signal/noise (measured at amp Headphone Out)	85dB
AMPLIFIER	
Power output/channel (8 ohms)	30 watts
(20Hz, 1kHz, 20kHz both channels driven)	
LOUDSPEAKERS	
Efficiency	high



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# Pioneer S-555

**R**ecommended

PIONEER HIGH FIDELITY (GB) LTD, FIELD WAY, GREENFORD,  
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This expensive and well endowed system stands nearly a yard high with the turntable lid open, and greets you each time it is turned on with a sign in the display area of the tuner which invites you to 'PLEASE ENJOY PIONEER MIDI SYSTEM,' and which politely wishes you GOOD-BYE (sic) at the end.

Presentation of the system is by the book: high tech, clean cut, rather busy looking fascia with small, tightly written control graphics – and black. Most of the interconnections are made by ribbon cables with colour coded connectors.

Given that the system is as expensive and well equipped as it is, I was mildly surprised to find that the remote control is far from having high button count. Amongst other things, it lacks the random tuner preset and CD track selection possibilities available on the system itself. It does access a number of special timer modes though, and it's simplicity is rather easier to cope with than some.

## PL-Z460 turntable

The only wholly unremarkable component in the system, the auto return belt drive deck, sits on quite effective shock absorbing feet. Susceptibility to knocks and bumps is better than average, but the height of the stack is such that shock absorption is sorely needed. Measured

performance is neither better nor worse than average, so let's move on . . .

## F-Z460L tuner

This unit functions both as a tuner and as a timer. In the former role, it has a not especially generous total of 24 randomly assignable presets in two banks of twelve. It works on FM, MW and LW, and facilities include DX/local switching and memory scan.

There are no less than three timers which can be used for playback or recording, with daily repeat options which operate for up to a week or indefinitely. In addition, a series of timer modes are available. These set the system up in particular ways, for example, setting preset volumes according to the time of day along with surround sound, equaliser and loudness status. A sleep facility is also provided. Programming is assisted by explicit instructions shown in the display area.

## CT-Z360WR cassette deck

Fitted here is one record/play and one playback transport, both with auto reverse, Dolby B and C and a manual level adjustment facility. Tape type selection is automatic, and the deck will cope with metal as well as ferric and chrome bass tapes when recording. An electronic time/numerical tape counter

and track search are included, plus facilities for editing, dubbing and sequential play, some too bizarre to mention.

## PD-Z560T CD player

This CD transport – it drives the system via an optical digital link – offers two loading drawers and a wide range of play and tape editing modes. The display area is filled to overflowing with two sets of everything, including a complete calendar style display per transport, both operating together. The player can be programmed to play two discs sequentially (or an indefinite number if you reload discs whilst the other is still playing) or to play a selection of up to 24 tracks from both. The desk will even juggle the contents of both discs to design a playing order that best fills specified tape side lengths.

## GR-Z460 graphic equaliser

It is impossible to describe all the functions of this unit in the space available, but let's try. There are five preset, plus five user programmable equalisation memories, and 'active' loudness which is ordinary loudness by another name. Descending from the sublime to the ridiculous we find absurd gadgets like random equalisation, which suggests that someone has his priorities seriously out of order. There's also a feature called

Soundjog which can mould your previously designated equalisation curves according to modifying parameters described by Pioneer as Vivid, Mild, Sharp and Warm. What's more, the effects are adjustable in intensity using the knob that looks like a volume control but isn't.

After all this, it is disappointing to find that as a straight equaliser, the GR-Z460 is somewhat primitive. There are just seven bands of adjustment, and the two channels cannot be adjusted individually.

## A-Z360 amplifier & S-Z360 loudspeakers

At last, back to relative normality with this 40 watt/channel amplifier which has an unassigned input plus an output for an outboard DAT and a tape/VCR circuit. A 'Direct Mode' tone bypass switch operates on CD and DAT (both digital inputs) if required; the equaliser is bypassed when switched off, but others manipulate the system cassette deck feed. The amp has a built-in digital converter for use with the CD player, a feature that has qualitative consequences that are impossible to quantify, but no operational implications whatever. A simple surround matrix is fitted.

The 3-way loudspeakers are tall, comparatively slender, and although attractive, are not very well made. The frequency response looks best balanced for use away from walls, and the front covers can be removed, which is of some benefit musically. Bass extension is limited.

## How it performs

The tone for the system as a whole is set by two items: the amplifier and the loudspeakers. There's something vaguely shabby about the Pioneer duo. The bass lacks the vice-like grip necessary to convince with big orchestral or rock performances, and the treble is a tad too obvious and raw to wholly con-

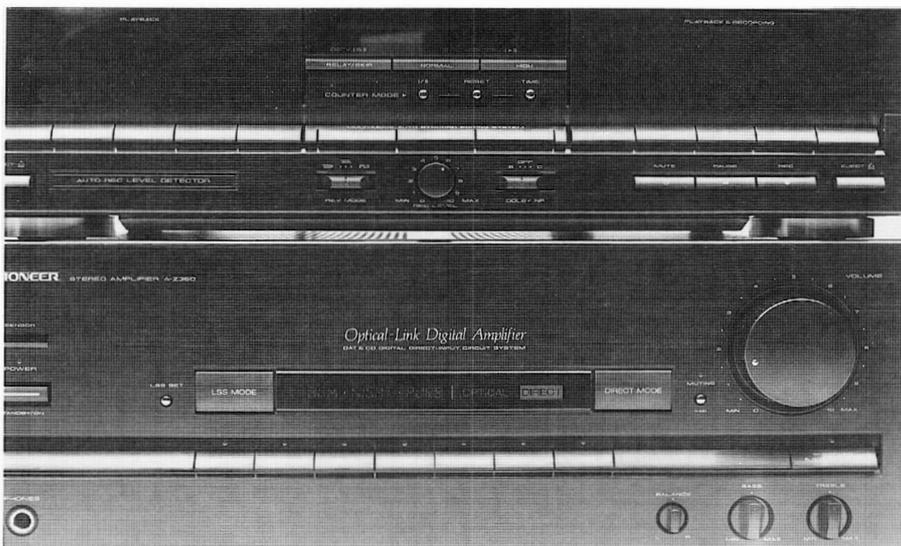
vince. The midband has a papery quality, especially when the comparatively high volumes that lie within the amplifier's compass are reached. Having said all this, the Pioneer is undeniably detailed and positive in presentation. The bass and treble are in equilibrium with the treble and the combination sounds lively, informative – and successfully engages the senses in a way that doesn't happen every day.

The record player is shabby and lightweight, and the cartridge lends a nasal quality to many vocals. Unfortunately it's not even possible to upgrade the cartridge.

The other components work extremely well. The cassette deck – frequently a weakness – proved impressively stable and modestly detailed, though there was some mid/high frequency smearing. Bass was also a little soft with some material, but on the whole, the deck was convincing, Type II tapes providing the optimum blends of cost and benefits. The CD player sounded clean and lively and provided an accurate sounding source, but as sometimes happens, it was the FM tuner which proved most effective. Certain live relays and even some tape generated material, on radio two, three and four sounded remarkably open and uncluttered. Instrumental separation and imaging was of a standard that even the CD player couldn't match.

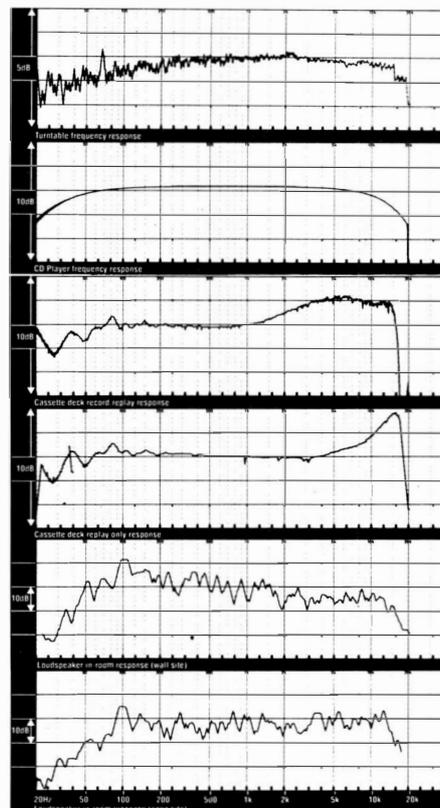
## Verdict

Musically, this system delivers the goods (given the price), albeit in an unexciting way. The record deck is little better than average, though, and the loudspeakers only just manage to pass muster. An uncommonly wide range of peripheral features is available to astound, delight and confuse, probably in that order. In fact the Pioneer system is a button pusher's delight. Recommended, but not perhaps for your ageing granny.



## TEST RESULTS

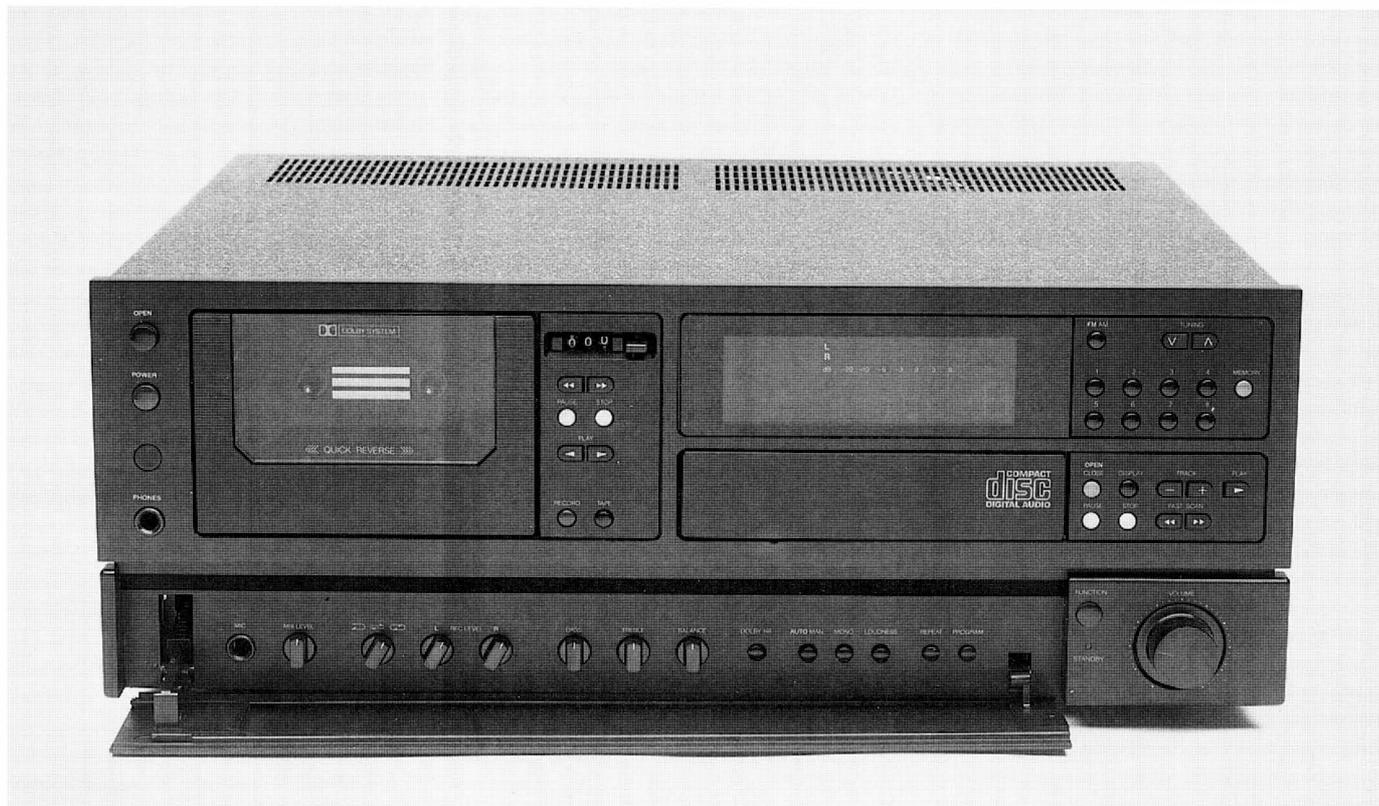
Cost with speakers	£800; without n/a
Options?	none
Size main unit	lid open, w/o projections 93 x 36 x 38cm (h x w x d)
Size loudspeakers	52 x 26 x 22cm (h x w x d)
<b>TURNTABLE</b>	
Wow & Flutter (wtd)	0.18%
Drift	average
Speed accuracy	+0.5%
Arm/cartridge resonance	OK
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	0.1dB
Cartridge channel separation	30dB
Cartridge tracking ability	80µM
<b>TUNER</b>	
Sensitivity	very good
Signal/noise	very good
<b>CASSETTE DECK</b>	
Wow & Flutter (wtd)	0.18%
Signal/noise ref 0dB Type II	51dB
Distortion 0dB Type II	2.8
<b>COMPACT DISC PLAYER</b>	
Signal/noise (measured at amp Tape Out)	<-100dB
<b>AMPLIFIER</b>	
Power output/channel (8ohms)	40 watts
(20Hz, 1kHz, 20kHz both channels driven)	
<b>LOUDSPEAKERS</b>	
Efficiency	medium



# Proton AI-3000II

**R**ecommended

PORTFOLIO MARKETING LTD., 67 NEW ROAD, LITTLE KINGSHILL,  
GREAT MISSENDEN, BUCKS HP16 0EU. TEL: (0494) 890277.



For those who are fed up with space consuming vertical stacks, the Proton is a fully integrated tuner amplifier with cassette deck and CD player, presented much like a standard high fidelity component. Although undeniably chunky and heavy at nearly 14kg, the system is equally undeniably discreet in appearance.

The Proton has another important advantage too. It is supplied without loudspeakers. Those who have any familiarity with high fidelity will not need to be told why this is important. For the remaining readers, system loudspeakers are on the whole a pretty miserable breed. It appears that most designers think people are only interested in the electronics, and that as long as the loudspeakers look convincing, other engineering and musical attributes can go hang. The level of engineering integrity in most system loudspeakers tends to be well below that of the electronics, and the ability to choose from specialist producers is one of the best starts any system can have.

Suitable loudspeakers for applications like this needn't be expensive. I used a pair of Heybrook *Point Fives*, a high quality compact costing £169 a pair, though designs costing as little as £90 – for example the Wharfedale *Delta 30* or JPW *Minim* – would be suitable.

The Proton is built into a steel box with a flat overhanging front panel. Build quality is rather better and more conservative in approach than is usually the case with packaged audio systems at this price level. The number of controls has been kept comparatively low, and many of the less important ones are positioned behind a front panel flap. Proton makes subtle use of colour to differentiate some of the controls, but the effect is somewhat uneven. As an example, the main function switch, which acts as a toggle to select the different inputs, is plain black. The first time I used the Proton it took several minutes before I noticed it, low down on the fascia. But the remote handset redresses the balance in some style. It not only looks good, it is unusually cleanly designed and overcomes most of the residual ergonomic awkwardness.

I reviewed the original Mk I version of the *AI-3000* some time ago, so this review is a rematch. The new model is unchanged externally, but benefits from an improved and more recent CD player mechanism and some 'minor' circuit changes.

## Main system unit

On the whole, the range of features has been held in check. The most obvious omission is the usual second play only

cassette transport, which means that without acquiring a second cassette deck, you can't dub from tape to tape, or play tapes sequentially without intervention. On the other hand are these things great losses? It is my contention that the dual cassette deck is one of those features we've been brainwashed into expecting. But it's your decision. . .

What you do get is a full auto-reverse capable deck with optical end of side changeover, which means that instead of the usual gapping 10-12 seconds continuity gap at the end of side, you only lose about a second or so. Record levels are set manually – not automatically as one press release claimed – and Dolby B noise reduction is available. All three standard tape groups are accommodated with auto tape type sensing.

The record level meters are clear and well designed. There are no special tape search aids beyond a simple tape counter. By system standards, the deck's frequency responses are quite respectable, but speed stability is a quite different matter. The wow and flutter figure at the time the test was run was around 0.4%, a long way from the specified 0.05%. Listening to the Proton, it seems that the poor result was caused by rapid pitch changes as though the tape is being jerked across the heads, as opposed to the more usual cyclic wow

due to off-centre capstans or other rotating parts. Whatever the cause, the effect was all too audible at first, but as the test progressed and the equipment was run in, I noticed that stability improved remarkably, which pre-empted a request for a second sample. Caveat emptor seems to be a sensible principle to follow here.

The CD player is a simple Philips derivative with standard Philips type 4x oversampling and 16 bit conversion, with the usual track skip and audible cueing, repeat and programming. A very attractive but ultra basic display shows either track timings or the current track and index number. The tuner is also simple and purposeful. It works on MW and FM -- Long Wave has been omitted unfortunately -- and provides eight presets on each band, with mono switching for FM if required. Both AM and FM front ends appear to be highly capable, the AM one being unusually clear and free of interference.

The amplifier section is rated at 22 watts/channel -- it measured 26 watts/channel -- and supplies loudspeakers via proper hi-fi type binding posts, and headphones through a grown up 6.3mm socket. Instead of useless equalisers, the Proton contents itself with ordinary bass, treble and loudness controls. Rear panel socketry includes line and phono (moving magnet) inputs, and a preamplifier output which could be used to drive a satellite power amplifier in another room for very simple multi-room installations.

## How it performs

Proton deserves a word of praise for the excellent instructions, which are clearly illustrated, easy to follow, and not too wordy. Well done -- and other manufacturers please note!

Musically the system is close to traditional high fidelity standards, which means that it significantly outperforms the majority of packaged systems. The

cassette deck is the weakest of the three source components: it lacks the fundamental stability and clarity of the CD player and tended to sound rather soft, especially at the frequency extremes, even with metal tapes. Yet once the pitch problem had in effect solved itself, the tape deck turned out to be more than a match for most of the competition, whether making its own recordings or playing prerecorded material.

The other two source components worked extremely well. The FM tuner never gave the slightest cause for concern, and the CD player was a notably secure tracker (a benefit of the Philips single beam servo and pivoted laser carriage). Although it wasn't free of a certain abrasive quality and harmonic thinness in the midband (in this respect at least the Philips connection seems a little tenuous), the clarity and tunefulness of bass lines is beyond reproach, and differentiation between instruments and voices is of a high order.

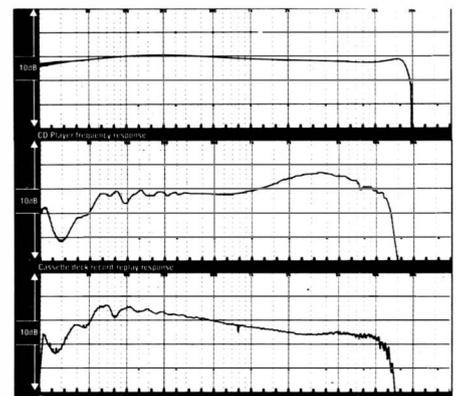
The amplifier also played its part, and it is here that the greatest differences between the Proton and other packaged systems were found. Again there are objective shortcomings. The amp is a little too restrained; it lacks air, space and energy by the best (hi-fi) standards and is not above a touch of hardness at times. Nevertheless, it is an absolute paragon by system standards, with a sense of power and dynamic vitality, plus an ability to get to grips with loudspeakers and impose its will in a way that is quite unusual. In practical terms it helped render the system transparent and wide ranging -- dynamically, tonally and (notwithstanding earlier comments) spatially.

## Verdict

This is a first class solution to the requirement for a compact, easy to use and unobtrusive system of genuine high fidelity standards. Recommended with enthusiasm.

## TEST RESULTS

Cost with speakers	n/a; without £650
Options?	none
Size main unit	lid open, w/o projections 17 x 42 x 37cm (h x w x d)
<b>TUNER</b>	
Sensitivity	good
Signal/noise	good
<b>CASSETTE DECK</b>	
Wow & Flutter (wtd)	0.40%
Signal/noise ref 0dB Type II	56dB
Distortion 0dB Type II	>3.3%
<b>COMPACT DISC PLAYER</b>	
Signal/noise (measured at amp Tape Out)	78dB
<b>AMPLIFIER</b>	
Power output/channel (8 ohms)	26 watts
(20Hz, 1kHz, 20kHz both channels driven)	



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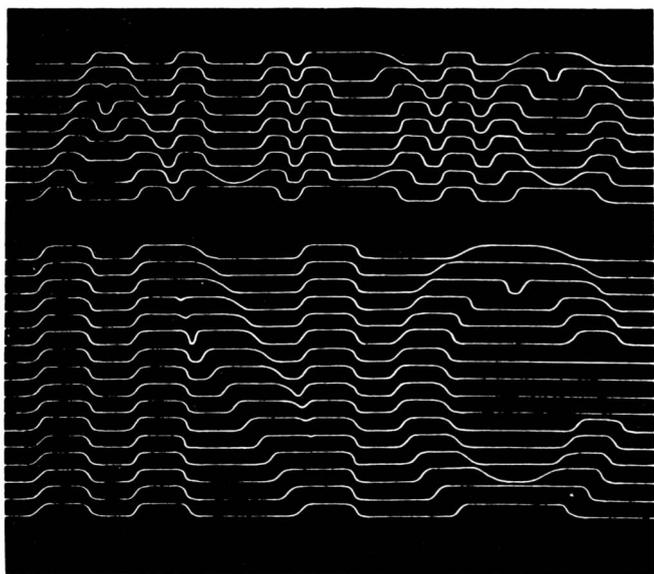
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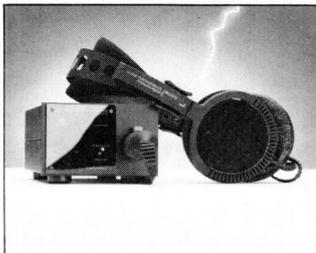
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# Sanyo SYS-801CD

SANYO MARUBENI (UK) LTD., SANYO HOUSE, OTTERSPOOL WAY, WATFORD, HERTS WD2 8JX. TEL: (0923) 246363.



There appears to be a practically insatiable demand for low cost systems that perform all or most of the functions expected of a more expensive system, and naturally there are plenty of suppliers ready to address this requirement. This model from Sanyo is a perfectly typical modern example of the genre, complete with attractive pricing and a remote control that is both more and less than it seems. In the Sanyo's favour, build quality and finish of the main electronics module are quite good for this class of product, and buying a system with a recognised brand name like Sanyo has got to be a better idea than buying one with a retailer's own tied brand name, or one of the lesser known third ranking names.

## TP-X801 turntable

This belt-drive deck has been designed by numbers – you know: plastic everything including the highly flexible lightweight plastic platter. The cartridge is a magnetic type, permanently fixed in place (the stylus is interchangeable of course). Operation is semi-automatic.

## DC-X801 main system unit

The tuner is beautifully simple to use. It consists of the following ingredients: six preset buttons labelled P1 . . . P6, a red LED display showing tuning status and

preset number, two outside tuning buttons labelled + and -, and two press buttons labelled 'band' and 'tuning/FM mode'. It doesn't take a great intellect to discover that you set the waveband, manual or auto-tuning, set the tuning in motion, and set them into memory with a prolonged press of the appropriate preset key. The tuning mode switch also doubles as a mono/stereo switch for use on FM. No separate memory buttons, no fuss, no hassle. There turn out to be five 'banks' of presets, one each for Long and Medium wave, and three banks (24 presets) for FM, accessed by pressing the band switch. And that's all there is to know, except that off-air FM performance is noise free even if it isn't particularly sensitive. The two AM bands lacked treble and clarity, but this is not unusual at this price level.

This straightforwardness is carried through to the rest of the design, which makes the instruction booklet all but redundant. This is an audio system you can just plug in and drive.

Take the cassette deck. The Sanyo has an auto-reverse record capable transport and a unidirectional transport which is used for sequential playback and for dubbing operations, which can be done at normal or at double speed. The latter makes appalling recordings and should not be used if you intend listening to the

results. In fairness, this comment is equally applicable to most other comparably priced systems too.

On the whole, operation has been kept simple, but luxury is definitely not the name of the game. The record transport has automatic tape type selection for ferric and chrome type tapes – metals are not usable on this system when recording – but the play only deck is lumbered with manual tape switching. Record levels are adjusted by an on-board ALC circuit, with or without Dolby B noise reduction. The controls are manual and rather stiff, the record and play keys on the record transport frequently failing to latch on at the first try. The measured frequency responses are surprisingly sound, but wow & flutter is well in excess of 3%.

And so the story continues. The CD player is a bare bones design with track skip and audible cueing, repeat and memory play, whilst the display normally shows only track numbers. With an eye on the market for those who use their systems to dub CDs, a range of CD editing features are available based on the idea of programming the tape length and allowing the deck to handle side breaks when playing a CD or a programmed selection of tracks.

The amplifier's solitary sophistication (or folly) is two sets of five graphic

equaliser sliders, one set per channel, each with a small LED telltale buried in the middle of each slider. Power output measures 16 watts/channel.

The Sanyo has fully manual source selection, but it also has remote control which adds certain features not available on the system proper, including random play, and a numeric keypad for CD track selection. On the other hand, and for many people this may be more important, the handset will not control the tape deck or the record deck, though it will switch the amplifier to those inputs. It cannot therefore be regarded as a full system remote control. One operational criticism is that the power to the CD player is cut whenever another source is selected, even if the drawer is in the process of opening as a new input is selected.

### SX-801 loudspeakers

There's a suggestion of glinting metal drive unit surrounds behind the loose weave front baffle, but the reality is a two-way system with bass and treble cones of the most primitive kind, and just the bare minimum of cabinetwork (it would be wrong to describe it as carpentry) to stitch it all together. The measured frequency responses can only be described as ragged in band with no appreciable bass and a loss of energy in the treble.

### How it performs

Realistically, systems like this one are as much about the largely strategic issues of pricing and availability as they are about technology or sound quality. The Sanyo looks like and is a lot of hardware for the money, but it's not going to give music lovers a lot of joy. In passing, it's worth noting that the same amount of money will buy a very respectable hi-fi system based on a single source, say a record or CD player.

It was no surprise to find that the tuner and CD player gave the most

respectable results. In fact both sounded coarse and thin, largely due to the amplifier, whose character was writ large on the system as a whole. Given a suitably strong signal from the aerial, the FM tuner was the more impressive of the two. Stereo reception was good, background noise low and stereo imagery believable. By contrast, the CD player sounded spatially and dynamically flat. The CD player was also a poor tracker, and was wont to skip at the slightest provocation, for example, on very small amounts of surface contamination that had no appreciable effect when tried on other players.

But it was in the rest of this system that the real shortcomings lay. The turntable sounded rough and ready, and was also extremely susceptible to shocks and bumps, the mildest of which would send it into paroxysms of instability and feedback. The cassette deck simply sounded crude and unstable. I've heard worse from other systems of this type in the past, but the Sanyo was bad enough to be worthless for serious musical purposes, so the 'improvement' is really of academic interest only.

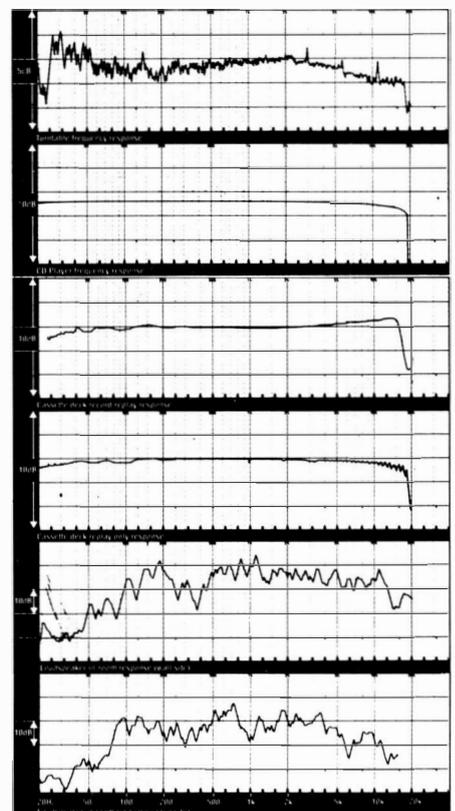
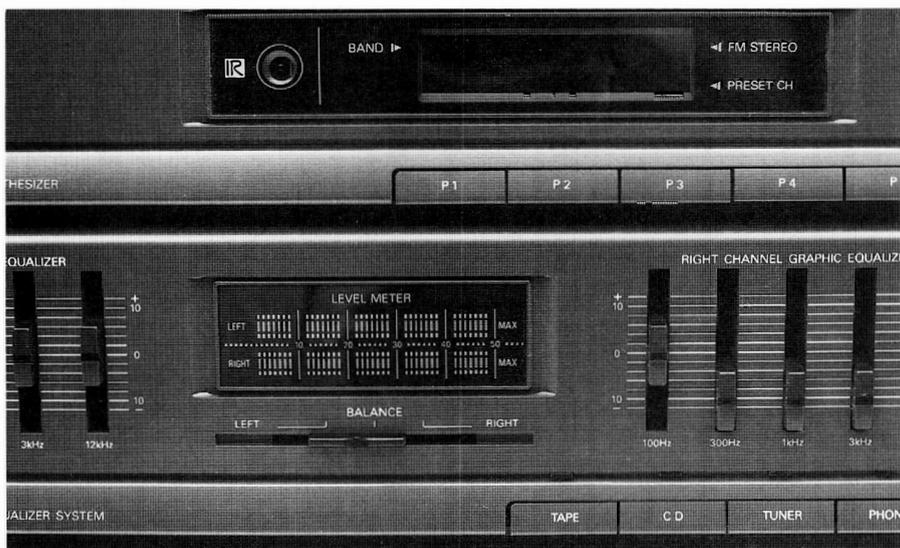
But it was the loudspeakers that made the most excruciating noises of all. The overall balance is best described as dark and compressed. My first reaction was to check that I hadn't inadvertently positioned the loudspeakers with the drive units facing the wrong way. Unfortunately I hadn't.

### Verdict

On the plus side, the Sanyo system has all the features required for everyday use. It's simple to drive and attractively presented. The CD player is adequate for this class of product and the FM tuner is really quite sound. The same however cannot be said of the cassette deck or the turntable, and the loudspeakers are amongst the least plausible musical instruments ever to be presented for review in *Hi-fi Choice*.

## TEST RESULTS

Cost with speakers	£360; without n/a
Options?	none
Size main unit	lid open, w/o projections 76 x 36 x 37cm (h x w x d) 41 x 23 x 18cm (h x w x d)
Size loudspeakers	
<b>TURNTABLE</b>	
Wow & Flutter (wt)	0.7%
Drift	average
Speed accuracy	+1.0%
Arm/cartridge resonance	too high
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	2dB
Cartridge channel separation	-25dB
Cartridge tracking ability	70µm
<b>TUNER</b>	
Sensitivity	poor
Signal/noise	good
<b>CASSETTE DECK</b>	
Wow & Flutter (wt)	>3.0%
Signal/noise ref 0dB Type II	n/a *
Distortion 0dB Type II	n/a *
• Auto level control	
<b>COMPACT DISC PLAYER</b>	
Signal/noise (measured at amp Tape Out)	58dB
<b>AMPLIFIER</b>	
Power output/channel (8 ohms)	16 watts
(20Hz, 1kHz, 20kHz both channels driven)	
<b>LOUDSPEAKERS</b>	
Efficiency	high





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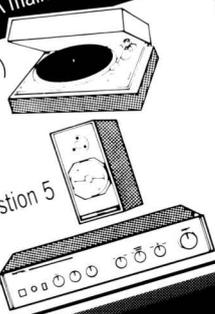
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## SUGGESTED SYSTEMS

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.

SPEAKERS	Goodmans Maxim II Widale Delta 30.2 JPW Minim Gale GS210	Celestion 3 JPW Sonata M/Short MS 3.10 W/Dale Diamond 4 Alison AL100 Mission 760	Celestion DL4 II Tannoy E11 JPW Sonata-M M/Short MS3.20	H/brook P15 Celestion 5 Celestion DL6 II Monitor Audio R7	Tannoy M15 Wharfedale 505.2 Monitor Audio R9 M/Short MS 3.30	Castle Warwick KEF C45 Celestion DL8 II Rogers LS4A (Add £40)	Castle Durham Heybrook HB1.3 Tannoy M20 (BK) Tannoy DC 2000 (Add £70) M Audio Mon II (Add £50)
Rotel RAB20AX	294.95	309.95	329.95	349.95	369.95	389.95	429.95
Rotel RAB20BK4	329.95	339.95	359.95	379.95	399.95	429.95	469.95
Cambridge P50	349.95	379.95	409.95	419.95	439.95	469.95	489.95
Pioneer A300	349.95	389.95	409.95	419.95	439.95	469.95	519.95
Rotel RAB40BK4	379.95	309.95	329.95	349.95	369.95	389.95	499.95
Harman PM6100	299.95	284.95	299.95	319.95	339.95	359.95	434.95
Rotel RAB10A	264.95	354.95	379.95	399.95	419.95	459.95	499.95
QED A240CD II	334.95	264.95	289.95	299.95	319.95	344.95	439.95
Yamaha AX330	254.95	349.95	449.95	469.95	499.95	519.95	549.95
Arcam Alpha II	329.95	429.95	389.95	399.95	409.95	429.95	479.95
Harmon PM6300	419.95	359.95	314.95	329.95	334.95	374.95	424.95
Kenwood KA501.0	349.95	299.95	309.95	369.95	389.95	419.95	409.95
Nad 3225PE	289.95	289.95	349.95	369.95	389.95	369.95	459.95
Nad 3020 i	279.95	329.95	309.95	319.95	429.95	439.95	474.95
Marantz PM 30SE	319.95	284.95	379.95	389.95	389.95	429.95	439.95
Technics SU 810K	279.95	354.95					
Musical Fidelity B1	334.95						

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### OPTIONS

The following Compact Disc Player or Turntable may be ordered instead of the Dual CS503/1 in the above systems.

#### CDs

- Denon DCD560
- Denon DCD660
- Denon DCD860
- Denon DCD960
- JVC XLV231
- Marantz CD40
- Marantz CD41
- Marantz CD50
- Marantz CD50SE
- Marantz CD60
- Marantz CD60SE
- Nad 5320
- Nad 5325
- Philips CD624
- Philips CD634

- add £50
- add £80
- add £130
- add £180
- add £30
- add £50
- add £130
- add £130
- add £150
- add £180
- add £200
- add £70
- add £100
- add £80
- add £130

- Philips CD850
- Philips CD610II
- Pioneer PD6500
- Rotel RCD855
- Rotel RCD865
- Sony CDP790
- Technics SLP277
- Technics SLP477
- Technics SLP550
- Technics SLP570
- Yamaha CDX530

#### TURNTABLES

- add £270
- add £40
- add £100
- add £130
- add £180
- add £70
- add £40
- add £80
- add £120
- add £170
- add £60

- Dual CS503-2
- Dual CS505-3
- Dual CS430
- AR EB 101
- Nad 5120
- Revolver black inc. arm
- Revolver Rebel
- Ariston Q Deck
- Rotel RP855
- Systemdek1 + AT 110E
- Systemdek IX900 + MOTH + AT110E

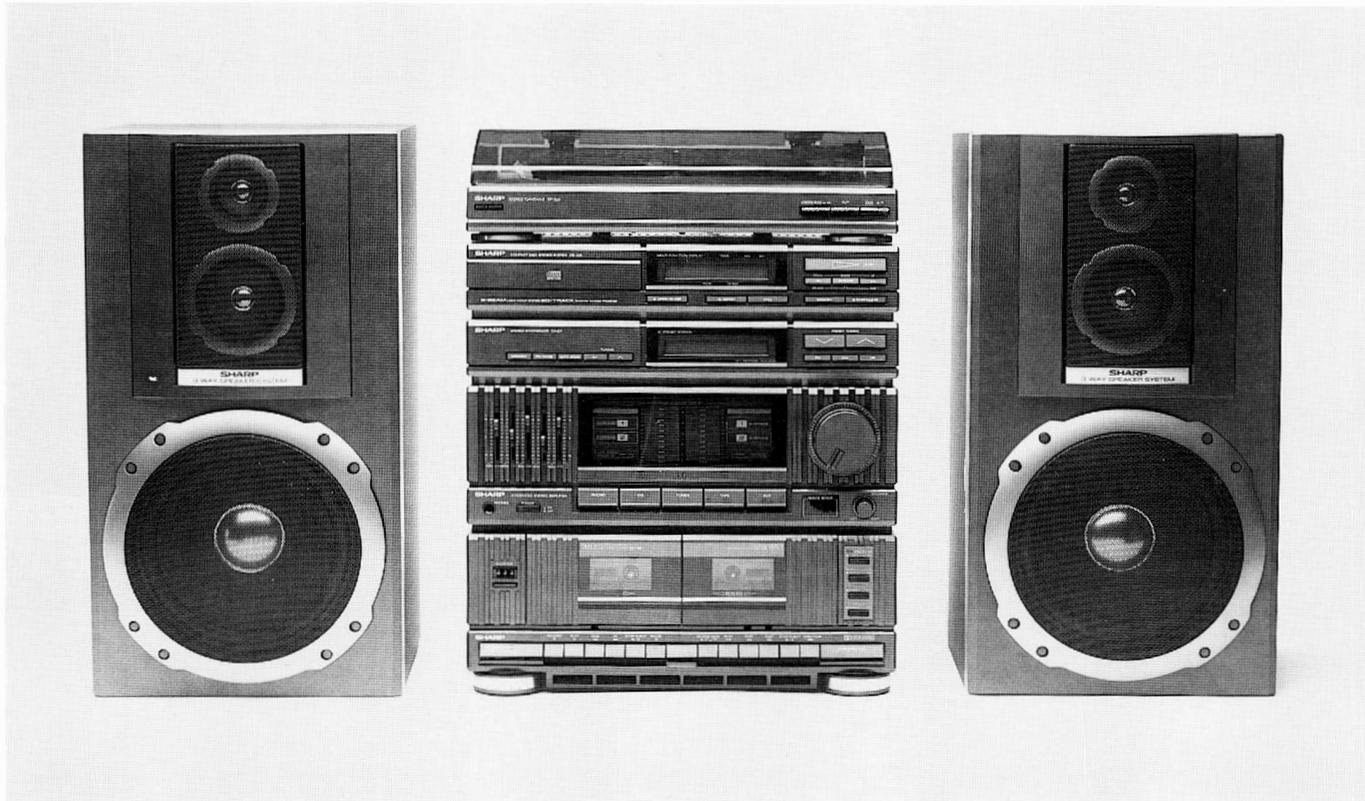
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# Sharp System 320E

SHARP ELECTRONICS (UK) LTD., SHARP HOUSE, THORP ROAD,  
MANCHESTER M10 9BE TEL: (061) 205 2333



There's something faintly endearing about this system, which has some strikingly questionable styling features. Savour if you will the spectacularly gross vertical fluting on the bottom half of the system and the central Multi-Sound Display (sic) and I'm sure you'll agree it's painful. Tack doesn't come much tackier, and to make it worse, the front panel lights up in a bright, garish yellow, the kind of hue that makes me want to park on top of the nearest traffic warden's head. The effect is very cheap and cheerful. The whole system costs £500.

Everything (except for the record deck and, of course, the loudspeakers) is supplied in a single moulded plastic box which incorporates the system amplifier, the CD player, the tuner and the cassette deck. The record deck has its own shock absorbing feet, and sits on top of the main system unit.

## RP-320E turntable

The record playing part of the system is constructed in much the same way as its competitors, which means a surfeit of flimsy plastic mouldings sitting on slightly springy feet in the hope that the structure won't be excessively excitable. The platter is an alloy item which is slightly heavier than usual. Drive is by belt and operation is semi-automatic,

that is manual start-up and auto return at the end of side.

The magnetic cartridge is non-interchangeable and produced the quite respectable frequency response shape shown. Other measured parameters are moderately average, more or less, but wow & flutter is good.

## CD-320E main system unit

Radio first. The tuner stores up to 30 preset frequencies. Presets, numbered up to 10, will store one AM and one FM frequency apiece, while presets numbered 11 - 20 are equipped to handle a single FM frequency each. Direct preset selection is not possible. Stations can be searched sequentially using the local up/down controls, and an intro search function is also fitted. A mono switch is used for weak, noisy FM broadcasts. The controls are very neatly designed, and enhanced further by a particularly attractive yellow backlit LCD display panel. Off-air performance is fair on FM, but AM sound quality proved badly interference-prone and both tonally and dynamically flat.

The CD player is almost equally straightforward and purposeful, the only limitation being the cueing feature, which is only available when pause has been selected, but not during programmed play. The drawer action is

very smooth, and again the display (time and track numbers, plus simple function indicators - 'play' etc) is a peach. Facilities include 20-track programming and repeat. Tape dubbing is a largely unassisted manual affair, and is devoid of the special edit modes.

The cassette deck is without doubt the most pedestrian and under-developed part of the system. The two transports are mechanically controlled using banks of levers which are both small and rather close together, which makes them prime fingernail-cracking candidates. One of the transports is a player only and is bi-directional. The other is uni-directional and, of course, is capable of recording. All the usual basic operating modes are available, including normal and double speed dubbing, but there are severe restrictions on the deck's capabilities.

To whitt: type selection on both transports is manual, and in any case restricted to Type I and II (ferric and chrome) tapes. Record levels are set manually and transport control logic is primitive, which, in practice, means that dubbing and sequential play are manual operations which cannot be initiated with the single keystroke required on most modern systems. There are no track search or memory features either, the sole search aid of any kind being a

mechanical tape counter coupled to the record/play transport. The measured wow & flutter figure is very poor at 0.34%, and the two frequency responses, (playback only and record/play) which show a progressive loss of output at higher frequencies, are even poorer.

The amplifying section of the Sharp barely scrapes 19 watts/channel, which compares unfavourably with the optimistic official rating. Facilities extend to a six band graphic equaliser, plus separate bass boost circuits (X-Bass 1 and 2) and on the rear panel an auxiliary input to which a recorder can be attached. The final feature of note is a 'surround sound' matrix which requires a second pair of speakers. The matrix, which appears to be a variant on the Hafler difference circuit, can be switched to give two different but essentially random characteristics.

### CP-320 loudspeakers

This is a three-way design built into a flimsy wooden carcass with an ugly moulded baffle. It seems that Sharp have made a sincere and concerted attempt to emulate those cheap 'disco' loudspeakers that were once so popular. Again, an excellent example of questionable taste, badly executed. The measured frequency response is surprisingly smooth, especially in the treble.

### How it performs

By £500 system standards, the loudspeakers are just the right side of poor, whilst the electronics sound just the wrong side of threadbare. The CD player for example, is subtly aggressive and thin sounding. Even auditioned on headphones via the system amplifier, it has a flat, expressionless, almost deadpan quality which although not unacceptable, is often unappealing. Dynamics tend to be downplayed too; the system is unable to rise to a forceful climax at any realistic volume without the sound becoming thinner and more

aggressive still.

Realistically, the loudspeakers could be a great deal better. Like most of their counterparts in other systems, the CP-320 loudspeakers are somewhat rough sounding, with many papery and hollow box-like colorations. Music reproduction is quite detailed in its way, but messily presented so that, for example, subtle soundstage information is garbled and imagery is undermined. Bass quality was thin too, yet changing loudspeakers did not yield improvements.

I've already discussed the CD player. Unfortunately, this was the best of the sources. The FM tuner displayed much the same threadbare quality already identified in the CD player, though much depended on the nature of the music being played. The tuner was at its least attractive with densely orchestrated classical music, which often sounded transitory, and also with male speech which was boxy and synthetic.

The turntable was rather more impressive than you might expect from the foregoing. It was no less rough in tone than the other sources, yet it suffered all the traditional problems of cheap, flimsy turntables. This said, it was considerably more articulate and open sounding than the CD player or the tuner, especially in the midband. By contrast, the cassette deck was a complete write-off. Pre-recorded cassettes sounded a thick tonally but overall quite reasonable, but recordings sounded dull, drop-out prone, and displayed a wobbly sense of pitch.

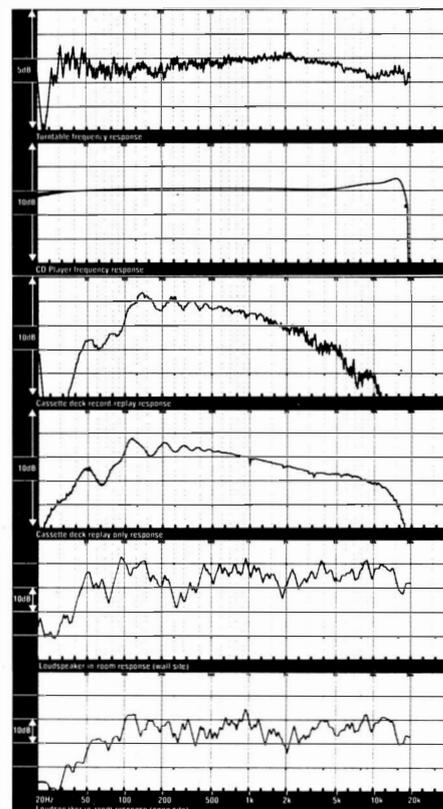
### Verdict

Placing all the evidence end to end, there seems to me only one significant difference between this and other comparable low end CD midi systems – the price. This one is at least £100, maybe as much as £150 over the odds. And in an area of the market where margins of competitiveness are very tight, this cost disadvantage is crucial.



## TEST RESULTS

Cost with speakers	£500; without n/a
Options?	none
Size main unit	lid open, w/o projections 86 x 36 x 36cm (h x w x d) 43 x 26 x 26cm (h x w x d)
Size loudspeakers	
<b>TURNTABLE</b>	
Wow & Flutter (wtd)	0.10%
Drift	low
Speed accuracy	+0.3%
Arm/cartridge resonance	OK
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	1dB
Cartridge channel separation	30dB
Cartridge tracking ability	68µM
<b>TUNER</b>	
Sensitivity	fair
Signal/noise	good
<b>CASSETTE DECK</b>	
Wow & Flutter (wtd)	0.34%
Signal/noise ref 0dB Type II	n/a*
Distortion 0dB Type II	n/s*
* auto level record	
<b>COMPACT DISC PLAYER</b>	
Signal/noise (measured at amp Tape Out)	-83dB
<b>AMPLIFIER</b>	
Power output/channel (8ohms)	19 watts
(20Hz, 1kHz, 20kHz both channels driven)	
<b>LOUDSPEAKERS</b>	
Efficiency	medium



# Sony Compact 302CD

**R**ecommended

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



The 302CD system replaces the 301CD which just missed a formal recommendation in last year's issue by the skin of its teeth. The 302 is no breakthrough. It has been changed cosmetically, and upgraded in certain areas, notably the output power and the loudspeakers. But some shortcomings have been perpetuated afresh in the new model...

Although linked dubbing operations are possible, auto source selection, surprisingly, is not. A remote control is included, though.

## PS-LX43P turntable

The system turntable is manually actuated with auto arm return at the end of side. There are no surprises here, either in the design or its execution. Note the early LF response roll off, and the quite well maintained treble.

Its unusually flimsy build led to greater than usual susceptibility to handling noise and feedback.

## CDP-M15 CD player

Few surprises here. As co-developers of the medium, Sony have a closer association with CD than many of their rivals, and the CDP-M15 is certainly a little slicker and better behaved on marked discs than many. Features-wise, however, it is very straightforward, the only concessions to gimmickry being random

play ('shuffle'), intro scan and a fade to/from pause, which has obvious applications both when listening and when recording from disc.

## LBT-V302 main system unit

This single unit contains the system tuner, cassette deck and the amplifier. The fascia is a plastic moulding with deep feature lines dividing the tuner controls from those of the amplifier, and the amplifier from the cassette section, the final effect looking a little fussy. This said, ergonomic design is elegantly straightforward, and there is a minimum number of controls.

Actually, one below a sensible minimum. The tuner lacks a monostereo switch for use on FM. This may not have much effect on listeners within the primary service area of local transmitters who use good quality outdoor aerials, but not everyone has such an aerial, or wants to be limited to local transmitters. The lack of mono switching inevitably means noisy stereo reception of weak signals where the user could have had hiss free mono. Unfortunately, the error has been compounded by failure to fit a 75ohm coaxial aerial input. Spring terminals labelled as suitable for 75ohm downloads are fitted, but judging by the off air performance this input is poorly matched, resulting in signal

loss. The outcome was high background hiss levels.

In other respects, the tuner is perfectly standard in design and execution. There are nine preset keys, each of which can store two transmissions from any mix of MF, MW and LW bands, and which are accessed by first passing a 'shift' key which switches memory banks between 1 - 9 and 10 - 18. Off air performance is rather dull and interference prone.

Moving on to the cassette deck, we find a unit that stresses flexibility and simplicity of operation above all other parameters. The main (recording) transport is bi-directional, whilst the play only transport is uni-directional, which places a bar on the ability to dub whole tapes in one operation. Recordings can be made on Type I and II (ferric and chrome bias) tapes only. Tape type switching is set automatically; and so too are record levels. Dolby B noise reduction is provided, plus normal and double speed dubbing, in each case using single control keys to set the wheels in motion.

The measurements are interesting. Numerically at least, wow and flutter levels are not particularly low, but there are plenty of decks that perform worse in this price area, and subjectively at least, wow artefacts appear to be quite

low so that even pitch sensitive instruments like piano normally sound stable and clean. The play only response shape is a little bright (+3dB at 15kHz) which results in a rather topky sound with prerecorded material, along with some of the telltale stereo ambiguities caused by record/replay mistracking of the noise reduction circuit. The record/replay test result is notable mainly for the way that the frequency extremes have been truncated.

The 22 watt/channel amplifier has a 2x5 band equaliser, a variable bass circuit and a simple surround sound matrix derived from the front difference signal (L-R). There are no spare inputs.

### SS-R302 loudspeakers

The SS-R302 loudspeakers are a little larger than usual at this price level, and contain three drive units apiece disposed vertically in-line. They're neither worse nor better built than usual, and the same applies to the in-room response shape, though some treble roughness is indicated.

### How it performs

One word sums this system up better than any other: practical. It costs £400, which as these things go could be described as cheap without scraping the barrel. I found it easy to get to grips with. You can freely switch between sources without components shutting themselves off every time you log off.

Listening to the record deck was a bit of a trial. Compression levels were horrendous, not least because there's no bass to speak of. Vinyl roar and impulsive noise were always prominent and the bottom line here was of a limited, rather threadbare sound – not that this is any surprise with this kind of product. The tuner was also a weakness, partly because of its propensity to background hiss, but also because it isn't actually a very good tuner. It tends to sound flat and thin, with little sound-

stage depth and a lack of sonority and dynamic range.

The rest of the system performed well, however. Even the loudspeaker failed to live down to expectations. Whatever the frequency responses say, they actually sound quite decent, with reasonable extension in the treble and a satisfyingly homogeneous sound elsewhere, with good presence and reasonable levels of detail. The amplifier helped here with a decent, solid delivery, and so did the cassette deck, which, like the loudspeakers, exceeded expectations with a limited but clean, attractive and reasonably neutral behaviour as a recorder. The CD player was also above average in sound quality, and is the star of the show.

### Verdict

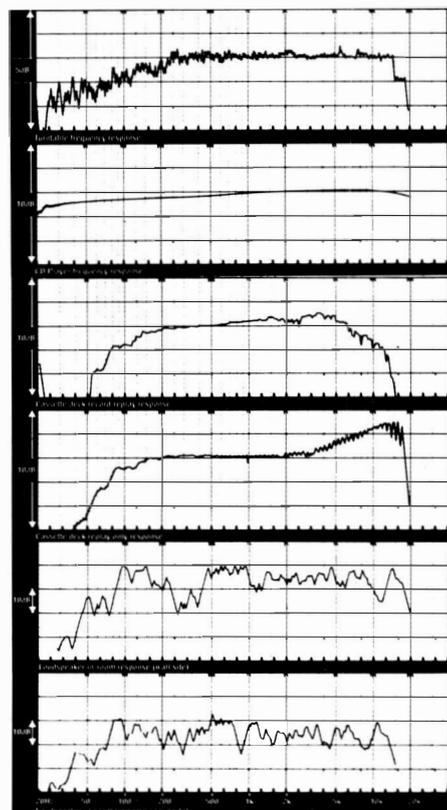
If midi systems – hi-fi for those who can't get along with hi-fi – are not easy to handle, what precisely is the point? This one is very easy to drive for a number of reasons, some of which have been identified above. Coming to the Sony fresh from several thousand pounds worth of high fidelity separates, it was predictable that the Sony wasn't going to prove very exciting, but it does have a kind of easy going competence. The resources available have been well husbanded and the package works remarkably well given the price.

On the negative side – and I know it becomes boring to keep reiterating the fact – the record deck is a real weakness and simply isn't suitable for serious use. If you have a record collection of any value, you should consider paying more for a system with a much better turntable (if you can find one) or stick with a simple record playing separates system. The lack of mono switching and the inadequate aerial input are also a serious liability. The important caveats aside, the Compact 302 is an even better design than its predecessor. Recommended.



## TEST RESULTS

Cost with speakers	£400; without n/a
Options?	n/a
Size main unit, lid open, w/o projections h x w x d)	72x 35x 38cm
(Size loudspeakers (h x w x d)	43x 24x 19cm
<b>TURNTABLE</b>	
Wow & Flutter (wtd)	0.20%
Drift	average
Speed accuracy	+0.5%
Arm/cartridge resonance	OK
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	1.0dB
Cartridge channel separation	28dB
Cartridge tracking ability	80µM
<b>TUNER</b>	
Sensitivity	very poor
Signal/noise	poor
<b>CASSETTE DECK</b>	
Wow & Flutter (wtd)	2.2%
Signal/noise ref 0dB Type II	n/a*
Distortion 0dB Type II	n/a*
* Auto level control	
<b>COMPACT DISC PLAYER</b>	
Signal/noise (measured at amp Tape Out)	81dB
<b>AMPLIFIER</b>	
Power output/channel (8ohms)	20 watts
(1kHz both channels driven)	
<b>LOUDSPEAKERS</b>	
Efficiency	high





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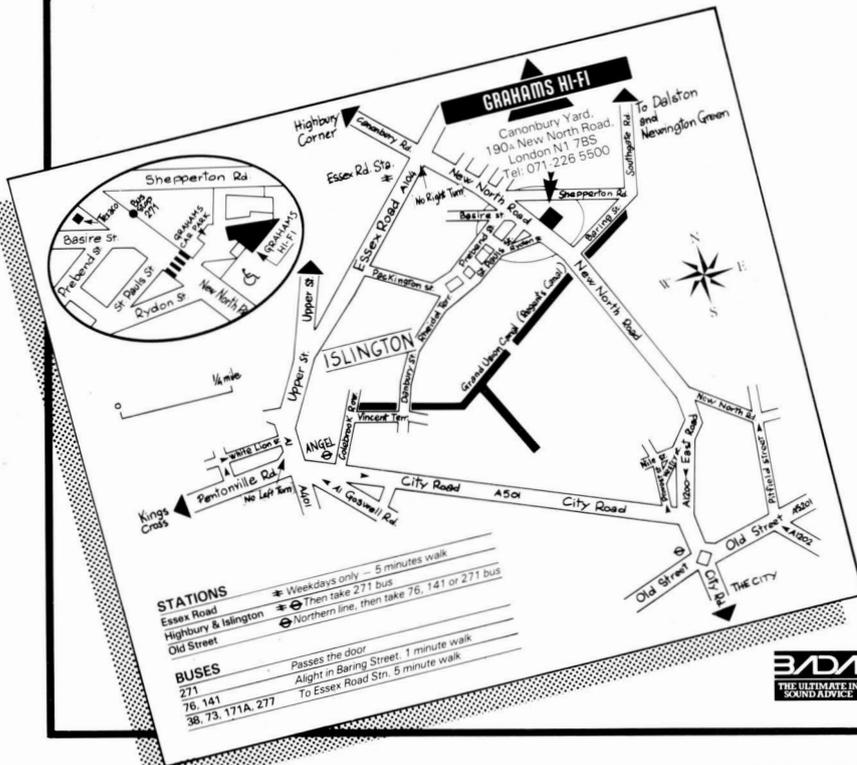
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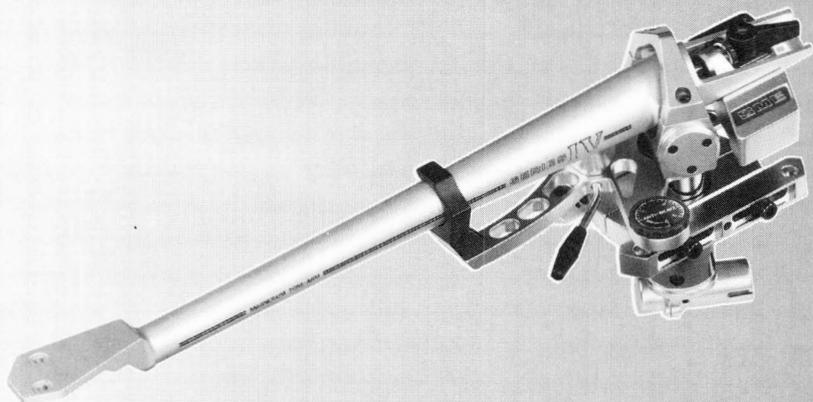
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# Sony LBT-V702CD

**R**ecommended

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



£700 – the price of the Sony *LBT-V702CD* – is relatively costly as CD midi systems go, but about as little as you can expect to get away with for a system that can justify hi-fi status.

As you explore this system and compare it to others, you may notice that the Sony is far from being the most comprehensively specified or appointed system in its class. The Kenwood *M-54CDS* for example, which at £600 costs £100 less, has an astonishingly sophisticated control system and facilities, some of which would not have been thought of a couple of years back. I was surprised to discover that the Sony doesn't even offer auto-source selection, which is practically *de rigueur* these days. Of course the money has had to go somewhere. Either Sony are profiteering, or we have a system that delivers musically. . .

Of course the paucity of facilities on the Sony is not something that the average hi-fi freak would recognise. He will probably be using a manual turntable and an amplifier that may have no more than a volume control and a selector switch to play with, and the fairyland of technological toys at the Sony user's disposal will still look impressive.

This is a system of matched separates, but in some cases they are separates in name only. The tuner and the cassette deck can have no independent life out-

side this system as they draw power from the amplifier and communicate via flat ribbon cables. The CD player and turntable on the other hand are mains powered and deliver signals through standard phono connectors, and the amplifier looks pretty traditional. A very full function remote control is included in the package, but as usual the poor old turntable is left out in the cold. It can be selected remotely, but it can't be controlled.

## PS-V725 turntable

There are no real surprises with this deck which has all the usual weaknesses and shortcomings in the time honoured fashion – thin metal platter, flexi-arm with fixed magnetic cartridge, no suspension etc. The one plus point it has up its sleeve (arm?) is fully automatic operation instead of the semi-auto mechanism that other manufacturers use to drive people away from vinyl. Technically the Sony is about average to middling in performance. For what it's worth, the cartridge response is fairly smooth, but there is some treble loss.

## ST-V702 tuner

Synthesiser driven in the usual way, the rather button bound *ST-V702* doubles as a system timer. In its tuner role it ranges freely across FM, MW and LW. It can

store a random selection of up to 30 frequencies in three banks of 10. Selecting a station requires an input of the form A3, B9 or C1 etc, though a memory scan feature is also available. FM RF performance is perfectly good – sensitivity and selectivity are well up to scratch – but AM performance is disappointingly wooden and colored. Intelligibility is on the low side.

The timer will switch the system on and off at a predetermined time within a 24 hour period, with daily and sleep options. Curiously however, I could find no way to make the system record off air using the timer, which is a remarkable omission.

## TC-V702 cassette deck

This deck doesn't look much until you study it closely and discover that in reality it has the lot. Starting with a standard arrangement of record/play and play only auto-reverse transport mechanisms, the mix is leavened by Dolby B and C, manual record level adjustment and a neat level display with an electronic time and memory counter. There are various added minor features, and of course the usual batch of tape to tape dubbing, sequential play and search modes, but they have been discreetly integrated into the design and don't get in the way. Pre-recorded tapes

are a little duller in balance than usual (the playback frequency response plot shows why), but as a recorder it is well set up. The transport is just short of being very good; irregularities were rarely audible except on pure tones.

### CDP-M48 CD Player

Another conventional system component, the *CDP-M48* is an 18-bit, 8x oversampling player. Like many in its class, it is over equipped with display and play facilities, which in contrast to the rest of the system, tend to detract from practicality in ordinary use rather than enhancing it. Tracking performance is a strong point.

### LBT-V702 amplifier & SS-R702 loudspeakers

Though suitable for stand mounting, the *SS-R702* loudspeakers are amongst the largest in this project. They are fitted with three cone drive units apiece in a vertical in-line layout, but the enclosures are flimsily constructed. The in-room frequency response trend looks somewhat uneven: the two crossover joins are poorly handled and there's raggedness in the plots. But the overall energy trend looks about right.

To drive the loudspeakers, the *LBT-V702* amplifier is a meaty and well built design that packs a useful 40 watts/channel. There are relatively few gimmicks but plenty of interconnection possibilities, including a patch for an out-board processor (an equaliser, or more usefully a Dolby Pro Logic decoder, say) and a circuit which will handle a video recorder (sound + vision) and also doubles as a second tape circuit. An output is also fitted for a video monitor (video only), and a second video input (again, sound + video) is on the front panel.

### How it performs

The turntable sounds a little better than average. It offers tolerably good speed stability and the cartridge tracks accept-

ably, though it does sound messy when presented with complex material recorded at high level. The worst offence committed by the deck is a lack of weight and dynamic range. It sounds spatially flat too; but midrange analysis is reasonable and the treble is not as aggressive as some system turntables.

The loudspeakers were approached with considerable scepticism, but in the event turned out to be capable of making quite pleasant noises. A decent £100 design from a specialist loudspeaker producer would have no trouble disposing of them, but the Sonys did at least offer tolerable resolution and an acceptably smooth mid/treble. The bass balance was good, but sounded best when it was dealing with material without excessive bass content.

The rest of the system is genuinely good. The CD player and tuner are both of a high standard. The tone is set by the amplifier, which has a more focused and controlled presentation than usual, and which appears much more positively in command of the loudspeakers. The CD player is not the world's greatest, but it passes muster in this context, as does the tuner. Both are clean and detailed. They do tend to sound spatially flat, but they both made music which in the end was enjoyable and revealing. And so, finally, did the cassette deck. Many systems are badly let down by the tape deck; this one was capable of making genuinely excellent recordings. It sounds well set up and stable, and it was often possible to hear right through recordings which scarcely betrayed their humble cassette origins. Impressive.

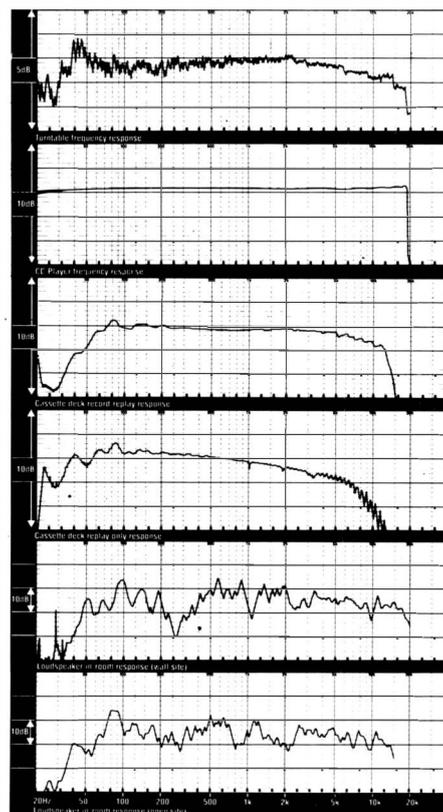
### Verdict

This system represents a triumph of commonsense engineering over gadgetry. The turntable and loudspeakers could easily be improved of course, but the system has an overall competence and homogeneity that sets it apart from many rivals. Recommended.



## TEST RESULTS

Cost with speakers	£700; without n/a
Options?	n/a
Size main unit	lid open, w/o projections 82 x 36 x 34cm (h x w x d) 53 x 28 x 21cm (h x w x d)
Size loudspeakers	
<b>TURNTABLE</b>	
Wow & Flutter (wtd)	0.18%
Drift	low
Speed accuracy	+0.8%
Arm/cartridge resonance	OK (<10Hz too low, OK, >14Hz too high)
Cartridge channel balance	0dB
Cartridge channel separation	28dB
Cartridge tracking ability	80µM
<b>TUNER</b>	
Sensitivity	good
Signal/noise	good
<b>CASSETTE DECK</b>	
Wow & Flutter (wtd)	0.24%
Signal/noise ref 0dB Type II	56dB
Distortion 0dB Type II	3.2%
<b>COMPACT DISC PLAYER</b>	
Signal/noise (measured at amp Tape Out)	<100dB
<b>AMPLIFIER</b>	
Power output/channel (8 ohms)	40 watts (20Hz, 1kHz, 20kHz both channels driven)
<b>LOUDSPEAKERS</b>	
Efficiency	high



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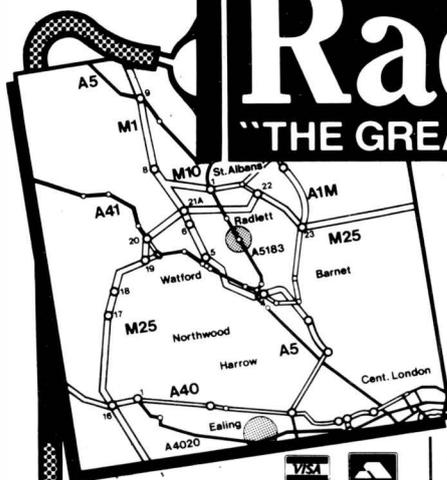
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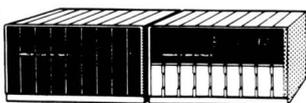


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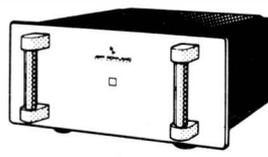
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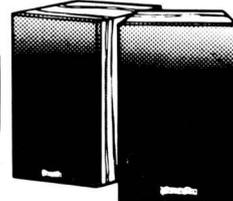
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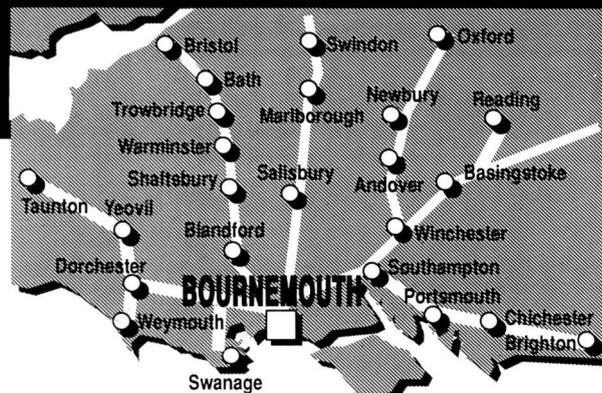
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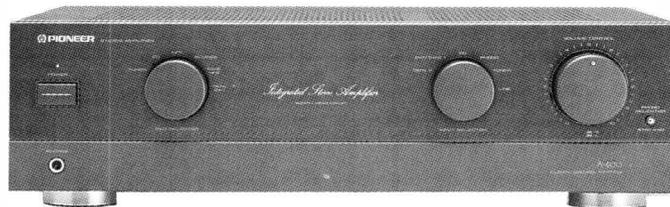
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# Technics CDC30

**R**ecommended

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



At first sight this system looks like most of the others. Lift the turntable however, and you find – a multi-disc CD player, with an LP-like platter moulded to accept up to five discs which rotate under a fixed 'arm' containing the top of the disc clamp. The platter can be rotated at will, and discs placed on or removed at will, giving CD play the informality that has always characterised records.

Multi-CD player apart, this is a finely presented and well built system featuring remote control and a full set of logical features which extend from simple auto source selection to sophisticated disc to tape dubbing. Also supplied with the system is a pair of loudspeakers that defy the usual conventions by looking exactly like hi-fi speakers.

## ST-X301L tuner

The *ST-X301L* tuner goes one better than other system tuners in providing a novel automatic presetting feature which looks for and memorises stations on the fly. This can be useful as a way of determining what is available in the locality, but if you want specific stations memorised against specific preset locations, the usual manual setting up is probably a lot less bother.

In common with an increasing number of competing systems, the Technics *CDC30's* tuner incorporates a timer to

control operation at a preset time, for example, to make a recording off air. In fact there are three timers: a sleep timer, a one event/24 hour timer and a timer which repeats programmed events daily or weekly with certain options for excluding weekends.

FM reception quality is A1 given a decent signal, and susceptibility to RF interference is low. MW and LW alike are also a real strength, the Technics providing a rare combination of clear, intelligible reproduction and good selectivity and interference rejection.

## RS-X301 cassette deck

Technics have a slightly old fashioned, almost purist attitude to system design that shows more clearly with this product than elsewhere. Technics is not willing to sacrifice musical integrity by abandoning manual record level setting, and the deck has Dolby C and can record on metal, where many competing systems will have auto level recording, and no metal or Dolby C capability. Other features are limited to relatively simple search functions. What suffers in the *RS-X301* is the fascia design which is a mess. The record level meters have very little range: they're only really of use in the vicinity of 0VU, but build and control feel are otherwise above average. Test results indicate a modest tech-

nical standard in respect of pitch integrity and response accuracy. Pre-recorded tapes tend to sound a little bright and thin on this deck.

## SL-PK25 CD player

There's something vaguely Heath Robinson-like about this deck. Maybe it's the acres of moulded plastic. Be that as it may, this is actually a very competent CD player which accepts up to 5 discs (which if need be can be changed around as they are being played) and which operates in a very quiet, efficient and decidedly un-Heath Robinson-like manner. All controls and the multi-disc display are fitted on the front fascia. They include a bank of five keys to select the disc (or disc running order) plus the usual track search and selection keys to allow up to 32 tracks from any or all of the discs to be programmed.

## SU-X301 amplifier & SB-C55 loudspeakers

The amplifier helps redress the aesthetic balance of this system which so far has tended to veer rather sharply in the direction of over-complexity. The *SU-X301* is as simple and as obvious as they come, though the volume control is an electronic stepped type, dressed up to look like a manual control. Ironically, electronic volume networks almost

invariably sound poorer than the old type. Interesting features include a basic surround sound matrix (on second thoughts it really isn't all that interesting after all), a spare auxiliary input and a pre-power link which can be unlinked, and so allow an external sound processor (Dolby Pro Logic, say) to be plumbed in.

The SB-C55 is built much more like a high fidelity design than most. Where most system speakers use simple untreated paper pulp cones, the Technics uses a much more satisfactory dome tweeter and what appears to be a plasticised cone bass driver, mounted in an insufficiently damped but at least tolerably well built enclosure. It has a smooth, accurate frequency response measured 50cm or so from the nearest walls, which is where these speakers sound best.

## How it performs

So far as visitors are concerned, the multi-disc player is bound to be the star of the show, but the real stars are the SB-C55 loudspeakers which are not merely designed just like real loudspeakers, but also sound just like real loudspeakers!

Of course loudspeakers can only reproduce what they're fed, and the overall standard of the electronics is only moderately good. The amplifier in particular tends to 'smudge' bass transients and fine detail is often modulated by louder, foreground events which makes it difficult to follow quiet instruments, or distinguish between similar sounding members of a group. On the plus side, there was more than adequate power in hand to produce reasonably lifelike images in normal size rooms.

The CD player has a budget deck sound: slightly raw and not very three-dimensional. But tracking quality was quite good, and the level of detail and pitch stability were beyond reproach. The tuner rates highly on the system

tuner hierarchy, but again there was a trace of transitory glare to the sound that marked it out. Nevertheless, given a decent signal, bass reproduction was deep and full, and stereo soundstage information was coherently presented in a palpable space.

The cassette deck is significantly inferior to its counterpart in the other Technics system reviewed in this issue, but it remains a fair sounding design, though sustained notes on almost any instrument put pitch stability under a spotlight it is not equipped to sustain. Something of the amplifier's 'precedence' effect, whereby it proved difficult to follow instrumental or vocal lines that were not in the foreground, was apparent from cassettes too. But the gross instability and lack of detail of some system cassette decks was, most thankfully, absent.

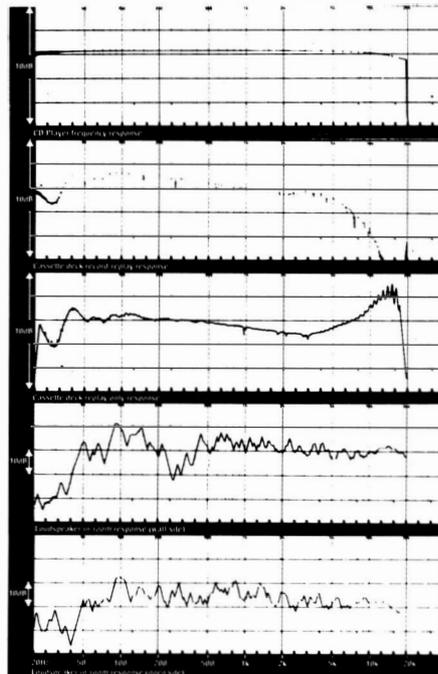
A system like this could have come badly unstuck with the wrong kind of loudspeakers. Happily, not only is the SB-C55 a clean and accurate sounding design by system standards (an important caveat), it also tended to flatter the rest of the system, or at least not draw attention to its shortcomings as a more holographically detailed and dynamic loudspeaker might have done. As a result the CDC30 sounds comfortable and at ease; it blends into its surrounds and provides a fair degree of musical analysis whilst verging slightly but not excessively in the direction of being easy on the ear. To ask for more would have been unrealistic with this kind of system.

## Verdict

The Technics CDC30 can be confidently recommended. It doesn't quite have the attributes of a best buy, but the loudspeakers are excellent, and there's enough sound engineering in the electronics to ensure consistently good music making. Build quality is also excellent.

## TEST RESULTS

Cost with speakers	£600; without n/a
Options?	none
Size main unit	lid open, w/o projections 68 x 36 x 40cm (h x w x d)
Size loudspeakers	43 x 25 x 24cm (h x w x d)
<b>TUNER</b>	
Sensitivity	very good
Signal/noise	very good
<b>CASSETTE DECK</b>	
Wow & Flutter (wtd)	0.25%
Signal/noise ref 0dB Type II	46dB
Distortion 0dB Type II	0.4%
<b>COMPACT DISC PLAYER</b>	
Signal/noise (measured at amp Tape Out)	< -90dB
<b>AMPLIFIER</b>	
Power output/channel (8 ohms)	20 watts
(20Hz, 1kHz, 20kHz both channels driven)	
<b>LOUDSPEAKERS</b>	
Efficiency	medium



# Technics CDX50

**Recommended**

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



Tall, dark and elegant, the Technics CDX50 is a classic up-market midi system built from components which look and behave much like traditional hi-fi separates. There is a considerable degree of built-in automation and the system operates effectively as a unit with auto-source selection and some powerful tape editing and dubbing features to its credit. Remote control, which without the CDX50 might appear rather daunting to operate, is of course included...

## SL-J110R turntable

The SL-J110R, an old friend from last season's systems, is not built any better than some of the others in this report. Nevertheless it has an important advantage over all comers this year as the only one with a T4P cartridge mount, Technics proprietary interchangeable fitting which at one time was used by just about every system manufacturer except those making the cheapest and nastiest gear. Now it seems T4P is an extravagance that most won't pay for. The benefits to the user are the ability to change to any T4P cartridge without adjustment being required. In practice it also means you get a better class of cartridge as standard; the one fitted here stands head and shoulders above any of the designs included in this issue. The

Technics is also fully automatic, with linked operation possible when recording onto tape (synchro dubbing).

## ST-X901L tuner

I spent a long time trying to determine how this tuner differed from the ST-X301L supplied with the CDC30 system before I hit the answer: it doesn't. Apart from a tiny change to allow for different methods of wiring the systems, the two tuners are identical.

For the record however (well not for the record exactly, but you know what I mean), the tuner has presets for up to 28 random frequencies on the usual three wavebands, which can be stored either automatically or manually. Note the rotary tuning control which provides a realistic manual tuner feel to the self-seeking tuning process. The ST-X901L also has a one shot on/off timer, with an option of daily or weekly programming (with or without all or part of the weekends), plus a sleep timer. RF performance of AM and FM alike is excellent, with the bonus of unusually clean, articulate AM sound quality.

## RS-X501 cassette deck

Whilst some system manufacturers are making progress in civilising their one time fearsomely complicated cassette decks, Technics have supplied this

rather messy looking product whose aesthetics and ergonomics can most charitably be described as well under par. This said, the features provided are not to be sneezed at. Both transports are auto-reverse capable with optical end of side changeover triggering, which reduces the no-signal time from about 12 seconds to a little over one second. Only one transport records, and record levels are set manually with good quality though short meters to assist.

Dolby B and C noise reduction are available, and so is Dolby HX Pro, which is not a noise reduction process but a circuit designed to improve the dynamic and high frequency saturation performance of lower bias tapes. It operates when recording only, and the advantages are apparent with any playback machine. All tape types can be accommodated automatically, and other features include track skip and the usual plethora of dubbing bits and bobs. Wow & flutter is satisfactory and the frequency responses are smooth and well extended.

## SL-PJ37A CD player

The SL-PJ37A is a transport only, which delivers a digital signal to the system amplifier for conversion. Operationally however, it's a conventional unit with a high quality display with a calendar

type track readout which is rather more tasteful in appearance than some. The range of operating features is standard, but the tape editing controls are more varied than usual.

## SU-X501 amplifier & SB-C57 loudspeakers

The well organised amplifier delivers about 28 watts/channel, and is chiefly remarkable because it has a built in digital to analogue converter capable of handling two digital products (DAT and one other, say) in addition to the system CD transport. A mixture of electrical and optical connectors is available for the job. An analogue output suitable for driving a DAT recorder is also provided, plus an auxiliary input and a second tape circuit. Finally a patch is available for an outboard equaliser or Dolby Pro Logic (or some other) processor. A number of peripheral and rather gimmicky extra features are also provided.

Extra gadgets apart, the SB-C57 is built like a grown-up SB-C55. Both the enclosure and the drive unit complement – bass and midrange cones and a soft dome tweeter – are reminiscent of hi-fi practice, though the enclosures are still not as well built or as effectively damped as they should be. Appearance is excellent, and the baffle covers can be removed to advantage.

## SH-E66 graphic equaliser

As equalisers go, this one appears sensibly designed within the constraints set by the seven available bands and the fact that the two channels cannot be adjusted separately. A number of equalisation curves can be stored, and some are preprogrammed at the factory. The equaliser setting can be allowed to influence the sound to be recorded onto tape, though this is not recommended for general use since it wastes headroom on tape and reduces signal/noise. Sadly, Technics fails to point this out.

## How it performs

This is an exceptionally fine sounding system. Some of the auditioning was carried out in parallel with the cheaper Technics system, which emphasised the superiority of the CD50, and in particular its wider ranging, more exacting style of music making.

Curiously enough, little or none of the audible benefits could be attributed to the loudspeakers. Excellent as they are (and they are), they sounded little better than the SB-C55 supplied with the CDC30. They have a little more weight and authority, but if anything sounded slightly less refined and articulate. By the standards of almost any other system loudspeaker however, they sound unusually crisply detailed and dynamic, with real neutrality and good, solid imagery when mounted on tall pedestal stands a little away from walls.

It was the electronics that really scored however. Not the tuner of course, which is the same perfectly satisfactory model sold with the CDC30, but the amplifier and the other source components. Even the rather shabbily built turn table sounded authoritative and well organised.

The CD player sounded a little better than its multi-disc counterpart, but the source that showed the most dramatic improvement was the cassette deck which was altogether tauter and more stable, and which provided superior separation between instruments. It was no match for the CD player, but the difference was small enough to pass unnoticed except during critical listening. The amplifier also had more authority, greater precision and firmer control.

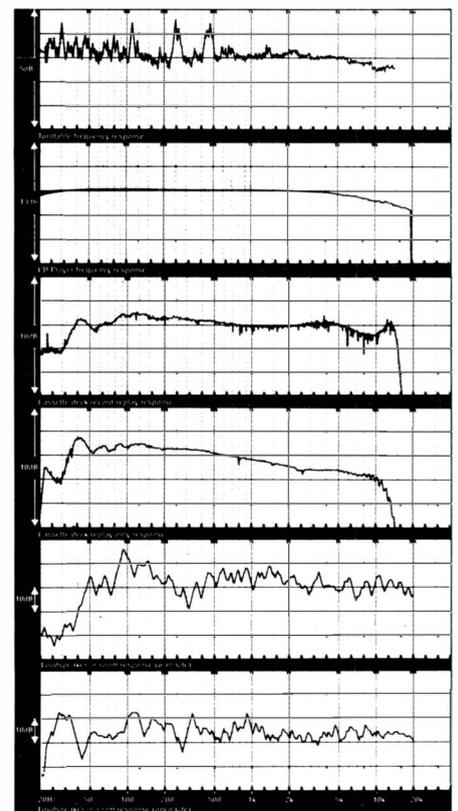
## Verdict

This is a costly but capable system with considerable musical integrity via all its inputs and – again – good build quality into the bargain. Highly recommended.



## TEST RESULTS

Cost with speakers	£750; without n/a
Options?	SH-E66 graphic equaliser (tested) £99
Size main unit	lid open, w/o projections 85 x 36 x 32cm (h x w x d) 47 x 26 x 25cm (h x w x d)
Size loudspeakers	
<b>TURNTABLE</b>	
Wow & Flutter (wtd)	0.20%
Drift	average
Speed accuracy	+0.1%
Arm/cartridge resonance	too low
(<10Hz too low, OK, >14Hz too high)	
Cartridge channel balance	0.5dB
Cartridge channel separation	-30dB
Cartridge tracking ability	65µM
<b>TUNER</b>	
Sensitivity	very good
Signal/noise	very good
<b>CASSETTE DECK</b>	
Wow & Flutter (wtd)	0.15%
Signal/noise ref 0dB Type II	49dB
Distortion 0dB Type II	0.9%
<b>COMPACT DISC PLAYER</b>	
Signal/noise (measured at amp Tape Out)	-96dB
<b>AMPLIFIER</b>	
Power output/channel (8 ohms)	28 watts
(20Hz, 1kHz, 20kHz both channels driven)	
<b>LOUDSPEAKERS</b>	
Efficiency	low



# Yamaha YST-C11

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This new system from Yamaha slots in just above the trend-setting *AST-C10* (now reduced in price to £529) which was reviewed in *Choice's* last CD Midi System issue (December 1989). It follows broadly the same pattern but it offers a number of extra features and revised speaker design and styling, whilst costing the same £600.

Like its predecessor, the *YST-C11* is an upmarket luggable designed for those who wouldn't give houseroom to anything that could be described as a ghetto blaster. It has a distinctly designer look, with rounded edges and corners, recessed tape controls and tiny control buttons, many scarcely larger than a match head. The unit is finished in a matt grey with discreet blue panel graphics.

To describe the Yamaha as a ghetto blaster, upmarket or otherwise, will probably cause apoplexy chez Yamaha. Nevertheless this is precisely what it is, or would be except for one rather important detail. The Yamaha is designed for use on mains current only. It came as a rude surprise not to find a battery compartment nestling somewhere around the back, especially as the main system unit is equipped with recessed carrying handles, clips to attach the loudspeakers, and even moulded posts intended for wrapping

any loose cable around.

## Main system unit

The tuner has 10 random presets and works on all three UK bands. Mono/stereo switching is also available. The CD player is loaded from above, record player style and allows basic track programming and intro scan. The usual track cueing is also available, but only by using the track skip keys from the pause mode. Like the tuner display, the one for the CD player is a very attractive back lit LCD panel, and includes a calendar style readout that for once doesn't look cheap and tacky.

Most of the front panel is given over to the cassette deck section which consists of two auto reverse transports, one capable of recording. A slightly curious set of capabilities includes Dolby B but not Dolby C (no great loss), tape to tape dubbing in real time but not double speed (no loss at all), manual tape type switching (bad) with no metal record capability (normally wasted on this type of product, but still. . .) and automatic record level setting (great for convenience, but bad musically). Track search and sequential play are supported, and so is dubbing from compact disc.

Other capabilities include a 5 band graphic equaliser, a clock which drives a sleep facility which switches off auto-

matically within a 225 minute timescale, and a 24 hour timer standby. A single auxiliary input is available, but no signal output and no phono facility. Power output measured 17, but the figure is less meaningful than usual due to the *Astarte* circuits.

Those items newly included on the current model and missing from its predecessor include a level marker in the form of a LED telltale built into the volume control knob, and a balance control slider.

The CD player now offers random track access on the front panel. Previously this feature was available only via the remote handset. Other minor changes include something incomprehensible called an EQ REC on/off switch. This, it turns out, allows the graphic equaliser to vary the tape feed so that fully equalised recordings can be made. Quite why this should be thought necessary or even desirable remains a mystery. It's generally (and rightly) thought sensible to record 'flat' (unequalised) for reasons of consistency and because this is the way to extract the most from the tape medium itself. The idea is to make tape dubs of existing material which are free of equalisation and to apply any correction on playback. If you prefer however, you can regard the switch as an easy way of

mucking up recordings without really trying.

## Loudspeakers

The most innovative part of this system is the dedicated nature of the loudspeakers and amplifier which use AST or *Astarte* – Yamaha's proprietary Active Servo Technology in which a loudspeaker port ('Helmholtz resonator') and the LF loudspeaker impedance are manipulated to allow efficient and adequately damped deep bass excursions despite the limited volume of the loudspeaker. Yamaha describes the port as an 'air woofer' which is somewhat disingenuous but gives the flavour. The result is a small loudspeaker capable of surprisingly gutsy performance and good bass extension (the knee of the curve is at 50Hz, and -3dB at 45Hz), but it relies on the particular design of the system amplifier to work properly. The small, oddly shaped enclosures are normally pulled away from the main system unit, and can be stood on small tripod stands.

## How it performs

A few words are in order on the topic of style and ergonomics. Although differences between the old and new models are not large, they have had the effect of increasing the button count significantly. The designer has done a fine job of keeping them in their place, but there's little rhyme or reason about the way that many of them have been grouped together. Obviously familiarity will ease the burden, but I doubt if it will prove a complete answer for most people.

This system is an interesting mix on audition. The combination of amplifier and loudspeakers produces a fairly ordinary but mellifluous enough mid-range and treble which should neither offend nor excite. The bass however, is really quite something. It can come as a genuine shock to hear how the diminu-

tive loudspeakers can get behind a bass line and drive a song as though they were several times as large. There is, however, a tradeoff in the form of a loss of subtlety and control. The bass does tend to overhang, probably less through lack of electrical control than because it excites the not particularly rigid enclosure into resonance, and also due to the behaviour of the port (air woofer) which like all resonant systems can be hard to stop quickly. But given the inherent problems with this kind of system, I'd judge the tradeoffs as well worthwhile.

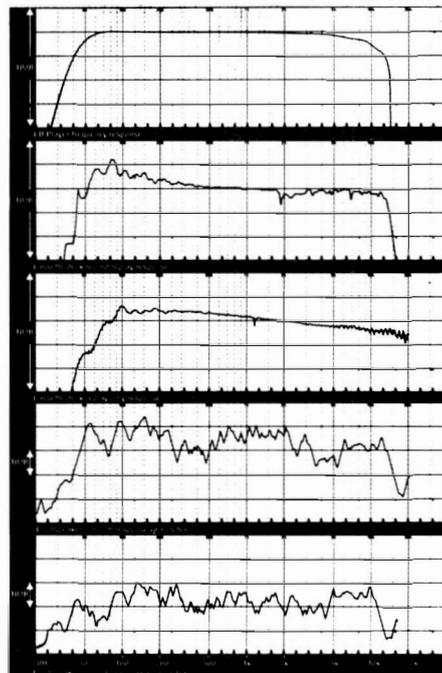
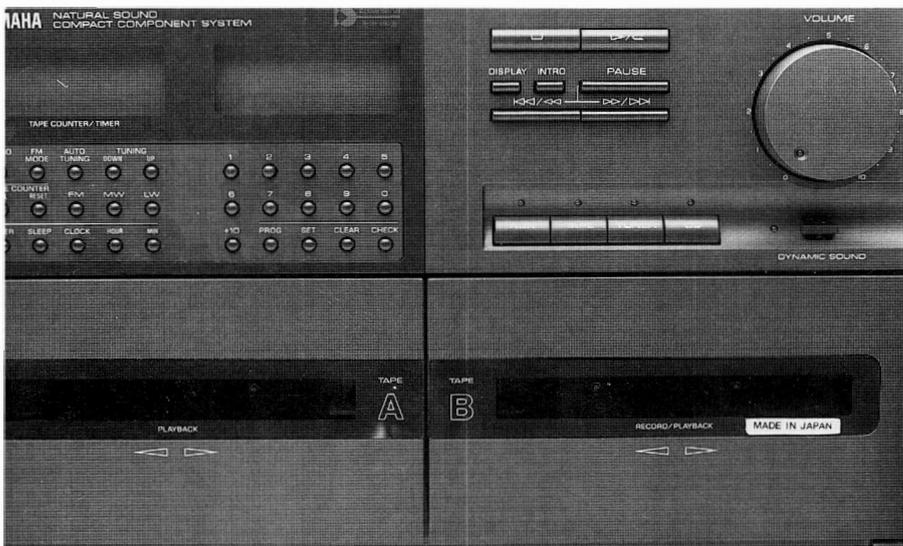
The tape deck didn't quite measure up. Tape hiss, bearing the imprint of the loudspeakers mid-bass prominence and extreme treble shyness, was often obvious during quieter passages. Pitch stability was none too certain, which could only be ignored with some material, and the bass end sounded distinctly waffly and slack where CD and radio offered quite good definition. The AM radio bands worked adequately, but FM tuner performance was excellent, notwithstanding only moderate levels of background noise. Ditto with the CD player, which along with the tuner complemented the rest of the hardware considerably more successfully than the cassette deck.

## Verdict

The Yamaha *YST-C11* is an eminently practical product which can be fitted into small spaces – and quickly reassembled for transport as required. My judgement is that as a radio and CD player, it successfully treads the thin dividing line between the ghetto blaster and high fidelity, and on the whole isn't too severely compromised by the self imposed constraints of the design. But cassette deck performance is a little disappointing, and the next upgrade should take this into account. A formal recommendation is precluded, but the system remains well worth shortlisting subject to the caveats discussed.

## TEST RESULTS

Cost with speakers	£599; without n/a
Options?	SPM speaker stands (not examined)
Size main unit	27 x 30 x 29.5cm (h x w x d)
Size loudspeakers	24 x 15.5 x 20.5cm (h x w x d)
<b>TUNER</b>	
Sensitivity	good
Signal/noise	fair
<b>CASSETTE DECK</b>	
Wow & Flutter (wtd)	0.7%
Signal/noise ref 0dB Type II	n/a *
Distortion 0dB Type II	n/a *
* auto level control	
<b>COMPACT DISC PLAYER</b>	
Signal/noise (measured at amp Tape Out)	96dB
<b>AMPLIFIER</b>	
Power output/channel (8 ohms)	17 watts
(20Hz, 1kHz, 20kHz both channels driven)	
<b>LOUDSPEAKERS</b>	
Efficiency	medium



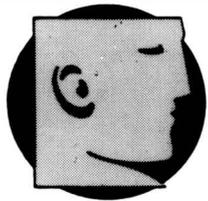
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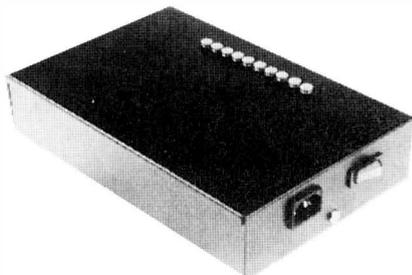


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# Conclusions, Best Buys and Recommendations

*It's time to sum up this month's batch of reviews, highlighting which midi systems most impressed our reviewer.*

The 1991 model year looks like being a good one, but probably not for midi systems. Most of the recent introductions continue to stagnate in the usual technical and styling clichés perfected over the past five years or more. But there are some signs of movement.

The basic concept of a midi system appears to have remained largely static in the last few years. Equipment widths are almost all 36cm, and a standard system will include two cassette transports and one of everything else – record deck, tuner and CD player plus loudspeakers. Very rarely now is the choice of loudspeakers left to the customer.

In 1991 it looks more likely than ever that the cassette

deck will feature one record and one playback only transport; that both will be auto-reverse; that Dolby B and not C noise reduction will be offered (C may soon meet its final denouement at the hands of Dolby S, but that's another story); that Dolby HX Pro headroom extension circuitry won't be included; and that record levels will be set automatically. This last is a classic mixed blessing. ALC eliminates the need for level meters and therefore cuts costs as well as improving ease of use. The trouble is it also inhibits dynamics and increases tape hiss in quiet passages. The tuner section is bound to be digital synthesiser driven and provide, say, 20 FM/MW and LW random presets.

It is a remarkable fact that nearly all systems still include a record deck as part of the package; in fact it continues to be easier to buy a system without a CD player than to find one without a record player. But the relentless downgrading of the engineering standards of record decks continues apace. This year brought an unusually depressing crop of what can only be described as plastic toys, to which I would never entrust any of my more valued records. In contrast to previous years, almost none of the 1990 crop had T4P or any other kind of detachable cartridge arrangements, which illustrates how even a pretence of quality seems to have gone out of the window. This is first division penny pinching, and to this writer at

least it's a cynical way of doing business. Of all the systems tested, only Technics persist with T4P interchangeable cartridge mountings. The T in T4P stands for Technics.

Against this loss, midi system control systems are becoming more intelligent, more automatic and more centralised. Paradoxically, this rarely seems to lead to a reduction in the control count. Or any serious attempt to make operation any easier or more intuitive. The one honorable exception is Akai with the FX 800CD.

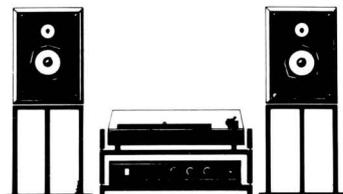
There is a clear drift towards increasing the range of features offered, sometimes in quite unexpected ways. An excellent example is the sudden proliferation of

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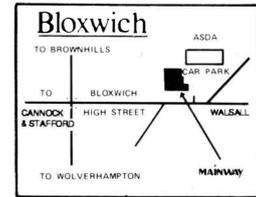


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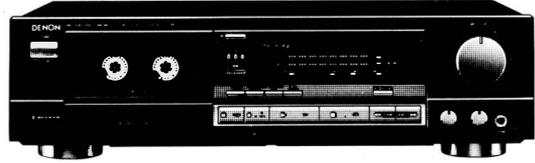
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system timers for wakeup purposes or to make off air recordings. Some of the timers are astonishingly complex; a number of machines are using rolling character displays to help in setting up timers or to help perform other relatively complex tasks involving user input. The ability to dub CDs onto tape appears to be of tremendous importance judging by the amount of gadgetry devoted to the task.

Reinforcing the lack of emphasis given to records, however, the turntable is invariably excluded from the control system. Arm setdown is usually manual, and is never triggered by selecting phono on the amplifier – or the phono input selected by starting a record.

The other system components that continue to get short shrift are the loudspeakers. Quite what mileage manufacturers find in selling loudspeakers which make their systems sound so painfully awful is hard to imagine. It's brickbats almost all round, the exceptions being those who don't supply loudspeakers at all or make them optional (Proton and Kenwood for example) and the odd manufacturer that really does seem to care about what its loudspeakers and therefore its midi systems sound like. The best example from this year's test is Technics.

## Best Buys

### Akai FX 800CD (£700)

This system is impressive for two reasons.

One: a real attempt has been made to cut the number of controls, and to some extent, extraneous facilities too, resulting in a system that should prove genuinely appealing to the market midi-systems were originally aimed at: the audio-naïve buyer who simply wants music but can't be bothered with the complication that seems to plague the subject. The other reason is that it actually accomplishes the musical ends rather well. Even the loudspeakers and

the turntable were not altogether disastrous, and good engineering elsewhere listed the Akai well above the general run of systems at this price level.

### Pioneer P500 (£400)

This is a high class compact mini system, built to a much higher standard than usual. There is no record player at all, and the speakers are somewhat larger than usual with systems of this type. The electronics are packed in a single unit and if it was equipped with a carrying handle, would even rate as a luggable. Musically, this is a distinctive package which could not be described as strictly neutral. Nevertheless it is an effective musical advocate and extremely enjoyable into the bargain. At £400, it's clearly superb value for money, fully deserving a Choice Best Buy rating.

## Recommendations

### Sony Compact 302 CD (£400)

Shortcomings of this affordable package are a noisy tuner (partly due to the absence of a proper 75ohm aerial input) and a turntable that is even poorer than usual, if that's possible. The control system is good, largely because it's very simple, and the system is respectively engineered elsewhere. Even the loudspeakers pass muster. At £400 it's a snip.

### Technics CDC30 (£600)

Technics' CDC30 is one of the few full grown midi systems that comes without a record player as standard. Instead you get a five disc auto changer which has a flat open platter on which the discs are loaded, with a Perspex cover which makes it look very like a record player when closed. The system is well built, and has particularly excellent loudspeakers.

### Kenwood M54CD/CDS (£530/£600)

This system is only recommended when purchased as the M54CD,

which is the version without loudspeakers. In this form it is very sharply priced and brims with high tech toys to keep you and yours amused through many cold evenings, including auto-source selection, auto startup when a source is selected and a highly sophisticated range of timer facilities. The cassette deck even has an auto-biasing facility to help make the most of a wide range of tape types. Aside from this the Kenwood is well constructed and very well finished with, for example, metal extruded fascias in place of the usual plastic mouldings. It also sounds quite decent, though it can sound harsh and thin by high fidelity standards.

### Proton AI-3000II (£650)

Here is a truly no-frills approach to packaged audio system design. The AI-3000 looks like an outsize amplifier or cassette deck, but contains a CD player, a single transport auto-reverse cassette deck and a tuner and amplifier. All are of broadly high fidelity standards, and the system will drive most budget high fidelity speakers without trouble. A record deck can also be added. Sound quality is excellent.

### Sony Compact 702CD (£700)

The Sony Compact 702CD is

chiefly remarkable for the lack of gadgets. Although it looks like a modern high-tech design, the Sony lacks even such basic features as auto-source selection, though you do get remote control. What Sony has done is to invest in the bits you don't see but which actually do the work, and the result is one of the best sounding systems tested in this issue, a comment that even includes the loudspeakers – but specifically excludes the turntable.

### Technics CDX50 (£750)

Unlike the cheaper Technics CDC30 system, this system features a conventional single disc CD player and a record player. In common with that model it has a more complex feature and control count than many potential users will find desirable, but again it has excellent loudspeakers, and the electronics are an improvement all round.

### Pioneer S-555D (£799)

The Pioneer sides with Kenwood and Technics in particular in offering a very heavy load of facilities, some of doubtful value, though there's no obvious lack of build quality – except in the case of the record deck of course. Sound quality tends to be a little aggressive at times, but is mainly good.

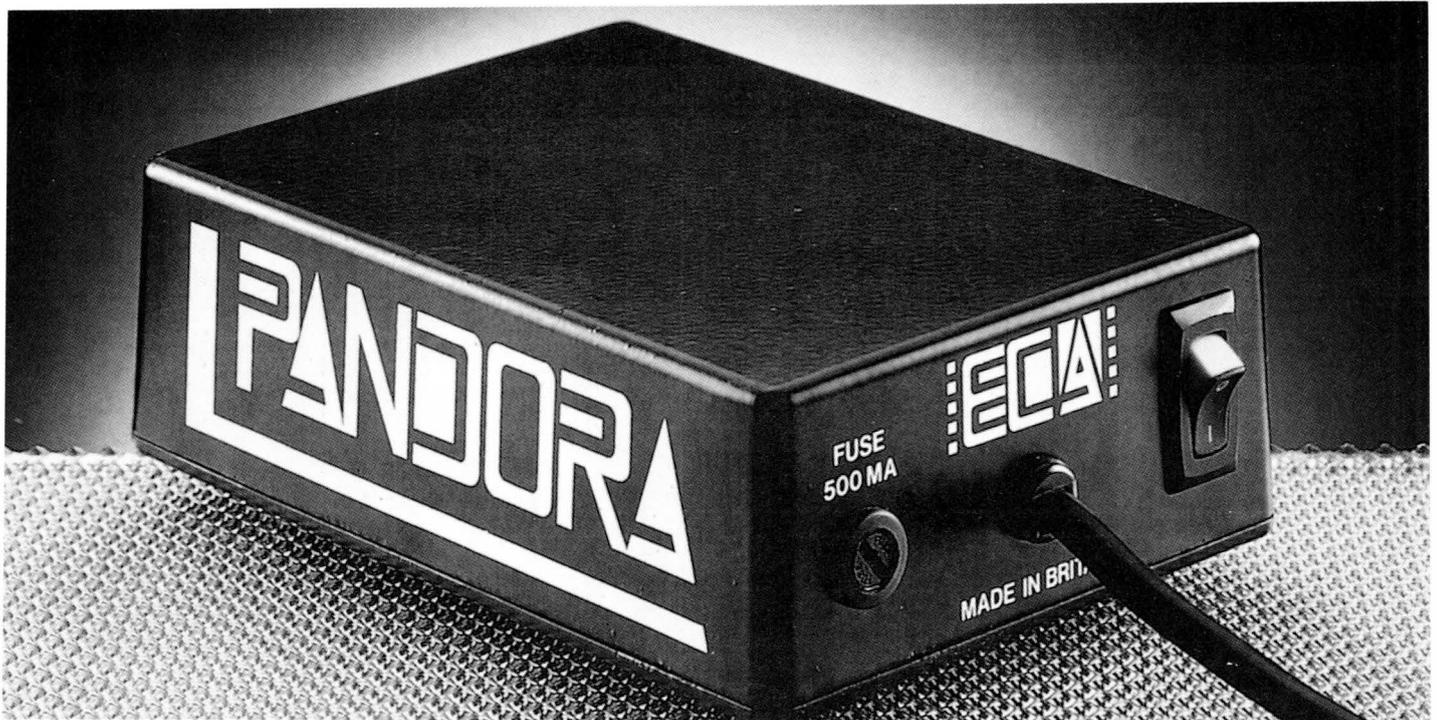


Kenwood M54CD: sharply priced and brimming with facilities



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# Tech Talk

*Every review includes a table of laboratory test results.  
This chapter explains how each test was carried out  
and how to interpret the results.*

This section describes the measurements with each review. Occasionally it proved necessary to alter the procedure, especially where the system concerned lacked the usual inputs and outputs, making it difficult to connect the test gear.

**Dimensions and prices:** We have given dimensions of the stacked system components with the turntable (if fitted) lid up, and of the speakers. Prices quoted are typical retail prices including VAT.

## Amplifier

**Power Output:** The figures presented are the RMS output in watts with both channels driven together to a point immediately prior to amplifier output waveform clipping at 1kHz. Equipment used: Dual beam oscilloscope, dual 8ohm dummy load and Nakamichi T-100 audio analyser, both for generating the sine wave signals and displaying the output on its wattage scale.

## Record Deck

**Speed variations (wow and flutter):** The measurement given is peak DIN-weighted, as measured using a 3kHz recorded tone from HFS 75 and the Kenwood w&f meter.

**Speed drift:** This is an assessment (not a measurement) of long-term drift (low-rate speed variations) using the same test set up as above.

**Speed accuracy:** percentage error, derived from tests using the Ortofon TC 3000 test computer. The more accurate, the better – although of course a slightly incorrect speed is less serious than appreciable speed variations.

**Arm/cartridge resonant frequency:** This is the average vertical/lateral resonance, also derived from the Ortofon TC 3000 test computer. This frequency is related to the mass of the arm and cartridge, and the stiffness (compliance) of the cartridge cantilever (the thin rod that supports the stylus at its visible end, and which

is secured loosely at the other end). Very low figures, below about 8Hz, may cause the cartridge to be easily disturbed by problems such as warped records, and (where fitted) turntable spring suspensions. Sound quality may suffer – pitch reproduction can become unstable and low frequencies generally may become muddy and ill-defined. Too high a frequency – above about 16Hz say – may result in a rather fluttery and under characterised bass. The 'ideal' range is 10-14Hz.

**Cartridge channel balance:** Again derived from the Ortofon TC 3000 test computer. The smaller the difference between the two channels the better, of course.

**Cartridge channel separation:** The figure indicates the amount of left hand channel signal appearing on the right hand channel output – or vice versa, the 'worst case' figure being quoted each time. The higher the figure, the better the result. Test equipment again was the Ortofon TC 3000.

**Cartridge tracking ability:** This figure indicates the highest recorded velocity the cartridge can track at the quoted tracking force – so the higher the figure the better. The measurement is not a comprehensive test of tracking ability, but it gives a useful general indication.

Any perceived shortcomings in tracking ability on music programme have been commented upon separately.

**Cartridge frequency response:** For these systems we used the 1/3-octave pink noise test bands on B&K QR 2011, which is designed for system response checks. The signal measured was from the tape output of the system where possible, or alternatively the headphone output.

## Cassette Deck

**Tape used for tests:** Measurements all refer to Type II (Chrome bias) tape. The brand chosen was either

Maxel XL IIS or TDK SA according to the manufacturer's recommendation (where available). Tapes used were always C90s.

**Frequency response:** The plot was made using the Type II tape selected as described above, and was run at 10dB ref 0VU on the deck's meters. Equipment used was a Neutrik sweep generator and chart recorder. The vertical scale was set to 10dB total, ie 2dB per large division.

**Speed variations (wow and flutter):** Record/replay, DIN Peak weighted. Equipment used: Kenwood w&f meter audio analyser. The lower, the better.

**Signal-to-noise:** CCIR/ARM weighted signal-to-noise ratio. The figure quoted is for the complete record/playback cycle at 400Hz and is referred to 0VU as indicated by the deck's meters and with any noise reduction switched out. The higher the number the better.

The presence of automatic level record controls, where there is no stable reference point for the record level, frustrated this measurement.

**Distortion:** Measured at 0VU on the deck meters, this should be read in conjunction with the signal-to-noise figure. A poor figure for the latter test may still be satisfactory in the light of a very low distortion figure (say 0.8 per cent), because there will still be several dB of headroom to play with above 0VU. Conversely, an apparently good signal-to-noise result may in reality be no better than average if the distortion level is high (say 2-3 per cent) at 0VU.

## Tuner

**Sensitivity and Signal-to-noise:** These are assessments rather than measurements. A laboratory FM stereo generator, which can be pictured as a small transmitter that can encode any source connected on to FM, was used for these, and for a major part of the listening tests as described in

the general introduction. The generator – a Radiometer SMG1 – has a range of outputs ranging from 10V, an extremely low level barely sufficient for good mono reception even with a sensitive tuner, to 100mV, approximately 100 times the amount necessary for good, low noise stereo. By feeding an unmodulated carrier to the tuner under test (that is, a transmission of silence) it was possible to obtain a reliable and repeatable idea of how sensitive and quiet each tuner was. As part of these tests, the tuner was also driven with a range of signal voltage levels using a very low-level piece of music, which gave an idea of the annoyance value of noise in the presence of a music signal.

## Loudspeakers

**Frequency response:** One loudspeaker from each pair was measured in the room used for the listening.

The room – the main listening room for the reviews – is irregularly shaped, but is roughly 17 x 15 feet, with a tall ceiling. The in-room response was made with a 1/2 octave warble tone signal, which is a normal sine wave modified so as not to excite room resonant modes unduly.

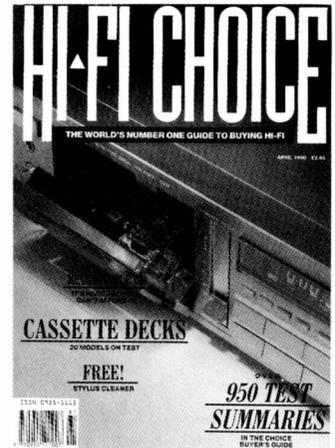
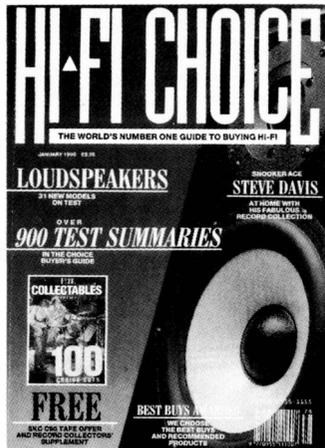
The equipment was a Neutrik generator, a high grade calibrated microphone and chart recorder, the microphone being essentially flat (ie accurate) to 20kHz.

**Efficiency:** This should be read in conjunction with the amplifier output figure to get a rough idea of the maximum attainable volume levels with each of the systems. Low loudspeaker efficiency implies that more amplifier power will be needed to shake the neighbours up, and vice versa.

A combination of low efficiency loudspeakers and low or medium amplifier power levels should act as a caution, especially for those with large listening rooms or a penchant for playing music at realistic volume levels.

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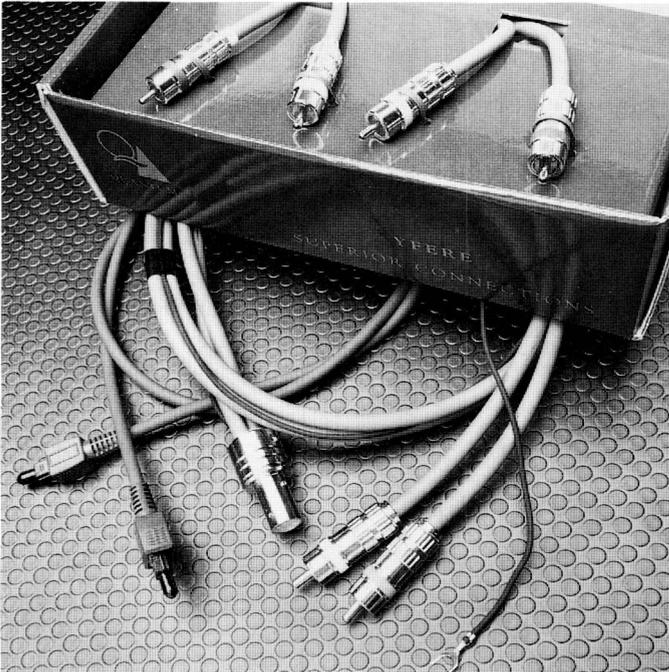
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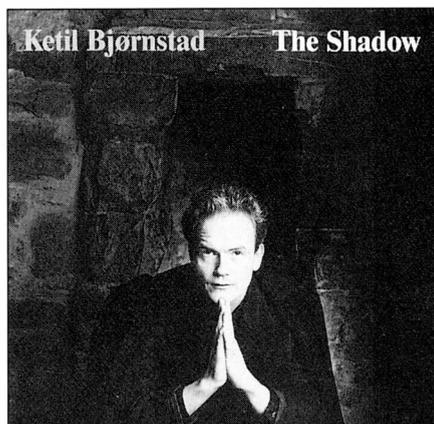
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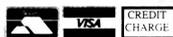
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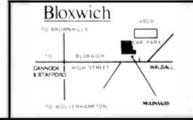
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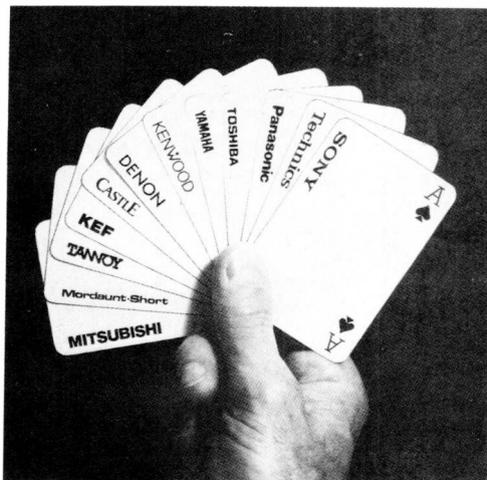


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THE AUDIO FILE, 27 Hockerill St, Bishops Stortford, Herts CM23 2DW. (0279) 506576. 9.30-5.30 6 days. Dealer Of The Year 1988/89. Linn, Naim, Rega, Quad, Cyrus, Arcam, Musical Fidelity. 0% credit.

## KENT

HI-FI CENTRE LTD., 65 King Street, Ramsgate, 0843 590321. A.R., Aiwa, Ariston, Celestion, Goodmans, Kenwood, Marantz, NAD, Radford, Tannoy, etc. etc. + guaranteed recon. equip. Dem room + home dems. Hi-Fi repairs & servicing, Trade in & Cred facs. Mon-Sat (9.30-5.30).

JOHN MARLEY HI-FI CENTRES, 2 Station Rd West, Canterbury. (0227) 769329. Also at Dover - (0304) 207562. B&W, Heybrook, Magnum, M.Y.S.T., Nakamichi, Pink Triangle, Rotel, Sansui, Technics, Quad. Dem and home trial fac. Mon-Sat 9-5.30 closed Thurs. Free install. Credit to £1,000. Access, Visa, Creditcharge. Service dept.

PHOTOCRAFT HI-FI, 40 High St, Ashford. (0233) 624441. No. 1 in Kent for Linn, Naim, Rega, Roksan, Exposure, Onix, Epos, Royd, Creek. But before you choose equipment choose where to buy it. Dem room, appts. necessary. Home trial and free installation. Visa, Access, Bada Chargecard. 9-5.30 Mon-Fri (Wed & Sat to 5 only). Service Dept.

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

TONBRIDGE HI-FI, 96 Woodlands Road, Gillingham, Kent. (0634) 52858. Linn, Naim, Rega, Pink Triangle Exposure, Creek, JRT, Sony, Ruark, KEF, Arcam etc. If your interest is music pay us a visit + find out what we do.

V J HI-FI, 29 Guildhall St., Folkestone. (0303) 56860.

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Mon-Sat 9-6. NAD, Yamaha, Marantz, Cambridge Audio, Denon, Kenwood, Rogers, Dual, Musical Fidelity, Quad, Dem and home trial facilities, free install, credit to £1000. Amex, Diners, Visa, Access. Service dept.

VJ HI-FI, 119 High Street, Margate. (0843) 226977. Mon-Sat 9-6. NAD, Yamaha, Marantz, Cambridge Audio, Denon, Kenwood, Rogers, Dual, Musical Fidelity, Pioneer. Dem and home trial facilities, free installation, credit to £1000. Amex, Diners, Visa, Access. Service dept.

## LANCASHIRE

MONITOR SOUND, 54 Chapel St, Chorley. (02572) 71935. A&R, Dual, Mission, Quad, Rogers, Rotel, Spondor, Thorens, Nakamichi, Yamaha, etc. 2 dem rooms. Open Mon-Sat, closed Weds. Free installation. Credit to £1,000. Access, Visa. Service dept.

NORMAN AUDIO, 131 Friargate, Preston PR1 2EE. (0772) 53057. Fax 562731. Sony Hi-Fi News Area Winner. Aiwa, B&W Loudspeakers, Denon, Marantz, Mission Cyrus, Monitor Audio, Nakamichi, Quad, Roksan, Rotel & many others! 2 lux. dem. Inge. Home trial by arrangement. Free install. Service dept. Inst. cred. facs. with several companies. Most credit cards accepted. 6 days 9-5.30.

## LEICESTERSHIRE

MJS HI-FI, 80 Stapleton Lane, Barwell, Leicester LE9 8HE. (0455) 469777. The Rock, Audio Innovations, Kelvin Labs, Snell, Helius, Sugden, Ruark, Concordant, Valdi, JPW. Dem and home trial facilities. Mon-Sat 9.30-7.00. Free installation and service dept. Visa, Access.

THE LEICESTER HI-FI CO, 6 Silver Walk, St. Martins Square, Leicester LE1 5EW. (0533) 539753. Arcam, Creek, Marantz, Mission/Cyrus, Musical Fidelity, Nakamichi, QED Hi-Fi, Quad, Rogers, Roksan, "and oodles more". 2 dem rooms, home trial arranged, free installation service department, credit facilities, Hi-Fi Markets, Access, Visa, Diners, Amex. 6 days 9.30-5.30.

SOUND ADVICE, Duke Street, Loughborough LE11 1ED. (0509) 218254. Arcam, Creek, Linn, Epos, Mission, Cyrus, Naim, Rega, Rotel, Yamaha etc. Dem facilities. Appts required. Free installation. Service dept. Credit facilities, Access, Visa, Amex. Mon-Sat 9.30-6.

## LINCOLNSHIRE

BOSTON HI FI CENTRE, 65a Wide Bargate, John Adams Way, Boston, Lincs PE21 6SG. (0205) 365477. Quad, Nakamichi, Creek, Ariston, NAD, Denon, Marantz, Castle, Rotel, JPW, Rogers. Separate demo studio. Home trial, free installation, service department. Access, Visa, Hi-Fi Markets Chargecard. Tues-Sat 9-5.30 pm.

## LONDON

A.T.LABS, 190 West End Lane, London NW6. (071) 794 7848. Mon-Sat 10-6. 2 dem rooms. Access/Visa. Sony Hi-Fi News Best Dealer '86 & '88 (National).

ANALOG AUDIO, 849 High Road, London N12. (081) 445 3267. Denon, Dual, JBL, NAD, Marantz, Rotel, Wharfedale, Cerwin Vega Teac, Mordaunt Short. Free install. Service dept. Instant credit up to £1000. Visa & Access. 9.30-6.6 days.

AUDIO CHOICES, 66 High Road, Leytonstone, Stratford E15. 081 534 6987. Marantz, A&R, Musical Fidelity, SD Acoustics, Rotel, Audio Technica, Ruark, Roksan, Moth, Nakamichi, B&W, Van den Hul, Dual, Pink Triangle, Alikon Acoustics. Dem room, home dems within M25 area. 10.30-7.30.

AUDIO VENUE, 24 Church Road, Crystal Palace, London SE19 2ET. (081) 771 7787. Linn, Naim, Nakamichi, Marantz, Dual. Credit available, 2 yr warranty, 2 Demo Rooms. Closed Weds.

BILLY VEE SOUND SYSTEMS, 248 Lee High Road, London SE13. (081) 318 5755. Linn, Rega, Naim, Nakamichi, Quad etc. 2 dem rooms. Inst. free credit. Access, Visa. Closed Thurs.

CORNFLAKE SHOP, 37 Windmill Street (just off Tottenham Court Road), London W1. (071) 631 0472. Mon-Sat 10-7. Rega, Roksan, Naim, Monitor Audio, Koetsu, Marantz, Yamaha, SME, DNM, Epos. Three dem rooms. Delivery and installation service. Credit facilities. Access, Visa.

DOUG BRADY HI-FI, 14-18 Monmouth St, London WC2H 9HB. (071) 379 4010. Wide range of top specialist hi-fi from Britain, America and Japan. 3 Dem rooms.

GRAHAM'S HI-FI, Canonbury Yard, 190a New North Rd, London N1 7BS. (071) 226 5500. Winner Sony/HFN

Greater London Dealer Award 1986-1989. Linn, Naim, Rega etc. £300-£3,000-£13,000.

JUST MUSIC, 52 Upper Tooting Road, London SW17 7PB. (081) 767 1233. Aiwa, Dual, Denon, Marantz, Quad, Rogers, Thorens, Musical Fidelity, Sugden, Heybrook and many more. Dem facilities. Appts can be arranged. Home trial. Free installation available. Access, Visa, Amex, Hi-Fi Markets, Chargecard, Creditcharge, finance arranged. 10am-7pm Mon-Thurs, 10-6 Fri & Sat.

KAMLA ELECTRONICS, 251 Tottenham Court Road, London W1. (071) 323 2747. Amadens, Ariston, BLQ, Gale, Incatech, JPW, Linn, Mordaunt Short, SME, Systemdek, Thorens, Townshend, Ruark, Wharfedale.

KJ WEST ONE, 26 New Cavendish St, London W1M 7LH. (071) 486 8262/63. Fax (071) 487 3452. Arcam, Audio Research, Acoustic Research, Apogee, Arcam, Audiolab, Creek, Epos, Linn, Meridian, Musical Fidelity, Pink Triangle. Appts. nec. Home trial. Free installation. Service dept. Major credit cards. Mon-Sat 10-6pm. (Late night Thursday til 7pm.)

ORPHEUS HOME DEMONSTRATIONS. (081) 299 0075. Alexander, Alphason, Cadence, Castle, Kiseki, Moth, Proton, Thorens, Townshend, Systemdek. Home demonstrations only. Appts. necessary. Home trial, free installation. Service dept. Three month interest free credit. Open 24 hours. All goods guaranteed two years.

SOUND ORGANISATION LONDON, 1 Cathedral Street, London SE1 9DE. 071 403 2255/3088. Linn, Rega, Roksan, Micromega, Radford, Rotel, Nakamichi, Onix, Creek, Naim, Exposure, Royd, Heybrook, Epos. Interesting new equipment always under evaluation. Single speaker listening room. Credit facilities. Appts. preferred, free install., Service dept. Open Tues - Sat 10-6. Late dem. by appt.

THE SOUND SHOP, 58 The Broadway, Mill Hill, London NW7. (081) 906 3364. Denon, Kenwood, JPW, Marantz, Monitor Audio, Musical Fidelity, NAD, Ruark, SD Acoustics, Tannoy etc. Home trial. Free installation. Service department. Access, Visa, Amex, Diners. Credit facilities. £1000 instant credit. 10-6 Mon-Sat.

STUDIO 99, 79-81 Fairfax Road, London NW6. (071) 624 8855. Linn, Naim, Meridian, Rega, Quad, Nakamichi, Mission/Cyrus, KEF, Bang & Olufsen, Yamaha, Creek etc. 2 single speaker dem rooms. Appts. nec. Home trials, free install. Service dept. Visa/c, Access/c & finance terms. 10-7 (Mon-Fri), 10-6 (Sat).

## GREATER MANCHESTER

THE AUDIO COUNSEL, 12 Shaw Road, Oldham, Manchester OL1 3LQ. (061) 633 2602. Linn Naim Rega, Rotel, Arcam, Micromega, EPOS, Creek, Nakamichi, Denon. 2 dem. rooms. Free install. Visa, Access. Licensed credit brokers up to £1000 instant credit. 10.00-5.30 Tues, Weds, Sat; 10.00-7.30 Thurs, Fri. Closed Mon.

CHRIS BROOKS AUDIO, 10-12 Oak Street, Hazel Grove, Stockport SK7 4EJ. (061) 419 9050. Tues-Sat 10-6, 2 dem rooms, credit facilities. All credit cards. Just like the Warrington Ship - total absence of bull. \*\*\*\*

## MIDDLESEX

A.T.LABS, 159 Chase Side, Enfield, Middx. (01) 367 3132. Mon-Sat 10-6. Two dem rooms. Access/Visa. Sony/Hi-Fi News Best Dealer '86 & '88.

A.T. LABS, 173-175 Station Rd, Edgware, Middx. (01) 952 5535. Mon-Sat 10-6. 2 dem rooms. Access, Visa. Sony/Hi-Fi News Best Dealer '86 & '88 (National).

HARROW AUDIO, 27 Springfield Rd, Harrow. (01) 863 0938. Mon-Sat 9.30-5.30. A&R, Audiolab, Cyrus, Denon, Dual, Heybrook, Linn, Monitor Audio, Musical Fidelity, Quad, Rotel, Tannoy etc.

NORTHWOOD AUDIO, 126 Pinner Road, Northwood, Middlesex HA6 1BP. (0927) 420877. Exposure, Musical Fidelity, Pink Triangle, Manticore, Audio Innovations, Rotel, Ruad, Ruark, SD Acoustics, Moth. Dem. room. Home trial. Free Install. Access, Visa. 9-6 Mon-Sat.

UXBRIDGE AUDIO LTD, 278 High St, Uxbridge, Middx UB8 1LZ. (0895) 30404 (Multi-line). A&R, AR, Ariston, Creek, Cyrus, Denon, Dual, JPW, KEF, Manticore, Meridian, NAD, Nakamichi, Quad, Rotel, Wharfedale, Yamaha, etc. 2 dem rooms. Mon-Sat 10-6.

## MERSEYSIDE

BETTER HI-FI, 16 Cook St, Liverpool L2 9RF. (051) 227 5007. Linn, Naim, Quad, Arcam, Audio Innovations, Threshold, Creek, Denon, Yamaha, Mordaunt Short. 3 dem rooms. Home trial. Free install. Service Dept. Access, Visa. Instant credit up to £1000, 0% on certain items. 9-5 Mon-Sat.

W.A. BRADY & SON, 401 Smithdown Rd, Liverpool L15 3JJ. (051) 733 6859. 'Largest choice of specialist Hi-Fi in N.W. £100-£20K'. All credit cards. 3 dem rooms. Closed

Monday.

IN CONCERT HI-FI, 144 Seaview Road, Wallasey, Wirral, Merseyside. (051) 630 5055. Denon, Kenwood, QED, Alexander, Spica, Shan Acoustics, Systemdek, Musical Fidelity, Audio Dimensions, Voyd. Single speaker dem room. Home trial + free installation. 10-6 - closed Mon. Access + Visa.

## NORFOLK

BASICALLY SOUND, The Old School, School Rd, Bracon Ash, Norwich NR14 8HE. (0508) 70829. Arcam, Linn, Naim, Denon, Spondor, Exposure, Audio Technica, Creek, Rega, Epos, etc. 2 comprehensive dem rooms. Home trial. Free installation. Visa, Access. HP facilities. Tues-Sat 9.30-1, 2-5.30.

MARTINS HI-FI, 5 High Street, Kings Lynn. (0553) 761683. Established 1968.

MARTINS HI-FI, 85/91 Ber Street, Norwich. (0603) 627010. Established 1968.

SOUND APPROACH, 161 Unithank Road, Norwich. (0603) 622833. Kuzma, Ariston, Castle, Denon, Exposure, Ion, Royd, NVA, Roksan, Ruark, etc. etc. Dem and home trial facilities. Mon-Sat 9-6.30. Free installation. Credit to £1,500. Visa, Access, Diners Club. Service dept.

## NORTHAMPTONSHIRE

CLASSIC HI-FI + VIDEO, School Lane, Kettering, Northants. (0536) 515766. Rotel Musical Fidelity, Wharfedale, Monitor Audio, Yamaha, JBL, Dual, Marantz, Kenwood, Kef, Celestion, and many more. Home trial, free instal, service dept. Access, Visa, credit facs. 9.30-5.30pm.

THE AUDIO SHOP, Coffee Tavern Court, High St, Rushden. (0933) 56651. Audio Technica, Denons, Goodmans, Rotel, Tannoy, Ion Systems, Thorens, Gale, BLQ, Royd. Dem room. Home trial and free installation. Mon-Sat 9.30-5.30 (Thurs 9.30-2). Service dept

## NOTTINGHAMSHIRE

CHANNY AUDIO, Chantry Walk, 18a Eldon Street, Tuxford, Newark, Notts NG22 0LH. (0777) 870372. Pink Triangle, Royd, JPW, Rotel, S.D. Acoustics, NVA, Michell, Art Audio (valve), Kelvin Labs, Sumo, + much more. 2 Dem. Rooms. Appts preferred. Home trial, free installation. Access, Visa + credit facilities and mail order. Mon-Fri 10am-4.30pm. Sat 9-30-5.30. Sun home dem by appt. Closed Weds.

DEFINITIVE AUDIO. (0602) 813562. Voyd, Audio Innovations, Snell, Helius, Systemdek, Revox, Deltec, JPW, Pirate, Loewe Audio Visual plus more. Home dems throughout Notts and E. Mids. Free install. 10-7, 7 days. Tel: (0602) 813562 for further info + appt.

## WEST MIDLANDS

ALTERNATIVE AUDIO Ltd, 93-95 Hobs Moat Rd, Solihull. (021) 742 0254 (sales), 0248 (service). The widest range of quality hi-fi and CD in the West Midlands. Tues-Sat 10-6.

AUDIO CENTRE MAINWAY, Sharing Asda Car Park, High Street, Bloxwich, Walsall, W. Midlands. (0922) 473499. Linn, Ariston, Aura, Arcam, Cambridge Audio, QED, Musical Fidelity, Rogers, QED, Systemdek, Moth etc. The Midlands most exclusive Hi-Fi Centre with private listening studio. Open evenings by appointment. Home trial. Free install. Own service department. Inst. credit, Chargecard. Interest free. Access, Barclaycard. Mon-Sat 9-5.30.

BRIDGE HI-FI, 3 Tudor House, Bridge St, Walsall. (0922) 640456. NAD, Dual, Yamaha, Kenwood, Technics, Pioneer, Mission, Celestion, Denon, Mordaunt Short. Appts required. Home trial & free install. Access, Visa, Diners, Amex. Credit to £1,000. 9.15-5.30 Mon-Sat. Service dept.

FIVEWAYS HI-FIDELITY LTD, 12 Islington Row, Edgbaston, Birmingham. (021) 4550667. Alphason, Arcam, Denon, Meridian, Musical Fidelity, Quad, Revox, Spondor, TDL, Thorens, etc. Dem facilities. Tues-Sat 9.30-6. Free installation. Access, Visa. Service Dept.

FRANK HARVEY HI-FI EXCELLENCE, 163 Medieval Spon Street, Coventry. (0203) 525200. All major agencies. Free inst. Service dept. Part ex. 3 dem rooms. Mon-sat 9.30-5.30. Wed 'til 8pm.

GRIFFIN AUDIO LTD, 94 Bristol Street, Birmingham. (021) 692 1359/(021) 622 2230. Castle, Creek, Cyrus, Denon, Linn, Marantz, Naim, Quad, Rega, Rotel. Tues-Sat 10-6.

HORNTON ELECTRONICS (1987) LTD, 8-9 Lower Temple St, Birmingham B2 4JD. (021) 643 0972. Aiwa, Acoustic Research, Denon, Marantz, Mordaunt Short, JVC, Mission, Sony, Technics, Wharfedale. Credit to £1000. Access, Visa. 9-5.30 Mon-Sat. Service dept.

MUSICAL APPROACH, 37 High Street, Aldridge, Walsall, W. Mids. (0922) 57926. Linn products, Arcam, Creek, NVA, Revolver, Onix, Epos, Marantz, Rotel, Quad & more.

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Dem facs. Home trial. Service dept. Credit facs available. Access, Visa. 9.30-5.30 Mon-Sat. 9.30-1 on Thurs.

## OXFORDSHIRE

ASTLEY AUDIO LTD, 3 Marketplace, Wallingford. (0491) 39305/34349. Technics, Panasonic, Pioneer, Kenwood, Sony, Yamaha, Denon, Dual, Mission, Tannoy. Home trial, free installation. Service dept. Access, Visa, Amex, Diners. Instant credit. Tue-Fri 9-5.30, Sat 9-5. Records & CDs stocked.

HORNS OF OXFORD LTD, 6 South Parade, Summertown, Oxford. (0865) 511241. Alphonson, Ariston, B&W, Celestion, Marantz, Nakamichi, Pink Triangle, Quad, Sony, Technics. Free installation. Service dept. Access, Visa. 9-5.30. Closed Thurs.

OXFORD AUDIO CONSULTANTS LTD, Cantay Hse, Park End Place, Oxford OX1 1JE. (0865) 790879. Oxford Acoustics, Audio Research, Krell, Magneplanar, Apogee, Aragon, Stax, Marantz, Wharfedale, Cambridge Audio. Home trial and free installation. Instant Credit. Access, Amex, Visa. 10-6 Tues-Sat. Service dept.

WITNEY AUDIO VISUAL, 28 High St, Witney, Oxford. (0993) 702414. Aiwa, Akai, AR, Bose, B&W, Cambridge, Dual, Mordaunt-Short, NAD, Onkyo, Pioneer, Roberts, Sony & Sony ES, Tannoy, Wharfedale, Yamaha, Reference Point Dealer. Dem facilities. Mon-Sat 9-5.30. Free installation, credit to £1,000. Access, Visa. Service dept.

## SHROPSHIRE

AVON HI-FI, 12 Barker Street, Shrewsbury, Shropshire SY1 1QJ. (0743) 55166. NAD, Quad, B&W, Arcam, Kenwood, Aiwa, Bose, Nakamichi, Revolver, Onkyo. Dem room. Home trial. Free Install. Service dept. Access, Visa. £1000 instant credit. Mon, Tues, Wed, Fri, Sat. 9-5.30.

CREATIVE AUDIO, 9 Dogpole, Shrewsbury. (0743) 241924. Linn, Naim, Roksan, Mission, Arcam, Rogers, Denon, Marantz, Rotel, Celestion, etc. Dem room. Home trial and free installation. Credit to £1000. Access, Visa. Tues-Sat 9.30-5.30. Service dept.

## SOMERSET

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.

## STAFFORDSHIRE

ACTIVE AUDIO, 29 Market Street, Tamworth, Staffordshire. (0827) 53355. Arcam, Ariston, Celestion, Denon, Heybrook, Kef, Cyrus, Musical Fidelity, Marantz, Revox, Rotel, Rogers, etc. etc. The only BADA Member in Staffordshire. Full dem. & home trial facs. Account and credit cards. Ring for opening times and free 'Fact Pack'.

ACTIVE AUDIO, 95 Stafford Street, Hanley, Stoke on Trent. (0782) 214994. Arcam, Ariston, Celestion, Cyrus, Denon, Kef, Kef Reference, Marantz, Rogers, Rotel, etc. etc. The only BADA Member in Staffordshire. Full dem. & home trial facs. Account and credit cards. Ring for opening times and free Fact Pack.

GRANGE HI-FI LTD, 153 Branson Road, Burton-on-Trent DE14 3DQ. (0283) 33655. Audio Innovations, Arcam, Creek, Systemdek, Snell, Spondor, Rotel, Pink Triangle, Quad, Voyd, etc. 2 dem rooms. Mon, Tues, Thurs, Fri, Sat. Open 9-5.30. Closed Wed. Free installation. Credit facilities. Visa. Access. Service dept.

INTERSOUNDS, 62 Bennett Precinct, Longton, Stoke on Trent. (0782) 336233. Arcam, Denon, Dual, Mission, Musical Fidelity, NAD, Nakamichi, Revolver, Rotel, Systemdek etc. + 8 different speaker manufacturers. 2 dem rooms. Free install. In-house Service Dept. Access, Visa. £1000 credit subject to status. 9.30-5.30 Mon-Sat, Closed Thurs.

MUSICAL APPROACH, 137A Newport Road, Stafford (above Royal London Insurance). (0785) 55154. Linn Products, Arcam, Creek, NVA, Revolver, Audiotec, Onix, Epos, Marantz, Rotel and more. Home trial. Free installation. Service dept. Credit facilities available, Access, Visa. 9.30-5.30 Mon-Sat.

## SUFFOLK

EASTERN AUDIO 41 Bramford Rd Ipswich. (0473) 217217. Quad Audio Lab Denon Dual Marantz Mission NAD Nakamichi Technics Arcam. Mon-Sat 9.30-6.

## SURREY

DATASOUND, 23 South Street, Dorking, Surrey RH4 2JZ. (0366) 882897. Arcam, Celestion, Denon, Dual, Marantz,

Mission, Musical Fidelity, NAD, Rotel, Tannoy. Dedicated listening room. Free Install. Service dept. Up to £1000 instant credit subject to status. 9.30-5.30 6 days.

PJ HI-FI - the Hi-Fi Shop, 3 Bridge Street, Guildford, Surrey GU1 4RY. Tel: (0483) 504801. 9-6 Mon-Sat. Linn, Meridian, Creek, Arcam, Quad, Revox, Musical Fidelity, Rotel, NAD, Nakamichi, Marantz.

ROGERS HI-FI, 13 Bridge Street, Guildford (0483) 61049. Aiwa, Denon, Dual, JPW, Marantz, Monitor Audio, Philips, Pioneer, Tannoy, Trio-Kenwood. Mon-Sat 9.30-6. Dem. facilities. Instant Credit. Access, Visa. Service dept.

SOUNDS EXCLUSIVE, 1 Kent House, High Street, Cranleigh, Surrey GU6 8AU. (0483) 268185. Marantz, Sumo, QED, Michell, Alphonson, SME, Ortofon, Finestra, Proac, Bose. Home trial. Dems a pleasure. Appts. preferred. Service Dept. Free install. Access, Barclaycard.

SPALDINGS HI-FI, 352-4 Lower Addiscombe Rd, Croydon, Surrey. (01) 654 1231. 3 dem rooms + home dem. Free installation, credit. Mon-Sat 9-6, Tues to 8. Closed Wed. Service dept.

SURBITON PARK RADIO, 48 Surbiton Rd, Kingston-Upon-Thames, Surrey. (01) 546 5549. Quad, Dual, Denon, Kenwood, Nakamichi, Rotel, Pioneer, QED, B&W, Tannoy. Dem and home trial facilities. Access, Visa. 9.30-5.00 Tues-Sat. Service dept.

TRU-FI SOUND AND VISION, 2 Central Parade, Redhill, Surrey. (0737) 767404/766128. Aiwa, Audio Technica, B&W, Nakamichi, Mission, Mordaunt-Short, Nakoaka, Sony, Technics. Dem. facilities. Free installation. Service dept. 0% finance. Access, Visa. Mon-Sat 9.30-6.

TRU-FI SOUND & VISION, 10 Church St, Leatherhead, Surrey. (0372) 378780. Sony, Technics, Panasonic, Mitsubishi, Ferguson, Aiwa, Pioneer, Sanyo, B&W, Mission. Free installation. Credit facilities. Access, Visa. 9.15-5.30 Mon-Sat. Closed Wed. Service dept.

UNILET HI-FI, 35 High St, New Malden, Surrey KT3 4BY. (01) 942 9567. Kef, Mission, Musical Fidelity, NAD, Nakamichi, Quad, Rotel, Tannoy. Dem. Amex, Access, Visa, etc.

## SUSSEX (EAST)

DEFINITIVE AUDIO BRIGHTON, 8 Dyke Road Mews, 74-76 Dyke Road, Brighton BN1 3JD. (0273) 208649. Voyd, Systemdek, Audio Innovations, Helius, Audionote, JPW, Snell, Pirate Stands, Goldring etc. Home dems throughout Sussex. Credit facilities. Visa.

HASTINGS HI-FI, 33-35 Western Road, St. Leonards, E. Sussex TN37 6DJ. (0424) 442975. Linn, Musical Fidelity, Quad, Nakamichi, Arcam, Celestion, NAD, Denon, Yamaha, Tannoy. 2 listening rooms. Home trial. Free installation. Service dept. All credit cards welcome. Instant credit up to £1,000, written details on request. 9-6pm Mon-Sat.

JEFFRIES HI-FI, 69 London Rd, Brighton, East Sussex. (0273) 609 431. 2 dem rooms, closed Mon, late night Wed. Parking, bus route. Credit facilities.

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

LASER SOUND & VISION, 72 Terminus Road, Eastbourne, East Sussex BN21 3LX. (0323) 640911. 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.

## SUSSEX (WEST)

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).

## TYNE & WEAR

BILL HUTCHINSON LTD., 87A Clayton Street, Newcastle-Upon-Tyne. Tel: 091 230 3600. A.R., AIWA, Denon,

Dual, JVC, Mission, Mordaunt-Short, Omar, Technics, Yamaha, etc. Demonstration facilities, free installation, service department. Instant credit, Access, Visa. Mon-Sat 10-6.

RED RADIO SHOP AND HI-FI CENTRE, 11 Olive St, (Off Park Lane) Sunderland. (091 567) 2087. Castle, Denon, Bose, JVC, Kenwood, Mordaunt-Short, Michell, Teac, Tannoy, Shure. Dem room, large with comparator facility. Free install. Service dept. Interest free credit and no deposit interest free credit. 9am-5.30pm daily.

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WEST MIDLANDS AUDIO, 158 Ombersley Road, Worcester, WR3 7HA. (0905) 58046. Linn, Naim, Rega, Absolute Sounds, Meridian, Mission, Arcam, Ion Systems, Roksan. 3 dem. rms. for budget. High end & Audio Visual. Appt. nec. Home trials, Free Install. Service Dept. Access, Visa, Amex, Diners, Lombard/Hitachi. Mon-Fri 9.30-8.30 by appt. Sat 9-5.30.

## YORKSHIRE (NORTH)

ELITE HI-FI, 178 Kings Road, Harrogate HG1 5JG (0423) 521 831. Voyd, Valdi, Avalon, Systemdek, Helius, Audionote, Goldring, Audio Innovations, Sugden, Marantz. Mon-Sat 9-5.30. Free installation. Service dept.

SCARBOROUGH HI-FI CENTRE, 53 Dean Road, Scarborough YO12 7SN. (0723) 374547. Cambridge Audio, Rotel, QED, Denon, NAD (incl. Monitor series), Thorens, Onkyo, Tannoy, Marantz, Ruark. Dem Room. Appts preferred. Home trial facilities. Mail order and part exchange. Visa, Access, Diners, Hi-Fi Markets Chargecard facilities. Open 10-6 Mon-Sat.

SOUND ORGANISATION YORK, 16 Gillygate, York YO3 7EQ. Tel: (0904) 627108. Linn, Naim, Rega, Roksan, Sony, Arcam, Mission, Denon, Ion, Rotel. 2 single speaker dem rooms. Appts. preferred. Home trial. Free installation. Service dept. Access, Visa. Instant free credit available. 10am-6pm Tues-Sat. Sony dealer. Award nominated 86, 87, 88.

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MOORGATE ACOUSTICS, 184 Fitzwilliam St., Sheffield. 0742 756048. Roksan, Linn, Musical Fidelity, Denon, Meridian, Krell, Quad, Audio Research, Exposure, Nakamichi. 2 Demo. Rooms. Free installation. Service Dept. Access, Visa, Credit. 9.30-5.30 Closed Mon.

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## YORKSHIRE (WEST)

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

AUDIOVISION (BRIGHOUSE) LTD, 5 Bethel Street, Brighouse, W.Yorks. HD6 1JR. 0484 713996. Largest range of Technics hi-fi in Yorkshire, Aiwa separates, Mordaunt-Short and Castle Acoustics Speakers. Panasonic, Finlux & Mitsubishi. Nicam TVs & Hi-Fi VCR's. Excellent CD dems. using comparator facs & over 1000 CD titles. Appts. pref. please phone. Free expert install. In-store Service dept. Visa, Access, Credit charge. Licensed credit broker. Open Mon-Fri 9-6, Sat 9-5.30.

ERRICKS, Hi-Fi Experience, Fotosonic House, Rawson Square, Bradford (0274) 309266. Dem facilities. Sales/service agents for A&R, Linn, Quad, Exposure, Nakamichi, Mission etc.

Huddersfield HI FI CENTRE, 4 Cross Church St, Huddersfield. (0484) 544668. B&W, Kenwood, Denon, Dual, Arcam, Musical Fidelity, Quad, NVA, Audio Lab, Philips, Mission, etc. Dem facilities - appointment req. Mon-Sat 9-5.30, Thurs 9-8. Closed Wed. Free installation, credit facilities. Access, Visa.

IMAGE HI-FI Ltd, 8-10 St Annes Rd, Headingley, Leeds. (0532) 789374. AR, Audio Lab, Denon, Linn, Marantz, Meridian, Mission, Monitor Audio, NAD, Quad.

SELECTIVE AUDIO, The Forge Cottage, 19 Crossgate, Otley. (0943) 467689. Exclusively handles Alphonson, Roksan, NVA, ProAc, TDL, JDI, in the area and other minimalist British designer products for the discerning listener. Dem facility. Member of the Cognoscenti. Mon-Sat 10-6.

# THE CHOICE DEALER DIRECTORY



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CEOL PRODUCTS, 185 Lower Rathmines Road, Dublin 6. Tel: 0001 975984 961358. Alphason, Audio Innovation, Exposure, Linn, Marantz, Monitor Audio, Mordaunt Short, Musical Fidelity, Rega, Roksan. Single Speaker listening rooms. Free installation. All major cards. Mon-Sat 9.30-6.00.

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### CENTRAL

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DAVID STEVEN HI-FI, 1-3 Main Street, East Kilbride, Strathclyde. (03552) 44145. Denon, Infinity, KEF, Marantz, Mission, Quad, Technics, Sony, Yamaha. Dem. room. Home trial facilities. Installation facilities available. Service dept. Access, Visa. Licenced credit broker. 9.30-5.30 Mon-Sat, 5.30-9.30 Mon-Fri by appointment.

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HI-FI CORNER, 121b Rose Street, 1 Precinct, Edinburgh EH2 3DD. 031 220 1535. Large range of products such as Nakamichi, Arcam, Audio Lan, Quad, Cyrus, Mission, Allison, Proton, NAD, Technics. Mon - Sat 10-5.30pm, Thurs 10-7.00pm.

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## TAYSIDE

W.M. COUPAR, 33 Reform Street, Dundee, Tayside. (0382) 29588. Bang & Olufsen, Nada, Technics, Denon, Kenwood, Dual, Nakamichi, B&W, Acoustic Research, JBL. No appointment necessary, free installation, service department. All demonstration systems wired through a demonstration compatitor. Licensed credit broker, Access, Visa. Monday-Saturday 9.00 am-5.30.

## WALES

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### SOUTH GLAMORGAN

AUDIO EXCELLENCE, 134 Crwys Road, Cardiff. (0222) 228565. Audio Research, Krell, Linn, Naim, NAD, Yamaha, Quad, Arcam, Mission + lots more. Closed Mon.

### WEST GLAMORGAN

AUDIO EXCELLENCE, 9 High St, Swansea. (0792) 474608. Audio Research, Linn, Arcam, Mission, Quad, Naim, NAD, Yamaha, etc. Closed Mon.

### GWENT

AUDIO EXCELLENCE, 37 High St, Newport. (0633) 220012. Audio Research, Linn, Naim, NAD, Yamaha, Arcam, Mission, Quad, etc. Closed Mon.

### NORTH WALES

ACTON GATE AUDIO, 4 Ruabon Road, Wrexham, Clwyd. (0978) 364500. Arcam, Cambridge, Celestion, NAD, Quad, Radford, Rotel. Semilink, Tannoy, Yamaha etc. Dem room, appts. nec. Free install. Service Dept. Access, Visa, Amex. 9-5.30 Mon-Sat. Closed Weds.

ELECTRO TRADER, 19 Colwyn Crescent, Rhos On Sea, Colwyn Bay, Clwyd. (0492) 48932. Ariston, Arcam, B&W, Heco, Infinity, Onkyo, Rotel, Tannoy, TDL, Yamaha etc. Dem room. Appts preferred. Home trial. Free installation. Access, Visa, American Express, Diners. 9.30-1.00, 2.00-5.30 Mon Sat.

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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 Arston *Superior* heads the Motor Units section as it is sold and was reviewed as a separate component – requiring a separate arm. Where there are several products with the same name but different model numbers these are in price ascending order.

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

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

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

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

system on a turntable.

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

Perhaps the most influential letters in the Directory are those found in the Value column, the *Rs* and *BBs* denoting the Recommended and Best Buy ratings that are appended to products we consider meritworthy. The Best Buy tag means that a product not only offers good sound quality but is reasonably priced as well. With source components a price limit of approximately £300 is usually used as a guide. Recommended means that either the performance of a product is particularly good irrespective of price or, alternatively that a good value standard is achieved but overall attainment falls short of Best Buy classification. An ideal situation would be to choose suitably priced Best Buy or Recommended products from relevant categories and create a Best Buy system, but, due to

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

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

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

## SYSTEM BUILDING

Pre-packaged one-make systems have been commercially very successful, with advantages like cosmetic consistency, competitive pricing, and (assumed) technical compatibility. However, despite the mass market clout of the consumer electronics giants, the hi-fi tradition of specialised separate components seems as strong as ever, and certainly represents the route taken by those who place sound quality first.

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

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

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

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

recorded music cassette material. As a hi-fi medium cassette suffers from pre-recorded material which has been improving but is still patchy in quality, and can usually be bettered by a home recording. There is also the worry that a tape made on a specific machine usually replays best on that machine, which may cause aggravation when upgrading a few years hence.

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

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

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

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

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

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

Provided that the loudspeakers can be placed fairly symmetrically, slight asymmetry elsewhere in the room is usually helpful.

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

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

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

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

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

## THE DIRECTORY

## TURNTABLES &amp; TONEARMS

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

Specialist turntables offer big sound quality

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

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

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

## INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research EB101 £230	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Alphason Solo/Xenon MCS £420/£300	Average+ Good	The deck is warm and euphonious with high levels of clarity. Wow artefacts occasionally just audible.	3 point suspended motor unit, optional quartz PSU/speed change 13g		67
Alphason Sonata/HR-100S MCS/Atlas £720/£480/£340	Very Good Very Good	Good sound in all areas – bass, clarity and neutrality all in the top class and bettered by very few decks. Atlas PSU expensive but worthwhile	Belt drive, suspended, optional PSU, 13g	R	79
Ariston Q-Deck £165	Good Average+	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid	BB*	67
Ariston Icon £215	Good Good	A thoughtful and efficient design that offers good sound, excellent value and semi-automatic operation too! Good vibration isolation eases siting	Belt drive, suspended, semi-automatic, 10g	BB	79
Ariston Forte £350	Average— Average	Heavy on engineering, short of soul? The Forte almost makes it, losing out only because of some residual pitch variations and a lack of bass power. The arm is modestly good	Manual 2-speed belt drive player and detachable arm, 10g		67
Dual CS430 £100	Average Average—	Ragged, sometimes unpleasant cartridge mixes with a modest pleasing player in a very sharply priced package.	Belt drive, with cartridge, auto return, 5g	R	67
Dual CS505-3 £160	Very Good Good	Continuous steady improvements have kept this model at the forefront of the budget market. Practicality is excellent and the deck has excellent timing bass/mid and stereo imaging	Semi-auto belt drive, 8g	BB	67
Dual CS5000 £230	Average Average+	The rare 78 facility may give grandma's collection a new lease of life but the player did not merit recommendation on price vs sound	Electronic, belt drive, subchassis, 10g		48
Goldmund ST4 £4,589	Very Good Excellent	The Studio turntable takes on a cheaper tonearm than the T3F, yet provides a similar reference standard objective and subjective performance at £2,000 less, in a neatly integrated though bulky package.	Solid subchassis, direct drive, parallel arm, detachable headshell	R	60
Heybrook TT2 turntable & arm £424/£269	Average Good+	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, belt drive, 14g	R	67
JVC AL-FQ555 £170	Below Average Poor	Clear midband sound but woolly bass and crude treble. Ease of use however ranks highly, and there's little to go out of adjustment	Auto, direct drive, 5.5g		67
Kenwood DP-990 £400	Average Average	Smart, slick and massive player suitable for low compliance cartridges only. A good but not inspired performer.	Semi-auto 2 speed direct drive, 16g		67
Kuzma Stabi/Stogi £699/£399	Average+ Stabi: Good; Stogi: Excellent	Stabi is powerful, spacious but not sufficiently subtle. Stogi is an excellent all rounder with even spread of abilities	Manual, belt drive, subchassis, 12.5g	Stogi: R	60
Linn Axis/Akito £399	Good— Average+	A neat, attractive and well-made package which delivers a rather harsh sound with a 'one-note' effect in the bass, but it's well suited to mid market systems	Belt drive, semi-suspended, electronic PSU, 10g		79
Linn Sondek/Ittok/Troika* £549/£483/£669	Excellent Very Good	Superb sound – the best LP12 combination yet. The Troika gives the system real solidity and strength, stretching the deck and arm qualities to the full. Arm has since been upgraded	Manual subchassis player, belt drive, 14g	R	60
Manticore Mantra/Musician £340/£170	Good+ Good+	Well engineered deck with satisfying sound. The arm is particularly fine and very good value	Belt drive, suspended, 15g	R	79
NAD 5120 £90	Average Average	A number of running improvements have given this player a range and tautness denied its lazier sounding antecedents.	Semi-auto belt drive, detachable armtube/weight, 9g	BB	67
Omega Point Silver/Black £895/£295	Good Good+	An avowedly stripped down turntable that lacks even an on/off switch, the Omega Point Silver offers fine midrange clarity and good stereo, but some HF compression and a lack of 'wellie'	Manual, solid, belt drive, unipivot, 11g		55
Opus 3 Continuo/Decca London International (Revised)* £599/£99	Poor Good	Heavyweight motor unit with many fine properties, but which needs further development. The idiosyncratic arm is a suitable (though not ideal) platform for the Decca cartridge. For all its faults though, the whole transcends the sum of the parts	Belt-drive manual, damped unipivot arm, 12g		67
Rega Planar 2 £155	Average+ Good	A remarkable product at the price, surprisingly articulate and confident	Manual, 11.5g	BB	48
Rega Planar 3 £207	Good Good	A long time leader in its price category, the '3 (with its excellent RB300 arm) sounded nicely 'musical' in a balanced and coherent manner	Manual, 11.5g	BB	48
Revolver Rebel £169	Average— Average—	Fat, assured and forward presentation, but ragged and subjective speed stability problems. With a little further development, it will be a winner	Manual, 2-speed belt drive inc cartridge, 13g		67
Revox B291* £892	Average— Average—	Sound quality ranks as below average. Subjective bandwidth is narrow and the music lacks grace and energy. Ease of use however is unrivalled	Automatic, remote controllable, direct drive parallel arm, prefitted cartridge		55
Roksan Xerxes/Artemiz/Shiraz £695, £595, £655	n/a Very Good	Imaginatively designed, sophisticated front-end system, a little drier than some perhaps, with superior stereo, resolution and presence	2-speed manual, MC cartridge, 9g	R	72
Rotel RP-855 £189	Good Good	Great sound for the money – detailed and clear with good bass and no irritating nasties	Belt drive, solid, speed adjust, 9g	BB	79
Systemdek IIX £248	Good Average+	Poised, clean sounding deck, forward and explicit in character. A good value deck under £250, and a relatively cheap and satisfactory suspended model	2 speed belt drive manual turntable and arm, 11g	R	67
Technics SLBD-22 £90	Average— Average—	Not bad for the price and a great improvement on the L20, it performs reasonably when not stretched	Semi-automatic, solid plinth, electronic, 6g P-mount	R	48
Technics SL-DD33 £110	Average Average	As with the QD33 though better value	Automatic, direct drive, solid plinth, 7.5g, P-mount	BB	48

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 130

# 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 classic jazz 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 Synco £265	Good Good	A particularly happy blend of qualities endows the Synchro with a blend of subtlety and force – the mailed fist in the velvet glove. Easy on the ear in the best sense.	Manual, belt drive, suspended motor unit	R	67
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	60
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/Colt

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## TONEARMS

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Alphason Xenon £240	Good Good +	A trimmed down HR100S, the Xenon has inferior bearings and a simpler finish, but sounds crisp and coherent. Fits any Linn cutout	12.75g	R	55
Alphason HR100S £420	Good + + Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	48/Coll
Ariston Enigma £99	Average Average +	Good but not the best in its class: mid-band sounds a little uneven; treble a trifle "brash"	11.5g		48
Audio Technica AT1130 £186	Good Good	Well suited to most cartridges including high compliance ones, the AT is smooth and tonally neutral, if slightly lacking in 'balls'	8.5g	R	67
Decca London International £49	Average + Average +	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48Summary
Eminent Technology £1000	Good + Good + +	One of the best sounding tonearms around, the linear tracking Eminent delivers impressive stereo imagery, focus and transparent sound	9g (vertical)	R	48/Coll
Goldmund T3F arm £4400	Excellent Excellent	This complex parallel tracker created an "ear-opening" experience when tested with a (since updated) Goldmund Studio turntable	16.5g	R	Coll 2
Helius Orion 2 £490	Very Good Very Good	Excellently engineered with rigid bearings, free from slack. It remains expensive but the level of performance deserves Recommendation	12g	R	48
Kuzma Stogi Reference £699	Very Good Very Good	A large, solid and well-made arm that holds the cartridge firmly, giving exceptionally clear sound with just a hint of brightness	12g	R	79
Linn Ekos £895	Very Good Very Good	Superb, state of the art design which builds significantly on Ittok's strengths	9g	R	67
Mission Mechanic £900	Good Good +	Nearly right, but inconsistency with level and vague imagery spoil what is otherwise a firm, powerful advocate for black vinyl	11g		55
Moth Arm £78	Good Good +	The ultimate budget arm? Refined, detailed, sweet and natural – performance improves in line with the rest of the system	12g	BB	60
Rega RB300 £115	Good + + Good + +	Despite its modest price this sets exceptional performance standards and could be used on a number of high-quality turntables	10-11g	BB	60
Roksan Artemiz £595	Average Good	Interesting design which works a treat on the Xerxes deck. Fits Rega cut-out. See issue 72 for up to date assessment	8g		67
SME 3009 Series IIIS £182	Good Average +	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009 Series III £253	Good Average +	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009R £335	Average + Average +	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME 309 £495	Very Good Very Good	Beautifully made, finished and presented, this arm is fully and easily adjustable and a highly neutral performer	10g	R	79
SME Series IV £810	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	60
SME Series V £1247	Excellent Very Good	Excellent in terms of design engineering and sound quality, this arm arguably sets a new reference standard regardless of price	10.5g	R	60

\* rating refers to original tested model

## CARTRIDGES

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

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

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

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/type	VALUE	BACK ISSUE FULL REVIEW
Arcam C77 £22	Average + Average +	A sensible moving magnet package with good bounce at a competitive price	6-16g Normal, MM	BB	48
Arcam C77Mg £30	Average – Average	Punchy sound quality with plenty of extra energy to liven things up. The solid body seems well worth the extra £10	4-8g Normal, MM	BB	67
Arcam E77Mg £50	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laid back sound, with good 'scale'	3-8g Normal, MM	R	48
Arcam P77Mg £60	Average + Average +	Cautiously recommended, the P77Mg was preferred to its cheaper partner by virtue of a better tip. Channel balance could have been better	4-9g Normal, MM	R	48
Arcam PMX10 £100	Good + Good + +	Not the very clearest in complex high-frequency sounds, but lively and exciting, good transients.	5-11g Low, MC	R	85
Audionote I02VDH £895	Good Very Good	One of the best, giving 'an extraordinarily relaxing midrange clarity', needs a transformer	8-18g Very low, MC	R	43
Audioquest MC5 £220	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal, MC		54
Audioquest AQ 404i-L £400	Good + + Good +	Slight harshness detracted from the performance of this otherwise clear-sounding and detailed cartridge	8-16g Low, MC		84
Audio Technica AT95E £18	Average – Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48

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## THE DIRECTORY

## CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/type	VALUE	BACK ISSUE FULL REVIEW
Audio Technica AT-420E OCC £31.50	Average Average	Better suited to pop recordings this MM bears some of the sonic hallmarks of the Linn K5	7-14g (damp) Normal, MM	R	67
Audio Technica AT-430E OCC £44.50	Average+ Average	A rising high frequency response yields something of a treble sting, not a good all-rounder	3-7g Normal, MM		67
Audio Technica AT-F3/OCC LE £74	Average+ Good	Though the 'limited edition' badge is a trifle tongue-in-cheek the 'F3' still offers excellent value	8-15g Low, MC	BB	67
Audio Technica AT-F5/OCC LE £106	Average Good+	This latest sample demonstrated some technical weaknesses but its spacious, fluid sound quality still represents a benchmark at this price	4-10g Low, MC	BB	67
Audio Technica ATOC7 £265	Good+ Good+	The OC9 is better if you can afford the extra. But OC7 is at least a taste of the high-end at a sensible price	6-13g Low, MC	R	54
Audio Technica ATOC9 £400	Average+ Very Good	Tonal colours are reproduced faithfully and it rarely puts a foot wrong. Slightly less transparent than more costly MCs but it has got real wellie. Good value (really!)	6-14g Low, MC	R	60
Audio Technica ART1 £800	Good+ Very Good	This is a delicate and very fluid-sounding MC that tracks well, offers very low distortion and exceptionally good stereo separation	9-18g Low, MC	R	72
Cello Chorale £750	Average+ Good	Now available through a new distributor at a saving of some £300, the Chorale is still blessed with a delicate but highly detailed treble. Arm matching is a problem	3-9g Low, MC		72
Denon DL110 £69	Good Good	Firmly recommended as a fine all-rounder, this high-output moving coil model is likely to perform well in nearly all circumstances	6-16g Normal, MC	BB	48
Denon DL160 £89	Average+ Good	Although listeners just preferred the 110 its brother here proved a twin in lab tests and is still "thoroughly competent"	6-16g Normal, MC		43
Denon DL 103 £99	Average Good	This classic spherical stylus model gives a lively sound with powerful bass, and is popular in broadcast studios	6-16g Low, MC	R	48
Dynavector DV-50X £99	Good Average	A high-output MC model with impressive lab performance, but whose tip and sound quality both disappointed	6-14g Normal, MC		48
Dynavector DV10X IV £125	Average Average+	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g Normal, MC	R	48
Dynavector DV23RS £230	Average+ Good	Sound quality was described as "shut-in", lacking energy and sparkle but with some "edginess" in high frequencies	10-22g Low, MC		28
Dynavector XX-1 £680	Good++ Good+	Good, but not immensely competitive at the price, and not helped by comparison with the low output version	7-15g Normal, MC		84
Dynavector XX-1L £680	Good++ Very Good	Very clear, very detailed, no troubles with tracking; response lift around 20kHz seems to do no harm	7-13g Low, MC	R	84
Empire 800 Mk II £33	Good Average	This very high output MM appears to be based on the classic Ortofon VMS series. A trifle uninspiring overall	7-17g Normal, MM		67
Empire MC-5M £110	Average+ Good	A very low compliance renders this MC best suited to heavy tonearms while its sweet, non-aggressive sound quality earns it a recommendation	13-20g Low, MC	R	67
Empire Benz Micro MC-2 £600	Average Good+	Similar to both the Empire MC1000 and vdH MC2 in design, the Benz offers a warmer and very transparent account of the music. Its tracking prowess is slightly limited	5-12g Low, MC	R	72
Glanz MFG 110EX £25	Average Average	A little bright but giving detailed bass and clear treble this was competitive at the price	6-16g Normal, MM	R	Systems
Glanz MFG310-LX £50	Good+ Good++	Detail and treble outstanding for sub-£100 cartridge. Slight coloration may be due to body resonance.	6-10g Normal, MF	BB	85
Glanz MFG610-LX £90	Good+ Good+	Similar to cheaper '310 but slightly clearer transients and bass. Benefits from lowish impedance loading.	3-10g Normal, MF	R	85
Glanz GMC-10EH £50	Good Good	The rising HF trend of this high o/p MC may cause problems in certain systems but with a favourable wind its seductive qualities will win out	8-14g Normal, MC	R	67
Glanz GMC-10LX £80	Average+ Average+	Bearing some of the hallmarks of the '10EH, the '10LX is still less competitive in the sonic stakes	7-15g Low, MC		67
Glanz GMC20E £129	Average Average	You could try hagglng but we thought the makers of this number were demanding too much lucre for their product	3-6g Low, MC		48
Goldmund Clearaudio £1500	Average+ Very Good	Something of a mixed bag overall, its sonic character bears a strong resemblance to the Pradikat though it shares some of the hallmarks of the more expensive Accurate	5-12g Low, MC		60
Goldring 1012 £40	Good+ Good	Slightly harsh sound but plenty of life and quite good detail. Some very high frequency coloration apparent	6-12g Normal, MM	R	85
Goldring 1022 £60	Good+ Good	As with 1012, a touch harsh; detail and transient purity improved, though, and it goes well with electric guitar!	5-11g Normal, MM	R	85
Goldring Elan £16	Average+ Average	A lightweight and frisky-sounding MM that appears to be based upon the same body as the Nagaoka mm4	7-15g Normal, MM	R	67
Goldring Epic II £26	Average Average+	An excellent budget choice though the limitations of the stylus are rather obvious at higher frequencies	5-12g Normal, MM	R	67
Goldring Eroica £100	Good Good-	More confused and coloured than its low-output sibling - high output less of an issue in these days of cheap MC-compatible amplifiers	8-15g Normal, MC		84
Goldring Eroica LX £115	Good+ Good	Not the most subtle cartridge in the world; can sound edgy at times, but lively and informative	8-14g Low, MC	R	84
Goldring Excel £500	Average+ Good	Goldring's most expensive cartridge to date errs on the warm and heavy side of neutral. Strong bass lines are its forte though its ability to resolve subtle treble details is weaker	6-13g Low, MC		72
Grado ZTE + 1 £26.50	Average- Average	Bass and treble are a trifle coloured but the midband proved highly enjoyable. Ideal for budget systems	6-13g (damping) Normal, MM	R*	54
Grado ZF3E + £47.50	Average- Average	Downtilting balance disguises the brightness of this cartridge: bit of a mixed bag at this price	9-20g (damping) Normal, MM	*	54
Kiseki Blue Goldspot £450	Good++ Good+	Good bass and imaging, but hints of spit and coloration let the side down slightly	8-15g Low, MC		84
Kiseki Purpleheart Sapphire £799	Good+ Good+	Rare, beautiful to look at and sweet to listen to, our review of this high-flyer conjured up images of Japanese art	5-14g Low, MC		Collection
Kiseki Blackheart £1795	Good Good	This cartridge demonstrated refined poise and a delicate but at once potent security, however, the price did seem a little on the high side compared to other Kisekis	6-16g Low, MC		60
Kiseki Lapis Lazuli £4000	Good Very Good	Combining very sensible design concepts at a silly price, the Lapis Lazuli is best thought of as combining the detail of the MC3000 and the fluidity of the Clearaudios	4-12g Low, MC		60
Koetsu Black S £612	Average Good+	The S is an OEM design built to Koetsu's blueprint. It features a sturdier fixing plate and offers a brighter, faster and more tactile sound than the earlier K	8-15g Low, MC	R	72
Linn K5 £32.50	Average Average+	Not as crisply focused as the costlier Linn magnetics, the K5 offers a smoother presentation	7-16g Normal, MM	R	67

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# THE DIRECTORY

## CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/type	VALUE	BACK ISSUE FULL REVIEW
Linn K9 £81	Average Good	Linn threw this model into the leading pack by beefing up the Basik's bodywork, adding a super stylus, and keeping the price fair	6-15g Normal, MM	BB	48/Coll
Linn Asaka £299	Good+ Good+	Disciples of Linn who are trying to realise their true "Karma" may find that saving money is not a short cut to heaven	9-18g Low, MC	R	48/Coll
Linn Karma £465	Very Good Very Good	A specialist which is strongly recommended for Linn-based systems; results may be less predictable in more general application	9-18g Low, MC	R	48/Coll
Linn Troika £669	N/a Very Good	Ex-Karma users have been seen with glazed expressions indicating smug self-indulgence the morning after fitting a Troika	8-18g Low, MC		Coll
London Maroon £149	Average Average+	Now manufactured under the London brandname this Decca cartridge is as iconoclastic as ever	9-20g (damp) Normal, MM		67
London Super Gold £300	Poor Average-	Immediate and (in the midrange at least) detailed, but very coloured, very nonlinear and questionable effect on records. Devotees swear by it	9-15g, damp Normal, fixed stylus MM		84
Milltek Aurora £249	Good+ Good+	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	48/Coll
Milltek Olympia £349	Average+ Good+	Warm and detailed sound - packs the punch of the best MCs with high output as a bonus	12-20g (damping) Normal, MC	R	54
Nagaoka MM4 £9	Average- Average-	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal, MM	R	54
Nagaoka MP10 £18	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal, MM	R	48
Nagaoka MP11 Boron £40	Average Average+	Responding well overall in PM's equipment and listening room, this model was mildly criticised for low level and dynamic limitations	5-13g Normal, MM	BB	48
Nagaoka MP11 Gold £47	Average- Average+	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal, MM	R	48
Nagaoka Stilton TS10 £50	Good- Good	Stilton-designed solid body (with three-point mounting) certainly gives remarkably resonance-free sound, but tip and generator are less good - a little rough at times.	5-10g Normal, MM	R	85
Nagaoka Stilton TS11 £70	Good- Good	Differs from TS10 in having Vital stylus with better tracing but still some high frequency harshness.	5-10g Normal, MM		85
Ortofon OM5E £15	Average- Average-	The OM10 is a hi-fi cartridge - the OM5E is not	5-16g Normal, MM		43
Ortofon OM10 £20	Average Average	One of the leading "cheapies", this gives a fine level of sound quality for the price, with good matching compatibility	5-15g Normal, MM	BB	48
Ortofon OM20 £45	Average Average+	This turned out to be the listening panel's favourite among Ortofon's moving magnet models	5-16g Normal, MM	R	48
Ortofon 510 £30	Good Good+	For the price, a good blend of virtues - weight, clarity and neutrality.	3-11g Normal, MM	BB	85
Ortofon 520 £50	Average Average+	Very sensitive to load capacitance this new Ortofon maintains the company tradition for a lively, effervescent SQ	7-16g Normal, MM	R	67
Ortofon 530 £80	Good+ Good+	Very clean and assured sound; transients not quite perfectly pure but plenty of detail.	4-11g Normal, MM	R	85
Ortofon X1 £50	Average Average	The cheaper X1 scored higher marks with our listening panel than the X3, but both were a disappointment	6-15g Normal, MC		48
Ortofon MC10 Super £70	Average Good	"What a delightfully sweet-sounding cartridge this is..." we said	5-15g Low, MC	BB	48
Ortofon X3 £70	Average Average	A lack of bass power, definition and a "zitty" top end makes this competent but 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 Quasar £300	Good+ Very Good	Many of the qualities of the MC3000, although a touch bright. Good detail and delicacy	8-15g Low, MC	R	84
Ortofon MC3000 MkII £850	Very Good Excellent	Low levels of body resonance are a real ear-opener. Nothing to criticise elsewhere: one of the very best	9-16g Low, MC	R	84
RATA RP20 £22	Average- Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g Normal, MM	R	48
RATA RP40 £44	Average Average+	The '40 did a good job of sorting out the layers and complexity of the mix, with good focus, excellent stereo spread and fine scale	6-15g Normal, MM	R	48
RATA RP70 £77*	Average Average+	Clearer and sweeter than the '40 this also seemed heavier and less lively. For £99 you can have a van den Hul stylus	6-14g Normal, MM		43
RATA RP70vdH £99	Average+ Good	Able to retrieve bags of musical detail (thanks to the vdH stylus), RATA's top cartridge ranks as one of the most articulate MM's available	11-18g Normal, MM	R	67
Rega Bias £34	Average Average+	Difficult to mount in some arms due to its shallow build, the bias offers a gentle, 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
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

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## CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/type	VALUE	BACK ISSUE FULL REVIEW
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 VST V £158	Good + + Very Good	Quite exceptional assurance with difficult material; very stable and clear sound. One of the best. Dynamic Stabilizer actually works!	4-11g Normal, MM	R	85
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 MC1 Super £800	Good + + Very Good	Slight softening effect on transients was the only real flaw, but it didn't quite seem to have that special touch one expects for the money	8-15g Low, MC		84
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 ineffectual sound quality that lacks some weight and impetus at very low frequencies	75W, 4 line, 2AV and MM/mc inputs		68
Aiwa XA-005 £130	Good + Average—	A technically competent amp with big, friendly but not overly engrossing sound quality	61W, MM 5 line inputs, source-direct		80
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
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

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NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Audio Innovations Series 1000/2nd Audio Amplifier</b> £1379/£2579	Poor Excellent	This valve combination offered awesome dynamic range with superb transparency and power to match. Compatibility with other brands is unpredictable	15W, MM, 6 inputs, monobloks	R	63
<b>Audiolab 8000C</b> £325	Excellent Good	A well established preamp with a highly controlled sound, though it could do with more life and depth	MM/mc, 5 inputs, hdph, tone controls	R	62
<b>Audiolab 8000A</b> £350	Very Good Good+	Exceptionally detailed, tactile and transparent via CD but slightly more clouded via disc. A stalwart design	72W, MM/mc, 4 line and full record out selection	R	74
<b>Audiolab 8000P</b> £495	Excellent Good+	A dynamic powerhouse, load tolerant and sonically reliable	100W	R	62
<b>Audion CD-1</b> £399	Average+ Good++	Nicely presented valve (line-only) preamplifier with fine bandwidth and enjoyable, musical sound. Great – if you can justify the cost. Well worth hearing	5 line inputs		77
<b>Aura VA-40</b> £189	Average Average+	Based on iTL's earlier MA80, this amp sounded slightly withdrawn or 'dead' if inoffensive	55W, MM 4 line inputs, MOSFET output		80
<b>Beard Audio CA35/P35mkII</b> £695/£895	Fair+ Very Good	Good build quality and a very smart finish combine with a characteristic valve sound to make a first class amplifier capable of giving hours of musical enjoyment	35W, MM/mc, 4 inputs	R	63
<b>Beard 506</b> £1195	Good+ Good+	A versatile valve preamp – the bass sounded lively if a touch softened while the treble was detailed but lacked a little sparkle and air.	4 inputs MM/mc	*	50
<b>Beard M70</b> £1995 pair	Good Good+	A substantial British monoblok power amplifier, but not a great deal more impressive than the P35 at half the price	70W	*	50
<b>Bryston 0.5B/2B</b> £695/£695	Very Good Good	Very rugged Canadian pre/power combo that sounds cool confident and punchy. Headamp available to suit MC cartridges	65W, MM and 4 line sources, overload LEDs on power amp	R	74
<b>Bryston 12B/4B</b> £1295/£1395	Good+ Good	Bryston's massive 4B power amp stood out as the backbone of this combo, the preamp sounding a trifle unbalanced between MM and MC inputs	272W, bridgeable to 800W, 6 line, 2 disc inputs, subsonic filter		68
<b>Cambridge P50</b> £200	Good Average+	A pleasant enough sound with full bass yet with a slightly mechanical quality that reduced its sense of 'naturalness'	56W, 4 line inputs + MM/MC + tone		85
<b>Cello Audio Suite</b> £1200	Excellent V Good/Excellent	Cello's preamp represents a whole new ball game in flexibility and sound quality (or war of attrition on your wallet)	Optional inputs MC etc	R	50
<b>Chord SPM-900</b> £1725	Average+ Good+	Technically very interesting, this mini-powerhouse uses a switched-mode supply to deliver a crisp and refined sound	236W with protection into lower loads	R	85
<b>Concordant Excelsior</b> £856	Good+ Excellent	Cottage industry styling might not inspire confidence, but sonically this preamp is tremendously vivid and detailed. Real high-end performance. We loved it!	MM plus 3 line inputs. External power supply	R	77
<b>Conrad Johnson PV10</b> £1,395	Excellent Excellent	Pricey, yes, but a fabulous preamplifier which confirms C-J's high reputation in the States. Beautiful imaging, superb detail, plenty of gain on the phono stage – classy build quality too.	MM plus 4 line inputs	R	78
<b>Conrad Johnson MV50</b> £1995	Good+ Good+	Coupled with the PV5, this CJ power amp performed well on audition	50W		Collection
<b>Conrad Johnson Motif MC-8</b> £1995	Very Good Very Good	A cheaper alternative to the '7, this preamp is an undoubted success in maintaining the Motif sound but does not compare on sound quality	MM/mc	R	50
<b>Conrad-Johnson Premier Seven</b> £8995	n/a Excellent	Price has increased since we tested it – but at this price who cares? The 'Seven is designed without compromise, and it's clearly one of the finest (valve) preamplifiers money can buy. Absolutely gorgeous!	MM, 4 line inputs, sep. Rec Out. versatile cartridge matching	R	72
<b>Creek CAS 4040 S2</b> £179	Good Good	More neutral than its predecessor tonally, substantial improvements in transparency were also noted, while the lively punchy, character is retained	30W, MM, 4 inputs, tone controls	BB	62
<b>Creek CAS 4140S2</b> £219	Average Good	Disc headroom still poor but the open and detailed, if slightly bright, sound wins through	40W, MM/mc, 3 line inputs, mono and mute	R	80
<b>Creek CAS-5050</b> £399	Average Good	Strong RF IMD compromises the sound of the CD input which contrasts with the delightful performance via MM/mc	72W, MM/mc, aux CD and video + pre/power mode	R	74
<b>Croft Super Micro A</b> £549	Average+ Very Good	The looks are somewhat improved, while this 'hot rod' version with tuned components performed very well indeed. There is still no gain on the line inputs	4 inputs, MM, straight line	R	57
<b>Croft Series IV(S)</b> £850	Good Good	The original IV is still available now supplemented by the higher price and power (S); both are fine performers	40(60)W channel	R	57
<b>Croft Series IVSA</b> £1000	Good Very Good	Featuring tuned components chosen for their sound quality, the 'A' variant is an impressive example of Croft's technique in valve design	60W special supply regulation	R	57
<b>Cyclone Catalyst</b> £1995	Good+ Very Good	Exceptionally load tolerant and very refined in delivery. Extra options available in future	74W, external MM or MC stages, 3 line inputs	R	80
<b>Deltec DSP-50S DPA-50S Pre/Power</b> £725/£925	Excellent Very Good+	Remarkable pre/power combo based around the highly linear DH-0A32 hybrid op-amp. Unmatched detail, resolution, control and transparency	63W, external feedback wiring, 3 line, MM/mc no tone controls	R	68
<b>Deltec DPA 100S</b> £2200	Very Good Very Good	A top-quality transistor power amp, sounding fast, articulate and well controlled, though maybe a touch clinical for some tastes	80W	R	50
<b>Denon PMA-250II</b> £140	Good Good+	Spacious yet tactile and gutsy sound via all inputs. Worthwhile upgrade over original PMA-250	53W, MM 3 line inputs, source-direct	R	80
<b>Denon DAP-2500 PDA-4400A Pre/Power</b> £549/£599 pr	Very Good Good	Denon's fully-fledged preamp also incorporates D/A converters that did not improve the sound of our £299 CD player. The power amps are brilliant!	172W, monobloks Opt/Coax dig + 2 tape, 4 line and MM/mc inputs		68
<b>Denon PDA-6600</b> £1,000/pair	Excellent Very Good	Delivers abundant high quality sound, solid engineering expertise and content clearly compensating for any compromising of purist audiophile principles	250W monoblok, remote power	R	60
<b>DNM 3A</b> From £1000	Good+ Very Good	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art preamp	5 inputs MM/mc twin vol controls	R*	44
<b>E.A.R. 802/509mkII</b> £1098/£1868	Average Very Good	Extremely well made and combining the sonic strengths of both transistors and valves this EAR combo warrants attention	100W, MM, 6 inputs, monobloks	R	63
<b>E.A.R. 549</b> £3,628/pair	Very Good Very Good	A valve monoblok that measures like a solid state amp is itself an achievement, but exceptional power delivery and bass 'slam' is not fully matched by delicacy and transparency elsewhere	200W monoblok, bias setting		60
<b>Exposure VII/VIII</b> £430/£470	Very Good Good	Supplied as a combination without the separate preamp power supply, this pre power combination performed satisfactorily especially on the moving coil input	50W, MM/mc, 3 inputs, straight line		62
<b>Exposure VI/VII*/VIII Pre/Power</b> £320/£500	Good Very Good	An established company like Exposure could do more to improve the 'look' of these amps which, nevertheless, sounded confident, dry and musical. Dual version no longer available	63W, Super mod, 4 line and 2 disc inputs with full rec-out switching	R*	68
<b>Exposure XI/XII/VIII Super</b> £1600	Good Very Good	New preamp and improved power amp led to a smooth and refined sound. MM/mc less transparent than CD	61W, MM/mc, 5 line inputs	R	80
<b>Grant G60AMS</b> £948 pr	Good Very Good	This neat and compact 60W valve monoblok gave good sound on the 8ohm tap, better still on 4ohms. The midrange was particularly natural	60W monobloks 8ohms	R	57
<b>Hafier DH120 kit form</b> £295	n/a Fair	We didn't build one; see below	60W		44

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## AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Hafner XL-600</b> £1,145	Very Good Very Good	Sounds remarkably open, transparent and inherently 'musical'. XL-600 is tremendously powerful and very compatible	426W in stereo mode, 1.5kW in bridge	R	74
<b>Hafner DH120 assembled</b> £360	Very Good Fair	Sound quality results were decent enough, but this power amp won't set the world on fire at this price	60W		44
<b>Harman Kardon HK6100</b> £159	Good Good	Re-packaged version of the popular PM635. Still offers very up-beat and exciting sound	47W, MM, 5 line inputs, tone controls	R	80
<b>Harman Kardon HK6800</b> £600	Good+ Good	Smoother and more evenly paced than previous H/K superamps, this model sounded both confident and nimble. A fine result	115W, 4 line + 2 tape i/p's + MM/MC	R	85
<b>Harman Kardon Citation 25/22</b> £649/£899	Good Average+	Not as outrageous as previous Citation amplifiers but neither as punchy nor exciting in the sonic stakes. A good all-rounder but lacks sparkle	138W, MM/mc full range of input and record out		74
<b>Heybrook C3/P3</b> £400/£500	Average+ Average-	There's a chance our power amp was a dud for the combo sounded very disappointing on the whole — glassy and uncouth	138W with plenty of current. Passive line inputs		85
<b>Jadis JP30/JA30</b> £4,145/£4,200	Fair Excellent	Two-box preamp plus monoblok power amps, classic valve design gives stereotype valve sound. Beautiful build, nostalgic styling and delightful sounding midrange transcend limitations at frequency extremes, in lab, and re cartridge matching	30W 2-box pre-, monoblok power, MM-only, 4 line inputs	R*	60
<b>Jeff Rowland Coherence One/Model 7</b> £3950/£9900	Very Good Very Good	The technical design of these amps is very elaborate but ensures they achieve an extraordinarily transparent and potent sound. However, the CD i/p is clearly superior to the disc inputs	448W monoblok MM/mc with variable loading options. Balanced topology	R	72
<b>Kelvin Labs Absolute Zero/M30</b> £395 + £295/£595pr.	Good+ Average+	Latest versions of the M30 offers a true 30W Class A and a slightly muddled but very comfortable sound. MC preamp is a very linear design	33W monoblok MC only + 4 line inputs. Separate L/r balance	R	74
<b>Kelvin Digital Integrated</b> £550	Good+ Very Good	Not so Class A as before but now fitted with a PDM DAC which offers a smooth, detailed and naturally 'musical' sound	34W, digital, line and MM i/p's only	R	85
<b>Kelvin Integrated</b> £395	Good+ Very Good	A true 20W Class A amp with lush, detailed and very musical sound to match. Watch out for re-style	18W, MM/mc, 4 line inputs	R	80
<b>Kenwood KA-550D</b> £130	Very Good Fair	Having dropped its moving coil input, this latest version has British style dynamics and rhythm but is not first grade yet	35W, MM, 4 inputs, hdph, tone controls	R	62
<b>Kenwood KA-4010</b> £170	Good Average+	A flexible design at moderate cost. Smooth and cultured sound if slightly lean in balance	81W, MM/mc, 4 line inputs, source-direct	R	80
<b>Kenwood KA-5010</b> £210	Good Good	Offers a slightly bass-light but very smooth, fresh and alive sound. Well built and sensibly equipped	101W, MM/mc, cd 3 tape, tuner, aux + direct	R	74
<b>Kenwood KA-7010</b> £300	Average+ Average+	More powerful version of the 5010 but less successful in the listening tests. RF IMD is the likely cause.	123W, as above plus -20dB mute facility		74
<b>Klyne SK5a</b> £2590	Very Good Very Good	Beautifully made and presented this American thoroughbred has a good lab performance, but although versatile, is rather expensive for the quality of sound offered	Balanced output, versatile cartridge loading		72
<b>Lectron JH50</b> £2,300	Average Very Good	Sexily presented valve power amplifier from France. Lovely valve sound too, with delicate and airy top end. Not especially powerful and rather expensive — but very desirable!	50W		78
<b>Linn LK1/LK280 Pre/Power</b> £545/£695	Good Good-	A very modern, logic-controlled amp with distinctive and inoffensive sound quality. Its restrained sound could do with extra insight and zip.	84W, compact amp CMOS sw. for 2 tape, 2 line and MM/mc. xlr sockets.		68
<b>Linx Nebula</b> £500	Average+ Average+	Ambitious both in style and design this amp was less impressive in the sonic arena — positive but two-dimensional	88W, logic-controlled i/p switching		85
<b>Magnum MP150/MF150</b> £320/£320	Average+ Good	This is no technical masterpiece but the strain-free, fluid sound augers well for CD-based systems. Excellent value	89W, 3 line + MM/MC i/p's. No tone cont.	R	85
<b>Marantz PM-50</b> £230	Good+ Average+	One of Marantz's new breed, the PM-50 has a big and beefy sound yet one that lacks refinement	92W, MM/mc, 4 line inputs, source-direct		80
<b>Marantz PM-75</b> £500	Good Average	More successful than most amps with on-board DACs but still not as balanced as other Marantz products	136W, opt/coax dig inputs, 6 line + MM/mc		68
<b>Marantz PM80</b> £400	Very Good Good+	Technically robust with an equally beefy and tactile sound. Great sense of power and control but spatially a little flat	133W, 3 tape, 4 line + MM/MC. Class A option	R	85
<b>Marantz PM94</b> £1,200	Very Good Good	At 23kg the PM94 is no lightweight in either physical or sonic respects. A very powerful and comprehensively equipped amplifier	140W MM/mc tone controls (switchable)		60
<b>Marantz PM-95</b> £1,800	Very Good Average+	Beautifully constructed, this amp was less convincing via its digital i/p than via line. Class A option best suited to sensitive speakers. Costly	151W with 30W available in Class A. Opt + coax inputs		74
<b>Meridian 201/205</b> £599/£425 each	Very Good Good+	A fine preamp with additional luxury option of full system remote, plus competent and attractive monoblok power amplifiers with generally good performance	100W MM/mc 6 line inputs remote capable straight line	R/—	62
<b>Mission Cyrus One II</b> £200	Very Good Very Good	Crisp, meaty and exquisitely detailed, this latest Cyrus amp had us enthralled via CD. MM/MC enjoyed a lesser clarity	34W, 4 line + MM/MC i/p's with dual-conc vol	R	85
<b>Mission Cyrus PSX</b> £230	Very Good Very Good	The PSX does make the Cyrus Two sound better, and also improves the PCM II CD player giving more wallop and clarity	Auxiliary power supply	R*	62
<b>Mission Cyrus Two</b> £330	Very Good Very Good	Also a top performer in its group with fine moving coil and compact disc sound. Since our review Mission has omitted the headphone socket on the Cyrus Two	50W, MM/mc, 5 inputs, straight line	R*	62
<b>Musical Fidelity B1</b> £200	Average+ Good+	The subject of much controversy, this 50W wonder offers a very deep, solid and powerful sound	50W, MM/mc, 5 line inputs, tape monitor	R	80
<b>Musical Fidelity A1</b> £269	Average+ Average+	Just scraping a recommendation, this current A1 sounded lush but sleepy — lacking the bite and sparkle of old	26W with 9W of Class A. 4 line + MM/MC inputs	R	85
<b>Musical Fidelity B200*</b> £349	Very Good Good+	Running cooler than other MFs, the B200 delivered fine musical and dynamic sounds with plenty of power	80W MM/mc 4 line inputs straight line	BB	62
<b>Musical Fidelity A100</b> £459	Good+ Very Good	This is another one recommended for fine sound with which you could keep your Chinese carry-outs warm	50W MM/mc 5 inputs straight line	R	62
<b>Musical Fidelity MA-50</b> £875 pair	Good Excellent	An audiophile bargain. One of the best sounding power amplifiers made	50W, monoblok	R	62
<b>Musical Fidelity P270</b> £1,399	Very Good Very Good	If the hot-box aspect is not a deterrent, this is something of a bargain. A big amplifier scale of sound which is just a little rough-edged	135W	R*	50
<b>Musical Fidelity MVX/A370</b> £2399/£2399	n/a Excellent	In its latest guise, the A370 confirms its status alongside the MVX as amongst the best indigenous components for both sound and presentation	MVX — mm/mc/4 line/phase invert. A370 — 150W	R*	72
<b>NAD 3020i</b> £140	Very Good Good+	The most balanced and communicative of NAD's 3020 series. Great at revealing subtle musical clues without aggression	31W with tone controls, 3 line + MM inputs	R	85
<b>NAD 3225PE</b> £160	Average+ Average+	Light and detailed if not as rich or weighty sounding as others. MM input sounds warmer than CD	42W + 70W dyn. headroom: soft-clipping, MM only	R	68
<b>Naim NAIT 2</b> £339	Average+ Fair	Well built with good load tolerance the NAIT delivered a fully competitive sound in spite of its modest measured power output. Recent modifications as yet unchecked	15W pc MM 3 inputs	R*	50

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NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Naim Separates</b> £560-£8,000	Very Good Good	A consistent and coherent series of 'building blocks' for conventional passive or active operation. Sound quality ignores conventional audiophile standards of presentation, but achieves fine musical communication	40-70W. MM/mc etc	R*	60
<b>Nikko Beta 400/Alpha 800</b> £225/£800	Very Good Good	Big, bold and gutsy these are indetectable amps with a sound quality to satisfy all but the most demanding users	358W(!) with every feature necessary	R	85
<b>NVA P70MC/a60</b> £830	Fair Average+	NVA's speaker cables are a must. the amp offering well-integrated but not particularly crisp sound	68W. MC. 3 passive line inputs		80
<b>Oakley S</b> £499	Good Very Good	Much improved version of the original Image preamp from Yugoslavia. This one won't disgrace itself even in top-notch systems. Image Six model (£150 more) is really fabulous	MM plus 3 line inputs	R	78
<b>Onkyo A-8000</b> £140	Good+ Good+	A rare combination of style, features and very acceptable sound quality. Free of compression and 'grain' — undemanding	64W. 5 line + MM disc i/p's + full tone cont.	R	85
<b>Orell SA-040</b> £359	Good Good+	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/mc. 4 line inputs, straight line	R	56
<b>Orell SA-040SE</b> £400	Average Average+	Very natural, relaxing if not overly exciting via CD, the sound closed-in to become 'pinched' or fettered via disc	64W. 5 line + MM/MC i/p's. Tweaky compts.		71
<b>Philips FA-880</b> £200	Good Average	A new and cheaper design from Philips that sounds best via MM disc. Can appear soft and unbalanced via CD	108W. MM/mc source-direct tone		74
<b>Philips FA960 MkII</b> £300	Good+ Average	The MkII '960 still failed to grasp our listeners' attention but it remains a competent amp nonetheless	122W. 6 line & 2 disc inputs + tone controls		68
<b>Philips DFA-888</b> £300	Good Average	As above but including a modified disc input and onboard DAC. Sounds tight but also slightly thin	107W. as above + opt and coax digital inputs		74
<b>Pink Triangle PIP</b> £2670	Excellent Excellent	This state-of-the-art preamp is one of the few truly high end products to come out of this country this year. It will most certainly worry the competition	MM/mc. 4 inputs, battery supply	R	62
<b>Proton 520</b> £115	Average Average	Very well equipped budget amp with a slightly flat and undynamic sound — acceptable at the price though	31W. MM/mc with variable MC gain. 4 line inputs	R	74
<b>Proton AP-1000/AA-1150</b> £250/£395	Good+ Average+	Bags of headroom available from this pre/power combo, but can seem bloated or unrefined via MM	67W. MM/mc. adjustable MC gain. 5 line inputs		80
<b>QED A240 CD II</b> £199	Good+ Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	62
<b>QED A240 SA II</b> £259	Good+ + Good+	Redesigned 240SA represents a significant allround improvement over its predecessor, and provides a good moving-coil disc input in a competitive price	45W MM/mc 5 line inputs straight line	BB	62
<b>QED A270</b> £299	Good— Good+	Building on the strengths of the '240, the '270 sounds weighty, fast and dynamic. A bit 'lumpy' via MC	51W. 5 line and 2 disc inputs, pre-out	R	68
<b>QED C300/P300</b> £300/£300	Good Good	A cost-effective combo, limited in its resolution but no less beguiling as a result. Disc stage is sweeter but samey	58W. 2 tape, 3 line, MM/MC + mono/biamp opt	R	85
<b>Quad 34</b> £299	Very Good Fair	This well-built durable preamp has useful filtering and above average tone controls but was found lacking in sound quality (viz: detail/dynamics)	4 inputs MM/mc tone controls		44
<b>Quad 405</b> £389	Very Good Fair	Not an impressive power amp but easy on the ear if not pushed and very reliable	100W		44
<b>Ray Lumley Model 75</b> £1,995 pr	Average Good+	Monstrous valve monoblocks which represent good value. What they lack in musical subtlety they make up for in sheer muscle. And these are Lumley's small monoblocks!	75W monoblok		78
<b>Revox B150</b> £1,047	Very Good Average+	Beautifully constructed but hampered by Revox's convoluted logic control. Open and smooth sound. Still costly.	117W. CMOS sw. for 3 line, 2 tape and MM		68
<b>Revox B250</b> £1,467	Very Good Good	With much improved sound over its predecessors plus amazing remote control facilities, this could form the heart of a round-the-dream-house system	150W MM/mc system/house remote tone controls		56
<b>Rose RV-23</b> £395	Good Very Good	Beautifully built classy British 'hybrid' preamplifier. You can spend more to get a more transparent sound — but it's hard to criticise the Rose given the competitive price	MM plus 3 line inputs	R	77
<b>Rotel RA810A</b> £120	Very Good Fair	As a cut price RA820AII this is a very successful little amp that loses little in sound quality to its predecessor. Excellent value	20W. MM. 5 inputs, hdph, tone controls	BB	62
<b>Rotel RA-820AX</b> £150	Very Good Very Good	The spacious, detailed and very musical performance of this budget amp is almost too good!	47W. MM. 4 line inputs	BB	80
<b>Rotel RA-840BX4</b> £190	Good+ Good+	Very authoritative but creamy-smooth and delightfully musical. Spatially convincing too, yet not as open as RA-820AX	39W. 4 line + MM/MC. dual-conc. volume. No tone	R	85
<b>Rotel RA870BX</b> £330	Very Good Good+	A powerful blockbuster with solid and well focused sound, good versatility and fine load tolerance	85W MM/mc 7 line inputs tone controls	R	56
<b>Rotel RB/RC850</b> £160/£140	Good+ + Good+	Quality separate pre and power amplifiers at near budget integrated amplifier prices. A notable achievement	60W MM/mc 4 line inputs tone controls	BB	62
<b>Rotel RC-870BX/RB-870BX Pre/Power</b> £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
<b>SAE P102/A202</b> £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
<b>Sansui AU-X911 DG</b> £480	Very Good Good+	At its best when used with the on-board MASH/PWM DAC where it sounds technically neutral but still emotionally charged	112W. 4 dig. 3 line and MM/MC i/p's. Rec-out	R	85
<b>Sony TA-F410R</b> £170	Average+ Average+	Over-zealous protection circuitry limits continuous power but sound is still agreeably focused despite being tonally lean	84W. 2 tape, 3 line + MM i/p's. Tone + Rec-out		85
<b>Sony TA-F630ESD</b> £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
<b>Sony TA-F730ES</b> £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
<b>Sumo Athena/Polaris</b> £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
<b>Teac A-X400</b> £115	Average Average	Sibilance and a lack of crisp vitality hamper the performance of this amp, as does the stringent protection circuitry	59W. 4 line + MM + tone + mic i/p level control		85
<b>Technics SU810</b> £130	Average+ Average	Our sample started off sounding fast, taut and well-integrated yet eventually failed on the MM disc input	66W. 2 tape + 3 line + MM. Tone + loudness cntrl		85
<b>Technics SU-V660</b> £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
<b>Technics SE-M100</b> £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 and direct CD no MM or MC disc	R	74
<b>Yamaha AX-330e</b> £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

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# THE DIRECTORY

## AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>YBA Model 3 pre/power</b> £995/£995	Good Good	Suited to highish sens. loudspeakers this duo produced see-through, ethereal stereo images that were more convincing towards the centre of the soundstage than at the edges	56W stereo amp MM only with 3 line i/ p.s. Separate L/r volume controls		72
<b>YBA 2 pre &amp; pwr</b> £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
<b>YBA 1 preamp</b> £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
<b>YBA 1 power amp</b> £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
<b>Acoustic Energy AE1</b> £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
<b>Acoustic Energy AE2</b> £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
<b>Acoustic Energy AE3</b> £1650	Very Good Very Good	Solid, authoritative and impressively accurate – if a shade ponderous and slow – AE's latest 'big one' is a much better bet than the earlier '4, combining traditional monitoring virtues with the latest metal diaphragm technology.	63 x 26.5 x 37cm low stands in free space	85dB/w 23Hz (in room)	R	86
<b>Acoustic Energy AE4</b> £1800 (stands £552)	Good Good	Magnificent but also seriously flawed, the AE4 possesses tremendous dynamic realism but a very mid-dominant balance. Large rooms and wallets only need apply.	54 x 32.5 x 44cm own stands in free space	90dB/w 40Hz		71
<b>Acoustic Research Red Box</b> £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
<b>Acoustic Research AR112</b> £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
<b>Acoustic Research AR122</b> £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
<b>Acoustic Research AR132</b> £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
<b>Alexander SE5</b> £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
<b>Alexander SE11</b> £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
<b>Allison AL105</b> £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
<b>Allison CD6</b> £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
<b>Alphason Amphion</b> £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
<b>Alphason Orpheus</b> £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
<b>Apogee Caliper Signature</b> £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
<b>Arcam Three + *</b> £150	Average + Average—	Arcam's baby speaker did not delight our listeners, but it might do better in less expensive systems	34 x 18 x 23cm close to wall at head height	88.5dB/w 95Hz		53
<b>Arcam Alpha</b> £199	Good Good	It has its own colorations to be sure, but delivers a fine room balance with unusually good dynamics, timing and 'life', and is fine material value for money as well	46 x 26.5 x 26cm stands close to wall	89dB/w 30Hz (in room)	BB	82
<b>Arcam Two + *</b> £280	Good Average	Most things to most men this compact is unlikely to disappoint with its lively "ballsy" character though lacking weight... a bit	38 x 23 x 28cm near wall shelf or 40cm stands	88dB/w 55Hz		59
<b>Arcam One +</b> £380	Good Average	Provides a solid, weighty and rich sound, but is a little raw in the treble and indefinite in the midband	22.3 x 28.1 x 37.8cm open space, on stands	88.5dB/w 60Hz		59
<b>Ariston Image</b> £180	Average— Average—	Despite a sweet treble character, the Image fails to impress with a 'lumpy' over-rich balance that has room integration problems	42 x 22 x 27.5cm stands in free space	89dB/w 28Hz (in room)		82
<b>Ariston Q</b> £395	Average + Average	The prettily shaped Q delivers a good impression of scale from a small box, but the rather laid back, ponderous and over-rich overall sound engendered little enthusiasm amongst the listening panel.	35 x 16.5-25 x 20-27cm high stands in free space	85dB/w 30Hz (in room)		86
<b>ATC SCM20</b> £1320	Very Good Good +	Massively built to no-compromise Pro monitoring standards, the SCM20 is invariably informative but the rather forward presentation is a mite uncomfortable too. Needs a big amplifier and sadly lacks a bi-amp option.	44 x 24 x 31cm stands close to rear wall	82dB/w 28Hz (in room)		86
<b>Audio Electronics TC10 II</b> £599	Good— Good +	Oddball appearance is rescued by a respectable technical performance, interesting and impressive engineering and fine sound quality at a realistic price.	70 x 33.5 x 33.5cm low stands in free space	87.5dB/w 40Hz	R	68
<b>Audioplan Kontrapunkt</b> £799	Good Good +	Cute little German miniature sounds as sweet as it looks, dressed expensively in real wood with matching stands. Not for bass or loudness freaks	31 x 24 x 13cm matching stands in free space	83dB/w 48Hz (in room)	R	86
<b>B&amp;W Vision DS1</b> £99	Average Average—	Although significantly hampered by upper bass cabinet coloration, the DS1 cleverly combines high sensitivity with a rich and generous soundstage	36 x 21 x 19cm stands quite close to wall	91dB/w 40Hz (in room)	R	82

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## LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
<b>B&amp;W Vision DS2</b> £150	Average Average—	Although the box is generous for the price, the DS2 is a rather uneven performer, both on measurement and listening. Careful stand selection and placement is needed to control the enthusiastic mid bass.	50 x 24 x 25cm stands in free space	89dB/w 43Hz (in room)		86
<b>B&amp;W DM550</b> £149	Good+ Average—	Beautifully presented, well engineered near-miniature with precise sound but a distinct lack of 'welligie'. Ideal for considerate flat dwellers	35 x 20.5 x 22.5cm stands in free space	86dB/w 70Hz		71
<b>B&amp;W DM560</b> £200	Average+ Average—	Fine cosmetic presentation and good engineering for the price; overload protection may be handy but listening panel was underwhelmed	49 x 23.5 x 30cm stands in free space	88dB/w 55Hz		66
<b>B&amp;W CM1</b> £345	Good Average	Cleverly thought out luxury design package is also fundamentally well engineered, if a shade pricey on 'sound for pound' basis	24.5 x 16 x 22cm close to rear wall	84dB/w 90Hz		74
<b>B&amp;W Matrix 801</b> £2500	Good+ Good+	Lacks the transparency of the best panels, and the drama of the best dynamics, but is something of an acoustic tour de force, with low coloration and fine stereo imaging	77/99 x 56 x 43cm floor or stands, free space	86dB/w below 20Hz (in room)	R	81
<b>Bose Interaudio 3000XL</b> £150	Average Average—	Lots of perceived value and well enough balanced, but low cost cabinet and driver engineering results in a crude and unsubtle sound	46.5 x 29 x 23cm stands in free space	89dB/w 45Hz		71
<b>Bose 305</b> £350	Average Good—	A bit of an oddball, fine dynamic liveliness and a good room match more than make up for the strange stereo imaging and treble	28 x 45 x 23cm high stands near wall	88dB/w 40Hz (in room)	R	78
<b>Bose 901 MK6</b> £1600	Good Average	Still controversial after all these years, the pre-equalised multi-driver 901 is cleverly engineered to deliver exceptional loudness with a modest amplifier, but mid bass tends to dominate the sound and transparency is notably lacking.	33 x 54 x 32cm rigid stands in free space	(92dB/w midband) 28Hz (in room)		86
<b>Boston A120</b> £349	Average+ Good—	Ugly but cleverly engineered, the 120 combines a tiny main driver with much larger ABR to give a generous, bighearted and lively sound despite little genuine bass extension and a few rough edges.	62.5 x 31.5 x 25cm stands in free space	89dB/w 48Hz (in room)	R	86
<b>Boston A4011</b> £120	Average Average—	Competent performance for size and price but below average relative to the UK competition	34 x 21 x 20cm on stands near wall	88.5dB/w 63Hz		41
<b>Boston Acoustics T830</b> £399	Good Good	A lot of speaker for the money, the T830 is a smooth and accomplished performer with a big and easy – or alternatively a lazy and laid back – sound	82.5 x 25.5 x 24cm floor, away from walls	91dB/w 28Hz (in room)	R	82
<b>Castle Clyde</b> £159	Average+ Average	A tidy little performer packing punch, but beginning to show its age in the light of new competition	37 x 21.5 x 22cm open space on stands	89.5dB/w 64Hz	R	46
<b>Castle Warwick</b> £179	Good Average—	Excellent presentation and fine engineering with overload protection, but a sonic disappointment in bass and dynamic qualities	46.5 x 25 x 23cm stands 1ft from rear wall	88dB/w 50Hz		66
<b>Castle Durham</b> £209	Average+ Average	Listening results were encouraging, well engineered and finished, but lean on treble and a bit weak on bass; still recommended	41 x 21.5 x 25cm near rear wall	89dB/w 67Hz	R	46
<b>Castle Pembroke</b> £229	Good Average+	Comfortably recommended, a sweet smooth sound with good overall balance of engineering-based performance	55 x 37.5 x 30.5cm open space on stands	88dB/w 46Hz	R	31
<b>Celef Cirrus</b> £180	Average Good	It's nice to see Celef back in the UK, with this decent sounding small reflex box that seems unusually tolerant of siting	39 x 20.5 x 23cm stands in free space	84dB/w 60Hz	R	66
<b>Celef CF2 Nimbus</b> £230	Good— Good—	Nicely balanced overall but a little uneven with it, this lively and dynamic large bookshelf model came close to Recommendation	46 x 25.2 x 24cm stands in free space	88dB/w 55Hz		71
<b>Celestion 3</b> £109	Average+ Average	This attractive little wall-mount gives good balance and stereo imagery, with a character which leans more towards inoffensiveness than excitement	31 x 18.5 x 21cm high stands against wall	86dB/w 55Hz (in room)	R	78
<b>Celestion DL6 Series Two</b> £159	Good Average	Good tonal colouring and plenty of bass for the enclosure size; the metal dome tweeter is excellent, but bass and mid lack clarity and 'bite'	45.4 x 24.5 x 26.2cm near wall, on stands	87dB/w 65Hz		59
<b>Celestion DL8 Series Two</b> £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open, stands	87.5dB/w 60Hz	R	59
<b>Celestion SL12Si</b> £579	Average Average	Careful setting up does reveal elements of fine sound quality, but this 'grown up' SL6 variation has a lumpy response alongside its improved power handling	53 x 20 x 27cm matching stands clear of walls	85dB/w 50Hz		66
<b>Celestion SL600Si</b> £799	Good+ Good	This Aerolam high tech miniature has certain remarkable qualities that some will find irresistible, but needs careful system and room matching.	27 x 20 x 23cm matching stands in free space	82dB/w 52Hz		68
<b>Celestion SL700</b> £1349 inc stands	Good Good	Very sophisticated, mostly smooth and accurate transducer, with fast but not very deep bass and a rather bright treble	37.5 x 20 x 23.5cm free air on tall stands	83dB/w 45Hz		60
<b>Celestion 6000</b> £1470	Very Good Very Good	A genuine fullrange audiophile quality speaker system – with Star Wars styling to suit a high tech environment	Complex, on floor in free space	82.5dB/w	R	60
<b>Cyrus 781</b> £250	Average+ Good	Properly run in, the pretty little 781 delivers a fast, dynamic and informative sound which more than justifies its price. Take care to adjust placement to suit room and system.	43 x 22.5 x 28cm matching stands 1ft from wall	88dB/w 28Hz (in room)	R	86
<b>Doxa 5 – 2</b> £900	Average Good	The high sensitivity and seductive midband makes an obvious partner for valve amplifiers, though obtaining a good room match may prove a little tricky	98 x 21 x 28cm floor well away from walls	91dB/w 30Hz (in room)	R	82
<b>Duntech PCL500 Marquis</b> £3998	n/a Very Good	Better value for money than the Crown Prince – and arguably more dynamic, with real bass 'slam' – but a little less refined in the higher registers	147.5 x 27 x 40 free standing away from walls	92dB/w 48Hz	R	65
<b>Duntech PCL1000 Crown Prince</b> £6120	n/a Very Good+	Immensely 'listenable', refined sounding speaker capable of creating lifesize musical images. Not overly transparent to source, but very civilised nonetheless	180 x 30.5 x 43.5 free standing away from walls	90dB/w 42Hz	R	72
<b>Goodmans Maxim Two</b> £90	Average+ Average	More wham-bam-thankyou-mam sound that imitates much bigger speakers when you let these babies yell. (A well-controlled yell)	26 x 17 x 19cm near wall on shelf or stand	86dB/w 85Hz	BB	59
<b>Goodmans B-Max/Maxim Two</b> £90 + £90	Poor Average—	Stick with the Maxims on their own until you can afford some real grown up loudspeakers	60 x 21 x 26 + see above, suck and see	89dB/w 55Hz (in room)		78
<b>Goodmans M100</b> £79	Average+ Average—	Effectively a Maxim on the cheap, the M100 measures more smoothly but sounds somehow less involving than its more famous stablemate.	20 x 17 x 26cm close to rear wall	85dB/w 50Hz (in room)	R	86
<b>Goodmans M300</b> £99	Average Average—	Conveying much of the charm and life which has made the Maxim 2 so popular, the M300 is sensitive, but also significantly hampered by upper bass cabinet coloration	38.5 x 21.5 x 17cm stands close to rear wall	89dB/w 50Hz (in room)	R	82
<b>Harbeth LS3/5A</b> £343	Good Average	Still a classic miniature, though not to every taste, and none the better for the recent update under our listening conditions. Limited dynamic range	30.5 x 19 x 16cm stands in free space	81dB/w 60Hz		66
<b>Harbeth HL Compact</b> From £539	Very Good Average	The clean and neutral sound lacks resolution and gives rather 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
<b>Heco Interior 90S</b> £159	Good Average—	Neatly finished and engineered miniature, but the disappointingly 'lifeless' sound left the listening panel decidedly underwhelmed	27 x 18 x 16cm on high stands	87.5dB/w 90Hz		74
<b>Heco Interior 120</b> £169	Good Average	Drab appearance belies a lively enough character, though the balance is altogether a bit bright for UK tastes	32 x 23 x 23cm high stands against wall	88dB/w 50Hz (in room)		78
<b>Heco Interior 430s</b> £429	Good Good—	This tall floorstanding enclosure delivers an impressively even sound balance with good bass extension, if not the lively dynamics to satisfy enthusiasts	85 x 24 x 27.5cm free space	88dB/w 43Hz	R	71

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## LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
<b>Heco Superior 740</b> £599	Good Good—	A similar sonic package to the cheaper Interior 530, these Superior clothes are very pretty indeed, though spikes are still awaited	84.5 x 22 x 25cm on floor in free space	88dB/w 30Hz (in room)		78
<b>Heco Superior 940</b> £1000	Good Good	This large and beautifully finished floorstander has an impressively smooth and attractively transparent midband. Bass is well extended but follows rather than drives the music along.	110 x 26 x 31.5cm free space	88dB/w 20Hz		86
<b>Heybrook Point 5</b> £139	Average Average	"Uncouth yet still satisfying", the Point 5 gives good dynamics and bass for a compact wall-mount, but is burdened by a somewhat unhappy treble	37.5 x 23 x 24cm high stands against wall	85dB/w 32Hz (in room)		78
<b>Heybrook Point 7</b> £185	Average Average	Physically an attractive package, but not entirely convincing in lab or listening panel test; interesting for all that	40.5 x 23 x 23cm stands against rear wall	85dB/w 60Hz		68
<b>Heybrook HB1</b> £199	Good Average+	No longer an over-bright character, a strikingly clear sound and fine transient performance now merits recommendation	47 x 29 x 23cm on stands near wall	88dB/w 61Hz	R	46
<b>Heybrook HB100</b> £255	Average+ Good	Well matched for wall 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
<b>Heybrook HB150</b> £319	Average Good	Convincingly communicative but a bit colored and congested, this lively compact wall-mount is nicely finished but a little costly for the content	40.5 x 23 x 22cm stands close to rear wall	89dB/w 42Hz (in room)		82
<b>Heybrook HB200</b> £399	Average Average	This luxury successor to the HB2 is lively and informative, but sounded insufficiently balanced to convince our listening panel	46 x 23 x 26cm stands against rear wall	87dB/w 55Hz		66
<b>Infinity RS2001</b> £180	Average Average+	A little coloured and unruly in the treble, the 2001 nevertheless retains the lively dynamic bounce of its predecessor; pity the price has gone up	36.5 x 22.5 x 20cm lightweight stands	87dB/w 50Hz (in room)	R	78
<b>Infinity Kappa 6</b> £795	Good Good	Interestingly styled US loudspeaker has unusual high tech drivers and good neutrality, but the sound seriously lacks excitement	63 x 38 x 24cm stands, free space	85dB/w 35Hz		66
<b>Infinity Kappa 8</b> £1850	n/a Good++	Very nicely made and unobtrusive but large four-way speakers which have a tendency to sound bass heavy unless used with solid core cables	118 x 51.5 x 17.5cm floor standing, open space	89dB/w 33Hz		72
<b>Infinity Modulus</b> £695	Good Average+	Luxury high-tech miniature is carefully conceived and beautifully executed. Undeniably attractive in the midrange and treble, the Modulus failed to handle the bass end of the spectrum as successfully.	30 x 18 x 26cm high stands 1ft from wall	84dB/w 45Hz (in room)		86
<b>Jamo Concert 2</b> £230	Good Average—	A thoroughly respectable 'bookshelf' performer that needs free space siting but includes attractive cabinetwork and a neat grille	41 x 24 x 25cm stands in free space	85dB/w 48Hz		66
<b>JBL TLX12</b> £149	Good— Average	This smart near-miniature has a 'boppy', lively bottom end, but beware of the fizz in its top	37 x 23 x 23cm stands 0.5m from rear wall	87dB/w 55Hz	R	71
<b>JBL LX33</b> £259	Average+ Good	A bit of a cheat, but a lot of speaker for the money, which manages a better room balance than many 'large bookshelf' rivals, and delivers a fine acoustic performance	80 x 25 x 21cm floor, 1ft from wall	89dB/w 48Hz	R	82
<b>JBL LX44</b> £340	Good— Average	This generously built model offers good power handling, bass extension and dynamic range, but suffers from the 'three-way syndrome', with middle muddle	58.5 x 30 x 29cm stands in free space	89dB/w 40Hz		71
<b>JBL XPL 90</b> £699	Good Average+	Though undoubtedly pretty and very expensively engineered, this elaborate near-miniature didn't really convince our listeners that it could deliver a sound quality to match its elevated price.	39.5 x 24 x 24cm stands in free space	85dB/w 45Hz (in room)		86
<b>JPW Minim</b> £79	Average+ Average—	Very civilised but dynamically limited, the Minim is well suited to the smaller room and where limited loudness is acceptable	27.5 x 18 x 19.5cm stands against wall	85dB/w 28Hz (in room)	R	82
<b>JPW Sonata</b> £99	Good Average+	Well balanced and integrated, this near-miniature offers fine sound if limited bass and dynamic range, plus real tree wood at a nearly silly price	32 x 23 x 20cm stands near rear wall	86dB/w 55Hz	BB	71
<b>JPW P1</b> £139	Good Average+	Honest and basically articulate if not very sophisticated, resolution is good but it can sound a little wearing in bright systems or with rough sounding material	44 x 25.9 x 26.1cm free space on stands	89dB/w 60Hz	R	59
<b>JPW AP2</b> £165	Good Good	Few grounds for criticism but purchasers should check out the treble qualities to avoid hammering the ear anvils	46 x 26 x 25cm 40cm from wall on 45cm stands	89dB/w 65Hz	R	53
<b>JPW AP3</b> £219	Good Average+	Pretty good stereo and well balanced overall it had its own character which is well suited to vinyl replay	52 x 25 x 29.5cm near wall on stands	90dB/w 57Hz	R	46
<b>JRT AD1</b> £500 (stands £100)	Average+ Good+	A most auspicious Choice debut for relative newcomers JRT. A fair share of cosmetic deficiencies do little to spoil the impressive coherence and timing that makes this beautifully finished and generously proportioned model so enjoyable.	59.5 x 28 x 36cm own stands close to rear wall	86dB/w 28Hz (in room)	R	86
<b>KEF C15</b> £99	Good Average	One of the tiniest around delivers a surprisingly 'big' and well balanced sound, with excellent stereo from free space siting	26.5 x 18 x 14cm stands in free space	85dB/w 60Hz	R	71
<b>KEF C25</b> £139	Average+ Average—	Very safe and competent, but rather short on inspiration, the '25 lacks the brio and flair of its smaller C15 brother	34 x 20.5 x 17cm high stands near wall	87dB/w 60Hz (in room)		78
<b>KEF C45</b> £199	Good Average—	Conventional and competitively priced, C45 delivers an impressively consistent and competent sound. As one listener commented: "Offensively inoffensive . . . whether it be love or loathing, give me some emotion".	47.5 x 28 x 24cm uncritical	87dB/w 30Hz (in room)		86
<b>KEF C55</b> £219	Good Average+	Similar to but less good value than C75, the '55 provides Uni-Q stereo stability but not real wood veneer or good low frequency room match	48 x 24.5 x 25cm stands, free space	91dB/w 30Hz (in room)		82
<b>KEF C75</b> £349	Good Good	Compact floorstanding model's Uni-Q driver provides fine crossover integration, giving stable stereo and fine dynamic range within a slightly 'rich' balance	72 x 24.5 x 25.5cm floor in free space	90dB/w 45Hz	R	71
<b>KEF R102</b> £365	Very Good Very Good	High class near-miniature with expressive, articulate midband and clean, accurate bass and top. The sound quality of the Kube circuitry, however, is suspect	33 x 20.7 x 26.3cm near wall or open on stands	89.5dB/w 60Hz	R	59
<b>KEF C95</b> £599	Good Good	Rich and lazy, but nonetheless very endearing in a cosy sort of a way, the '95 is a lot of speaker for the money, and delivers a big sound with grace and subtlety	88.5 x 24.5 x 31cm floor in free space	90dB/w 28Hz (in room)	R	78
<b>KEF 103/3</b> £680 inc. stand	Good+ Good	Technically impressive, excellent bass/power handling for size, but not for the audiophile system. Better among cheaper components, and good in a large room	56 x 27 x 30cm supplied stands free space	90-95dB/w 35Hz		53
<b>KEF 104/2 (inc. KUBE equaliser)</b> £895 (£994)	Very Good Good++	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound levels	90 x 28 x 41.5cm floor standing in free space	92dB/w 50Hz	R	60
<b>KEF 107</b> £2025	Very Good Good+	A welcome sense of ease and lack of strain at most normal levels. Minor criticisms included a dulling in the extreme treble. Excellent bass extension	116.5 x 33 x 45cm on floor in free space	87.5dB/w 20Hz	R	60
<b>Linn Helix</b> £279	Average+ Good	Attractive presentation is coupled with an attractively lively sound which is more neutral if less committed than earlier Linn loudspeakers	51 x 25.5 x 28cm stands 1ft from rear wall	88dB/w 53Hz	R	66
<b>Linn Kan 2</b> £339	Average+ Average+	A niche product for those prepared to tolerate its strong character for the sake of its fine bass performance and near invisibility	30.5 x 18.5 x 16.5cm Kan stands against wall	82dB/w 35Hz (in room)		78
<b>Linn Nexus</b> £379	Good Average	Good features include a solid, meaty bass plus good imagery and tonal balance. The catch is that Nexus lacks resolution and timing	49 x 23.5 x 30.4cm near rear wall supplied stands	89dB/w 60Hz		59

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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 MG11a £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	Priced but easy on the ears and worth considering especially where space is at a premium	38.5 x 18 x 32cm free space on stands	Active 40Hz		46
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
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 MS3.40 £230	Average+ Average	It looks pretty and sounds civilised, but the 3.40 failed to ignite any degree of enthusiasm amongst our listeners. Low frequency stand and room matching is a bit tricky.	57 x 23.5 x 27.5cm stands in free space	87dB/w 30Hz (in room)		86
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
NAD 8225 £150	Good Average+	Notwithstanding lacklustre styling and an unprepossessing appearance, this NAD miniature has a smooth and even midband plus an appealing overall jauntiness. The whole turns out to be worth more than the sum of its parts.	34 x 20 x 18cm stands close to wall	87dB/w 45Hz (in room)	R	86
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 c0.5m from wall	85dB/w 52Hz	R	71

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<b>NVA Cubix</b> £1,100	Average Good	Too idiosyncratic for formal recommendation, the Cubix possesses remarkable bass extension for its size, but is tricky to optimise and has some aggressive tendencies	60 x 32.5 x 32.5cm low stands against wall	88dB/w 20Hz (in room)		78
<b>Opus 3 Credo</b> £399	Average Average	Credo's odd-shaped silicate-based cabinet confers good box and bass performance, but the sound could be more neutral for the price	32 x 28 x 32cm stands in free space	88dB/w 65Hz		74
<b>Opus 3 Capella</b> £599	Good Good	The sound of this Scandinavian curiosity certainly benefits from the crushed marble enclosure, though presentation is strictly DIY	32 x 40.5 x 26(ave)cm amongst books in bookcase	86.5dB/w 45Hz		66
<b>Pearl &amp; Oakley Victoria 200</b> £1099	Average— Average—	Extraordinary – and to many very attractive – ‘ginger jar’ presentation in Staffordshire ceramics, but let down by need for further acoustic and mechanical development	93 x 33 x 33cm on floor in free space	87dB/w 30Hz (in room)		78
<b>Philips FB815</b> £230	Average Average	An impressively – indeed imposing – physical package for the price, clever engineering gives a very competent if slightly hard and brittle sound quality that somehow lacks genuine authority.	63 x 27 x 27cm low stands in free space	85dB/w 30Hz		86
<b>QLN Model One</b> £700	Good Average	Similar to Signature at two thirds the price, Model One exaggerates the latter's rich and heavy midbass and lacks its velvet smoothness	35 x (16-25) x (21- 27)cm pillar stands, free space	85dB/w 28Hz (in room)		82
<b>QLN Signature</b> £1,100	Good Good	Beautiful but expensive luxury compact has a rather laid back and ‘heavy’ sound, but coloration is low and stereo imaging very good	37 x 18 x 36cm heavy stands in free space	83dB/w 30Hz (in room)		78
<b>Quad ESL-63</b> £1690	Good+ Good++	With its unusual but subtle characteristics this classic electrostatic may not be punchy in the bass, but has strengths that some cannot live without	92 x 66 x 27cm open stand well clear of wall	84dB/w 34Hz	R	60
<b>Richard Allan CD5</b> £184	Average— Average—	This neatly presented small reflex design can sound engagingly communicative, but is flawed sonically and technically and quite expensive too	38 x 19 x 23cm on rigid stands	88dB/w 80Hz		68
<b>Rogers LS2a</b> £180	Average Average	Provides very good engineering and stereo performance for the price, alongside some ‘boxiness’ and certain dynamic constraints	36 x 23 x 21cm low stands 1ft from wall	88dB/w 50Hz (in room)		82
<b>Rogers LS4a</b> £219	Good Good—	This artfully voiced and well balanced compact gives a fair flavour of the classical ‘BBC sound’ at a very reasonable price	43 x 25.5 x 24.5cm stands 1ft+ from wall	87dB/w 32Hz (in room)	R	78
<b>Rogers LS6a</b> £285	Good Good	Stereotypically a Rogers model with impressively even balance, prospective purchasers will have to weigh the fine midband naturalness against slightly lazy dynamics and timing.	51 x 27.5 x 28cm stands in free space	86dB/w 25Hz (in room)	R	86
<b>Rogers LS7t</b> £399	Good+ Good+	A fine combination of classic qualities at reasonable price produces the “R” tag, but try to get a pair home on approval to check for bass ‘heaviness’	56 x 27 x 28cm free space on 40cm stands	88.5dB/w 48Hz	R	59
<b>Rogers Studio 1a</b> £579	Very Good Good—	The classic BBC monitor style sound sensitively updated – transparent and natural with fine stereo, but a touch ‘heavy’ in balance	63.5 x 30.5 x 30.5cm stands in free space	87dB/w 36Hz	R	66
<b>Roksan Darius</b> £1395 (+ £345 integral stand)	Good Very Good	New totally realigned, the current Darius provides an exceptionally impressive combination of transparency and delicacy with fine information retrieval and speed. The problem is affording the amplification to do it justice.	47 x 27 x 40cm own stands angled in space	82dB/w 20Hz (in room)	R	86
<b>Rotel RL850 II</b> £140	Average+ Average+	Strongly recommended. Well-balanced, clear, with decent focus and fine stereo, but tendency to ‘heaviness’ needs decent stands and space	44 x 25 x 24cm free space on 40cm stands	86.5dB/w 50Hz	BB	59
<b>Royd A7 Series 11</b> £115	Average+ Average	Lively clear sound; good upper bass and dynamics, but treble “ramp” made vocals sound shut in. Try before you buy	31 x 20 x 17cm shelf or 50cm stands near wall	86dB/w 75Hz	R	53
<b>Royd Eden</b> £235	Average Average+	Delightful mid/treble speed and transparency but determinedly bass light, this oddball miniature threatens cult status but could use a sweeter tweeter	31 x 20.5 x 18.5cm stands close to rear wall	87dB/w 85Hz	R	66
<b>Royd Apex</b> £485	Average+ Good	Not the smoothest sound around, it more than compensates with an impressively communicative and informative musical presentation	85.5 x 20 x 30cm on floor close to wall	87dB/w 33Hz (in room)	R	78
<b>Ruark Swordsman</b> £219	Good Average	Very attractively styled and finished, the Swordsman is a well built ‘small bookshelf’ model that delivered better test than listening results	38.5 x 20 x 27.5cm stands 0.5m from wall	84dB/w 50Hz		71
<b>SD Acoustics OBS</b> £695	Average Good	Recent changes have added some refinement to a seductive midrange, good timing and fine sensitivity, though bass extension is limited and coloration obvious	102 x 35 x 25cm floor, angled, away from walls	92dB/w 30Hz (in room)	R	82
<b>SD Acoustics SD1</b> £1150	Average Very Good	A large scale, airy and unusually detailed system with excellent dynamics. Current model has more civilised top-end and warmer balance than original model	123.5 x 38.2 x 31.9cm free space	90dB/w 50Hz	R	60
<b>SD Acoustics SD3</b> £500	Average Good	Neither cheap nor perfect, this near miniature (using OBS’ mid driver down into the bass) sounds unusually lively and dynamic within inevitable physical constraints, and is ultimately both engaging and entertaining.	38 x 19 x 29cm stands 10cm from wall	83dB/w 30Hz (in room)	R	86
<b>SD Acoustics Ribbon</b> £2000	Average Good+	Entertaining but a little underdeveloped and rather amplifier sensitive, the Ribbon is a lively and loud hybrid marred by some colorations: some like it, others don't	152 x 30 x (15-30)cm floor, angled, away from walls	91dB/w 30Hz (in room)		81
<b>Seventh Veil System IV</b> £1290 (+ £340 integral stand)	Average Good+	Lacks welly and loudness but delivers astonishing results with female vocals in particular. Antithesis of the ‘good allrounder’, this oddball design has considerable charm that the committed enthusiast might find irresistible.	72 x 44 x 21 x 29cm own-stands close to wall	84dB/w 28Hz (in room)	R	86
<b>Shan Shimna</b> £280 (stands £75)	Average+ Good—	Pretty little miniature in cast mineral/plastics has limited dynamic range and could sound smoother, but integration is good and box effects slight	31 x 16 x 17cm stands near rear wall	84dB/w 65Hz	R	71
<b>Snell Type C</b> £2350	n/a Very Good	Pricey, yes, but an extremely capable loudspeaker. Musical and transparent; excellent bass extension	112 x 38 x 33 free standing away from walls	90dB 35Hz	R	65
<b>Sony APM-101ES</b> £100	Good Average	Big hearted sound from small bookshelf successor to BB 10ES. sounds a little untidy at frequency extremes, so suits CD better than vinyl	39.5 x 22.5 x 23.5 stands in open space	86dB/w 52Hz	R	71
<b>Sony 121ES</b> £150	Average Average—	Good perceived high tech value, but the balance has an artificial ‘loudness’ character, too rich in the bass, making room matching difficult, and too strong in the treble as well.	43 x 25 x 28cm stands in free space	86dB/w 25Hz (in room)		86
<b>Sony APM-141ES</b> £200	Average Average	A great deal of loudspeaker for the money, the rich-sounding 141 needs a big room and still shows significant ‘loudness’ (boom’n’tizz) tendencies	61.5 x 26 x 32cm large room, free space	88dB/w 30Hz (in room)	R	78
<b>Sony APM-181ES</b> £300	Very Good Average	Big and beefy but also somewhat fat and bass heavy, this well engineered three-way has notable strengths but lacks transparency and sounds better at lower levels	57.5 x 29 x 36cm stands in open space	87dB/w 40Hz		71
<b>Sony APM 66ES</b> £700	Average+ Average+	Powerful heavyweight sound with a brilliant midband – clear articulate and transparent. But the bass is on the boomy side and the treble can sound grainy	66 x 38 x 36.5cm open space, low stands	89dB/w 60Hz		59
<b>Spendor SP2/2*</b> £500	Very Good Good+	Conceding little to the SP1, this 30 litre model displayed good tonal balance with a highly articulate midrange, only slightly marred at frequency extremes	50 x 25 x 30cm free space, stands	87dB/w 45Hz	R*	59
<b>Spendor SP1</b> £800	Very Good Good	A very subtle and musical performer that works particularly well with digital material. An exceptional allrounder	63.5 x 29.5 x 30.5cm stands in open space	87dB/w 41Hz	R	60
<b>Spica TC50</b> £599	Good— Good	This triangular-profile ‘grown up’ miniature is a shade boxy and laid back but has good rhythmic and musical integrity	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
<b>Spica TC50SE</b> £799	Good— Good	A heavily UK-modified TC50, the SE sounds less boxy and more spacious, but lacks some of the urgency of the standard model	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71

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<b>Spica Angelus</b> £1295	Good Average	A little bass shy and soft in the bass and lower mid, the free standing Angelus is otherwise tidy, extremely lively and fluid, if uneven overall	116.8 x 53.3 x 26cm away from walls	86.5dB/w 50Hz		60
<b>Studio Power DMS100</b> £249	Average + Average +	Close to a BB rating, and in many respects remarkable value for money. Delivers an impressively smooth and large sound, but sheer ugliness will limit its appeal	51 x 26 x 32cm open stands 1ft from wall	86dB/w 25Hz (in room)	R	82
<b>Sugden CL</b> £275	Average + Good —	A thoroughly impressive and likeable near-miniature, the CL is prettily and properly built, and needs a good driving amplifier	35.5 x 18 x 26.5cm high stands in free space	86dB/w 35Hz	R	78
<b>Tannoy E11</b> £129	Average Average —	Fundamentally turgid and slow, thanks to leaden upper bass and "shut in" treble, though stereo images are convincing, as are the reasonably uncoloured vocals	39 x 21 x 22cm stands, free space	87dB/w 45Hz (in room)		82
<b>Tannoy M15</b> £170	Good Average +	Somehow lacking the magic of its predecessors, the M15 remains a fine value compact that needs careful set-up to give optimum results	50 x 25 x 21cm Blu-tack to stands 1-2ft from wall	88dB/w 40Hz (in room)	R	78
<b>Tannoy DC1000</b> £200	Average Average —	The smaller of two DC models with dual concentric drivers, the '1000 is much less well balanced than the larger, floorstanding '2000	50 x 24 x 25cm	91dB/w 53Hz		71
<b>Tannoy M20</b> £250	Good Good	Alongside fine build and presentation, the M20 provides an unusually clever combination of the 'traditional' virtues of transparency and low coloration with more trendy strengths of speed and pace.	50 x 25 x 22cm stands in free space	87dB/w 25Hz (in room)	R	86
<b>Tannoy DC2000</b> £300	Good Good	Remarkably high sensitivity from unique dual concentric driver that has an involving but characteristic sound. Bass could be better	68.5 x 26 x 27cm floor in free space	93dB/w 55Hz	R	66
<b>Tannoy DC3000</b> £600	Good Good	Giving new meaning to terms like dynamic range and headroom, the magnificent '3000 is a must for those who enjoy high-level monitoring. But spare a thought for the neighbours	94 x 26 x 31cm floor 1ft+ from wall	94dB/w 30Hz (in room)	R	78
<b>Tannoy Westminster</b> £3600	n/a Good +	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few pockets and rooms	Huge, flat against rear wall, away from corners	96dB/w (manuf.)	R	Coll
<b>TDL Studio 1</b> £549	Average + Good	Delivering genuinely extended bass from a compact floorstanding enclosure, the Studio is very detailed but a shade clinical and detached in presentation	76 x 23 x 33cm low stands in free space	84dB/w 25Hz (in room)	R	78
<b>TDL Monitor</b> £1799	Very Good Very Good	Fine solidity and good accuracy, with enough bass extension to satisfy even organ freaks. Needs a big room and can sound a bit lazy and a shade tinkly	118.5 x 30 x 47cm 0.5m from walls	85dB/w 28Hz	R	66
<b>Technics SBC 250</b> £140	Average + Average —	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character	36.5 x 23.5 x 20.5cm free space, stands	86dB/w 60Hz		46
<b>Technics SB-CS5</b> £70	Average Average	Clearly fine material value for money, the CS5 nevertheless betrays its midi system heritage, the quest for size for its own sake compromising the performance of both enclosure and main driver.	42.5 x 25 x 24cm stands in free space	86dB/w 48Hz (in room)	R	86
<b>Technics SB-RX50</b> £500	Very Good Average +	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass	48 x 30 x 26cm free space on 40cm stands	86dB/w 40Hz	R	46
<b>Toshiba SS33-M</b> £100	Average Average	Providing a benchmark for budget loudspeakers, this Toshiba-inspired but UK designed and manufactured model is a lot of loudspeaker for the money, if a shade on the cheap	40 x 26 x 21.5cm stands in free space	86dB/w 55Hz	BB	68
<b>Townshend Glastonbury IIS*</b> £1700	n/a Very Good	What? No bass? Actually, like the KEF 107, Glastonbury II goes down so low you might not notice how good it is. A truly remarkable performer. Superb soundstaging	91.5 x 28 x 46 free standing in room corners	88dB 27Hz	R*	65
<b>Vandersteen Model One</b> £1000	Average + Average +	This compact American floorstander's elegant staggered baffle arrangement contributes to a refreshing freedom from boxiness, but the price is quite high in view of the additional mid forwardness and bass imprecision	100 x 30.7 x 25.6cm floor clear of walls	87dB/w 23Hz (in room)		86
<b>Videotone Minimax 2</b> £80	Poor Average —	Cheap in build and QC as well as price, but cheerful (if coarse) with it - if a little too cheerful after extended listening	27.5 x 17 x 20cm near rear wall	84dB/w 90Hz	R	74
<b>Visonik David 6001</b> £173	Average — Poor	Sharp styling a classy looking miniature makes, but the complex grillework worsens a sound which starts off with too much top and not enough bottom	20 x 12 x 13cm against rear wall	87dB/w 130Hz		74
<b>Wharfedale Delta 30</b> £80	Good Average	Very clear and surprisingly neutral for the price, with good dynamics and stereo within limited volume ceiling	37.9 x 20 x 16.9cm near wall on high stands	88.5dB/w 80Hz	BB	59
<b>Wharfedale Delta 50</b> £100	Average + Average —	"There's nothing obviously wrong, but it seems a bit mundane." is what we said when the Delta 50 was £129. But since then the price has dropped by 30 per cent, making it great value	48 x 27 x 19cm near wall on 40cm stands	88dB/w 55Hz		53
<b>Wharfedale Diamond III</b> £100	Below Average Average —	This latest version of the long running Diamond sports a better tweeter, but bass, though deep, is soft, and the midband is indistinct and uneven	24 x 18.5 x 20.5cm near wall, stands	86.5dB/w 75Hz		59
<b>Wharfedale Super Diamond</b> £140	Average Average —	Although there are improvements on the basic "legendary" model, listening panelists did not get airborne about this upgrade	24 x 19 x 19cm close to wall at head height	88dB/w 57Hz		53
<b>Wharfedale 504/2</b> £150	Average Average	Not strictly accurate, this musically involving miniature sounds unusually coherent and well integrated, if a shade dull in balance	29 x 18.5 x 19cm stands against rear wall	84dB/w 60Hz	R	68
<b>Wharfedale 505/2</b> £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
<b>Wharfedale 507</b> £220	Average + Average —	Generous in size but uningratiating sonically, the 507 doesn't seem to gel in the way the smaller 505.2 does, finding a good in-room balance difficult to achieve	49 x 25.5 x 29.5cm high stands 1ft+ from wall	86dB/w 35Hz (in room)		78
<b>Wharfedale Coleridge</b> £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
<b>Yamaha NS 1000M</b> £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.

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

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## CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal – at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes.)

There is no problem in connecting a cassette deck to any normal amplifier, but some care needs

to be taken in choosing the best tapes for a specific machine. (Trial and error is one effective technique, but many decks have manual bias adjustment and some match up to the tape automatically.) Lab performance and sound quality often go hand in hand, and are frequently somewhat dependent upon factory alignment. The mechanical integrity of the mechanism itself is another crucial factor, that is often reflected in the asking price.

All modern hi-fi decks have Dolby B and the majority have Dolby C besides; the very worthwhile

HX Pro system is becoming steadily more widespread. Remote control remains rare, though sometimes it is available as a system option.

Three-head recorders allow simultaneous checking of the recording being made. Auto-reverse is a useful convenience feature, but usually with some mechanical compromise, while double-mechanism 'dubbing' decks of dubious quality are fashionable at the bottom end of the market. The welter of different 'music search' systems available is some indication of their frequent ineffectiveness.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Acoustic Research RD-06</b> £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
<b>Aiwa AD-F270</b> £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
<b>Aiwa AD-F370</b> £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
<b>Aiwa AD-R470</b> £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
<b>Aiwa AD-WX777</b> £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
<b>Aiwa AD-F700</b> £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
<b>Aiwa AD-F800</b> £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
<b>Aiwa AD-WX888</b> £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
<b>Aiwa XK-007 Excelia</b> £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
<b>Aiwa AD-WX909</b> £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
<b>Aiwa XK-009 Excelia</b> £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
<b>Akai GX-32</b> £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
<b>Akai GX-52</b> £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
<b>Akai GX-65</b> £300	Average Average+	Fine ungmicky middle ranking deck with simple, purposeful controls, works best with metal tapes. Performance standards fair to good	3-head, dual capstan, Dolby C/HX Pro		87
<b>Akai GX-95</b> £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
<b>Denon DRM-400</b> £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
<b>Denon DRM-500</b> £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
<b>Denon DRW-750</b> £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
<b>Denon DRM-700</b> £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
<b>Denon DRM-800</b> £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
<b>Dual 5850RC</b> £269	Poor+ Average—	Average-to-middle deck which does most things well and skates over the more subtle things. Control system is uninspired but easy to master. Overpriced	Dolby C/HX Pro, bias adjust		87
<b>Goodmans GSW-5200</b> £90	Poor Poor	Musically unimpressive but at least it's cheap!	Dolby B, twin, one records		69
<b>Grundig Fine Arts CCT-903</b> 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
<b>Harman Kardon CD491</b> £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
<b>Kenwood KX-440HX</b> £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
<b>Kenwood KX-3010</b> £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
<b>Kenwood KX-4520</b> £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
<b>Kenwood KX-5010</b> £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
<b>Kenwood KX-9010</b> £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
<b>Marantz SD-40</b> £170	Average Average—	Transitory sounding electronics mar a basically good recording machine. Prerecorded material suffers from effects of Dolby pumping	Dolby B/C/HX Pro, bias adjust		81
<b>Marantz SD-50</b> £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
<b>Marantz CP230</b> £300	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52

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## CASSETTE DECKS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Marantz SD585 £300	Average Average—	Sound quality is a little sat upon, and control ergonomics are somewhat opaque, though the twin auto-reverse/recording capability makes this a powerful machine	Dolby B/C, twin auto-reverse & record, parallel recording etc		69
Marantz SD-60 £350	Good Very Good	A first rate, highly capable deck offering energetic yet refined sound largely due to good electronic design	3-head, Dolby B/C/HX Pro, variable bias & sensitivity	R	81
Marantz CP430 £399	Average Average	Uniquely flexible and compact package for outside work which at a pinch can double as a domestic cassette deck. dbx is useful for location work; results with Dolby B are acceptable	Portable 3 head, dbx, fine bias, ever-ready case and charger/adaptor	R	87
Memorex SCT-5 £150	Bad Poor	Poor example of a twin cassette deck where everything has been sacrificed on the altar of flexibility	1 rec/play, 1 play only transport, Dolby B/C		87
Memorex SCT-84 £200	Average+ Average+	The playback only transport is a little disappointing, but the record one is a quality item and the deck works well. Ergonomics are good, but styling and control feel are decidedly tacky.	Dolby B/C, fine bias, twin with auto-reverse record, unidirectional play	R	69
NAD 6300 £550	Very Good Very Good	Solid and homogeneous sound quality and very good replay compatibility thanks to 'play trim'. Distinctive, musical – and costly	Dolby B, C, HX Pro, 3 Head, bias adjust	R	63
Nakamichi CR-1E £345	Very Good Good	Modestly equipped by any standards, the CR-1E stands or falls by its build quality, which is high, and sound which is highly competent	Dolby B & C		57
Nakamichi CR-2E £395	Very Good Good+	Ordinary to look at, in some respects rather awkward to use (tape switching especially), the CR-2E sounds very slightly better than the CR-1E, and therefore ranks well. But it doesn't come cheap	Dolby B & C, bias adjust, remote control	R	57
Nakamichi RX-202E £545	Good Very Good+	Fine, clear and articulate sounding player. Excellent with prerecorded material, but idiosyncratic and sometimes obstructive control system	Auto reverse, Dolby B, C, 2 Head	R	63
Nakamichi RX-505E £895	Very Good+ Very Good+	First class recorder with near state of the art performance. Auto reverse tape system raises a few smiles, but provides auto-reverse without the usual compromises	Unidirectional auto-reverse, 3 heads, dual capstans	R	87
Nakamichi CR-3E £595	Very Good Very Good	The user interface is a little clumsy, though conceptually straightforward. Sound quality approaches the CR-4E, and is amongst the best at the price.	Dolby B & C, bias adjust, remote control	R	57
Nakamichi CR-4E £745	Very Good+ Very Good+	High class deck with a reasonably full range of features and superb sound at a slightly unlikely price	Dolby B & C, bias adjust, remote control, 3 Head	R	57
Nakamichi CR-5E £995	Excellent Excellent	A slightly simplified version of the all-conquering CR-7, the CR-5 has a very similar standard of audio performance – the best	Dolby B/C, fine bias, 3-head	R	69
Nakamichi CR-7E £1500	Excellent Excellent	Remarkably this deck is not only ergonomically but also sonically superior to the Dragon, particularly on record/replay	Real-time counter, track search, Dolby B & C, tape alignment adjust, bias adjust, remote control, 3 Head	R	60
Nakamichi Dragon £1750	Excellent Excellent	Previous to the birth of the CR-7E, this machine stood head and shoulders above the rest. It is still the ultimate for music cassette replay	Auto reverse, Dolby B & C, tape alignment adjust, bias adjust, remote		60
Onkyo TA-2120 £130	Average+ Good	Clear, vivid sound with good timing and resolution when using Type II tapes without Dolby. The controls are less inspiring – the meters in particular are plainly inadequate	Dolby B/C, auto tape sensing, block/side repeat	R	63
Onkyo TA-2200 £190	Poor Poor+	Mediocre, dynamically rather squashed sound quality, partly due to iffy transport. Messily equipped too	Dolby C/HX Pro, variable bias		87
Philips FC566 £179	Average+ Average+	Mostly well equipped, though some tape search facilities fail to exploit the auto-reverse capability. Sounds clean and stable – with prerecorded tapes too	Auto reverse, track search, Dolby B & C		57
Philips FC870 £250	Average Average	Disappointing at the price, this is a well equipped deck with off-tape monitoring, but a somewhat listless, smeared musical style	Dolby B/C/HX Pro, 3-heads, track/intro search etc		81
Philips FC567 £279	Average Poor	Well equipped but ergonomically substandard; sound quality is messy and lacking in clarity and dynamics	Dual deck, auto reverse, track search, Dolby B & C		57
Pioneer CT-337 £130	Average Average+	Simple but well made machine with a slightly soft but consistent standard of reproduction	Dolby C/HX Pro, CD synchro, mic inputs	R	87
Pioneer CT-447 £170	Good Good	An excellent and affordable package, decidedly OTT in the display area but capable of genuinely fine musical reproduction	Dolby C/HX Pro, auto tape alignment, track search	BB	87
Pioneer CT-656 £250	Good Good	Well conceived and executed low cost 3-head recorder. It benefits from and makes good use of metal tapes, but is never less than couth and stable sounding – even with ferric tapes	3 heads, off tape monitoring, fine bias, Dolby B/C/HX Pro	R	75
Pioneer CT-737 Mk II £350	Good Average+	Easy to use and sensibly equipped, the CT-737 is much improved, but sound quality is still a tad lacklustre	3-head, Dolby B/C/HX Pro, manual record bias/sensitivity		75
Pioneer CT-959 £450	Very Good Very Good	Near state of the art for £450. Engineering is of a high order which reflects in an open window sound quality, but playback response is very bright (being corrected by manufacturer)	3-head, var bias & eq, multi-mode meters, Dolby HX Pro	R	87
Pioneer CT-91a £500	Very Good+ Very Good+	Superb, near state of the art recorder with an excellent dual capstan transport and very capable electronics. At the price, this one is a mould breaker	3-head, tape calibration, Dolby B/C/HX Pro	R	75
Revox B215 £1,727	Very Good Very Good	Fine, consistent and solid sound quality, with excellent under the skin engineering and many useful features – but you're also paying for the same	Dolby C/HX Pro, 3 heads, dual capstans, auto tape align	R	87
Revox B215-S £1,826	Very Good Very Good+	This is a superbly engineered deck with a classically fine performance that almost transcends the stereotypes. Ergonomics are flawed but the user interface is both powerful and flexible	3-head, dual capstan, Dolby B/C/HX Pro, auto calibration	R	75
Rotel RD-845 £130	Below Average Good/Poor*	Extremely fine transport and clean sounding electronics for the price. Bass lacks weight, but deck works remarkably effectively with chrome tapes. *See text	Dolby B/C, manual tape selector	R	81
Rotel RD-855 £180	Average Good	The transport is OK and the various frequency responses are erratic, but good basic electronics help the Rotel deliver. Coherent, enjoyable and informative	Dolby C memory stop & repeat, track search	R	87
Rotel RD-865 £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
Sherwood DS-1135C £100	Average+ Average	Excellent value. There is a low level constant background drone, and Dolby C recordings sound flat and coloured. Elsewhere sound quality exceeds expectations	Dolby B/C/HX Pro	R	87
Sherwood DS-7000R £230	Average— Poor	Rough and ready cassette deck in which sound engineering has been sacrificed on the altar of extra selling features, namely three heads for real time off-tape monitoring	3-head Dolby B/C/HX Pro		87
Sony TC-RX110B £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

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NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Sony TC-K520</b> £170	Average+ Good	Fine, assured and detailed performer with a very well designed and straightforward user interface	Dolby C/HX Pro, variable bias, display on/off	BB	8/
<b>Sony (WMD6C) ProWalkman</b> £249	Good+ Very Good	"One of the finest sounding cassette decks on the market today. A mandatory Best Buy, which also fits in your pocket"	Dolby B, & C	BB	60
<b>Sony TC-K850ES</b> £400	Very Good Very Good+	Near state of the art recorder with excellent recording quality, and even better playback performance. Sounds — and looks — best with the display turned off	3-head, Dolby HX Pro, bias/level adjust, dual capstans	R	87
<b>Sony TC-K730ES</b> £500	Very Good Very Good+	First rate cassette deck that scarcely betrays it is a cassette deck on audition. Features and control wise, it feels a little dated	Dolby B, C, bias and equalisation adjust	R	81
<b>Teac V-270C</b> £89	Average— Average—	Not quite cheap enough to compete solely on price, the V-270C is a rather messy and unstable sounding deck	Dolby B & C, bias adjust		63
<b>Teac V-480</b> £129	Average Average+	A rather utilitarian model, the V-480 just makes it on to our recommended list by virtue of a clean, open sound that to an extent transcends the measurements	Dolby B/C/HX Pro, fine bias	R	75
<b>Teac W-470</b> £129	Average— Average	A low grade transport is allied to respectable electronics to give sound quality ranging between acceptable and good. Prerecorded tapes sound bright	Twin deck, one records, Dolby B/C, intro-search		75
<b>Teac V-870</b> £349	Good+ Good	Cut-down V-970X for the proletariat. Expensive and carefully engineered with mostly very good but slightly cold sound quality	Dolby B, C, HX Pro, 3 Head, manual tape calibration	R	63
<b>Teac V-970X</b> £449	Very Good Very Good	An excellent sounding deck with useful features (tape calibration etc) that fully justifies the price	Real-time counter, track search, Dolby B/C/dbx & Dolby HX Pro, bias adjust, remote control, 3 Head	R	57
<b>Teac W-990RX</b> £445	Good Good	A mess with dbx, but taut and articulate otherwise. The 990, though expensive, has a powerful range of features, making it one of the few really ambitious decks to successfully straddle both sets of requirements	Dolby B/C 9 dbx, dual auto-reverse/record, parallel & sequential recording, remote	R	69
<b>Teac R-919X</b> £489	Very Good Average	Superbly equipped, yet usable — and well built too. But sound quality is something of a disappointment at this price level, being appropriate for a model about half the price	3-head auto-reverse, tape calibration, Dolby B/C/HX Pro/dbx		75
<b>Technics RS-B555</b> £160	Good+ Good+	Very good value. Resolution, stability and quality of set-up are strong points, a slightly strained, synthetic quality is sometimes apparent	Dolby B/C/HX Pro, bias adjust, track search	BB	81
<b>Technics RS-B665</b> £199	Average— Poor	Disappointing deck, below par by Technics standards. Lacks detail and neutrality due to electronics and transport limitations	Dolby C/HX Pro, track search, fine bias, mic inputs		87
<b>Technics RS-TR255</b> £160	Average Average	Neat, sensibly designed middle of the road dual transport recorder, suitable where the ability to dub tapes is a particular priority	Twin transports, one records and auto-reverse, Dolby B/C	R	75
<b>Technics RS-TR265</b> £170	Average+ Average—	Flexibility and build quality are strong suits, and the control system is a gem, but performance is unduly compromised by the range of features and sharp pricing	Dual auto-reverse, one records, Dolby HX Pro		87
<b>Technics RS-B655</b> £200	Good Very Good	Excellent middle price deck, well equipped with a not over-refined but highly articulate and crisply defined style of musical presentation	Dolby B/C/HX Pro, bias adjust, track search	BB	81
<b>Technics RS-TR355</b> £200	Average Average	Serviceable middle market dual deck without serious fault but with some annoying inadequacies, notably an inability to play side A and B and then stop	Twin auto-reverse, one records, Dolby B/C/HX Pro		75
<b>Technics RS-TR555</b> £300	Average+ Average	Sound quality varies with mode of use, but is rarely less than competent, and is often highly enjoyable, dbx is best avoided	Dual auto-reverse/dual record/Dolby B/C/HX Pro & dbx	R	81
<b>Technics RS-B905</b> £350	Good Good	Good, well set up cassette deck with a clean, accurate sound but some compression. dbx circuit sounds poor	Dolby B, C, HX Pro, dbx, bias adjust, 3 Head		57
<b>Yamaha KX-230</b> £140	Average+ Average+	A strong near-budget performer, the strengths include good overall sound, excellent search aids. Weaknesses: ergonomics, soggy bass with prerecorded material	Dolby B/C/HX Pro, variable bias	R	75
<b>Yamaha KX-330</b> £170	Average Good	Cramped control panel but a strong, dynamic and comparatively stable performance distinguish this strong middle-price deck	Dolby C/HX Pro, optional remote control	R	87
<b>Yamaha KX-530</b> £230	Good Good	Excellent all-rounder that does most things at least competently and many things well. One of the best middle price decks	Dolby C/HX Pro, 3 motors, optional remote control	BB	87
<b>Yamaha KX-630</b> £300	Good Very Good	Well equipped and immaculately presented, offers fine, articulate music making with a bias towards high bias tapes, especially metals	3 head, Dolby B/C/HX Pro, optional remote	R	81
<b>Yamaha KX-800</b> £330	Good Average	The present Yamaha range seems oddly inconsistent. This sophisticated model sounds fine (almost) but came a clear second best to the KX-500	Real-time counter, track search, Dolby B, C, HX Pro with play trim, bias adjust, 3 Head		57
<b>Yamaha KX-930</b> £400	Good Average	Worthy but ultimately slightly disappointing mixture of fussy ergonomics and tidy but cluttered sonics	3 heads, dual capstans, Dolby C/HX Pro, remote control		87
<b>Yamaha KX-1200</b> £500	Excellent Average+	A veritable rats' nest of buttons and dials, albeit well laid-out. This is nearly a great recorder, but lacks simplicity of sound	Real-time counter, track search, Dolby B, C, dbx, HX Pro, bias adjust, remote control		52

## DAT RECORDERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Aiwa Excelia XD-001</b> £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
<b>Grundig Fine Arts DAT-9000</b> 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
<b>Luxman KD-117</b> £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
<b>Sony DTC-M100</b> £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
<b>Sony DTC-1000ES</b> £1299	Very Good Very Good	Fine, consistent performer with accomplished tape handling and good build quality	Standard track ID and search, remote	R	63

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# THE DIRECTORY

## CD PLAYERS

CD PLAYERS

This all-digital music source is well established, despite still high disc prices and the opposition of many hi-fi enthusiasts. Compact Disc's strengths over conventional vinyl are complete freedom from surface noise with automatic and programmable play, plus track skip and fast music scan – frequently under full remote control. However, many vinyl enthusiasts find CDs sound less involving than

top quality vinyl replay.

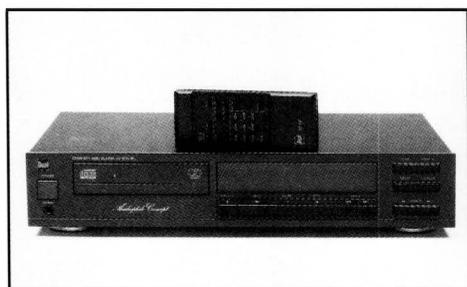
Introduced five years ago at around £500, CD players now average less than half that price, and for the main offer improved performance besides. Even cheaper players may have the latest decoding chips and the most useful play features: extra money can buy remote control, remote volume control, audio 'tweaks', plus improved build and component

quality control.

Compared with many hi-fi components, CD players give impressive lab performance, though there are differences between players nonetheless. **Sound quality** variations are even more marked, particularly in a good quality system. As it behaves very like a preamp, there are no problems connecting a player to a normal amplifier

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Aiwa XC-007</b> £499	Very Good Good	Creditable sound despite inverted output, high tech engineering with very good lab performance. A worthy contender but not cheap	Remote, keypad, timer, digital output, pseudo 20 bit, dual DAC		64
<b>Akai CD-55</b> £230	Good Average—	Budget model which fails to compare with the CD52	Remote, hdph, Good programming		83
<b>Akai CD-52</b> £249	Good Good	A nice surprise from Akai, genuinely good sound from this mid-priced model. Better linearity will help further	Remote, digital output, headphone socket	BB	64
<b>Akai CD-62</b> £330	Fair Very Good	Looks, build quality and the technical specification are right up to date. As it stands it sounds very good but if the indifferent lab performance could be improved, it would probably sound even better.	Remote, programme, hdph, comprehensive display etc	BB	70
<b>Akai CD-73</b> £450	Good Average	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imagery. Worth auditioning	Track entry keypad remote, menu display (switchable)		62
<b>Akai CD-93</b> £700	Good Very Good	Undoubtedly a CD player of real class in build, presentation, lab performance and sound quality, but also a shade expensive for formal Recommendation – though that's not to dissuade lovers of black lacquer wood finish.	Track entry remote, menu display etc.		58
<b>Arcam Delta Black Box</b> £260	n/a Very Good	This rich, powerful and articulate sounding DAC transforms the majority of medium price CD players	Needs D-out CD players	R	60
<b>Arcam Black Box II</b> £300	Very Good Very Good	An addition to the BB I, it also offers improved sound and more inputs	Optical and wired input digital decoder	BB	76
<b>Arcam Alpha</b> £375	Very Good Very Good	Arcam's new star, its best CD player yet and great value	Remote, hdph, etc, coax dig. out	BB	83
<b>Arcam Delta 70 II</b> £600	Very Good Good	Now in Mk II form a further improvement is seen in features, performance and sound quality. Solidly built and British	Now adds simple remote vol + std features; also display off	R	76
<b>Arcam Delta 170 Transport</b> £600	Very Good Very Good	While no bargain, this is a well made metal boxed transport providing clean digital data for outboard decoder/processors	Transport only, display off, usual programming	R	76
<b>Ariston CD1</b> £345	Good Good	Easy on the ear compact disc for those who like their music Radio 2 flavoured. And it looks good	digital output, remote control	R	87
<b>Cambridge Audio CD3</b> £649	Poor Good+	Unique internal configuration gives the CD3 a fluid and detailed sound falling off at the frequency extremes. The controls and displays are primitive	Optical/electrical digital out, remote control		87
<b>Carver TL 3100</b> £340	Average Average—	The sound quality did not live up to the excellent fascia. Carver's DTL did not aid the indifferent sound	DTL sound shaping, usual facilities, remote, memory		76
<b>Carver TL-3300</b> £700	Good+ Poor	Carver needs to listen critically to CD sounds; in our opinion, DTL does not improve the recipe	DTL, remote, programming, digital output		83
<b>conrad johnson DFI</b> £1,995	Average— Good+	Setting a decent standard and including an FET line preamplifier, the unusual DFI is worth investigating	Line preamp built-in, simple remote facilities		76
<b>Deltec PDM-One</b> £500	Average Very Good	A no frills audiophile bitstream converter at an affordable price	Coax-in, special cable and mains filter options	R	83
<b>Denon DCD 620</b> £180	Average+ Average—	Not competitive on performance though feature pack is good	Hdph + vol. edit, remote		83
<b>Denon DCD820</b> £270	Average+ Average—	A powerful combination of features and build for the money ensures recommendation. The sound is just good enough	Well equipped, power vol. edit etc, digital out	R	76
<b>Denon DCD 920</b> £320	Good Average+	Highly featured and well presented but unexceptional performance	Everything! inc remote volume		83
<b>Denon DCD1420</b> £400	Very Good Average	Superbly equipped with a fine lab performance, this modern player needs a touch more sonic spice to get recommended	20-bit, very comprehensive, remote, power volume etc		76
<b>Denon DCD-1520</b> £550	Very Good Very Good	High tech, high profile, high gadget content, good sounding player at an almost affordable price	Programme, hdph socket, remote, track entry, optical digital output	R	70
<b>Denon DCD 3520</b> £1000	Very Good Good+	Built like a battleship this new model takes its place at the top of the Denon range with a smooth and powerful sound, quite free of graininess	Composite 20-bit DACs, full programming features	R	72

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HIFI CHOICE

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## CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ferguson CD007 £130	Good Fair	The cheapest recommendation in the test group; don't expect the earth but the value is good	Manual, digital output, headphone socket	R	64
Ferguson CD008 £150	Fair Fair	Not as strong as its relatives... sample fault perhaps? Though performance is fair enough overall	Remote, midi digital output, 2x 0/s, timeshare 16 bit		64
Grundig CD9000 £1000	Good Good	Aimed at a market which puts external styling above sound quality. Although this player is of slightly above average competence in most departments it is expensive	Remote, programme, hdph socket, calendar display etc		70
Harmon Kardon HK7300 £199	Average Average—	Budget low bit technology, does not deliver enough for a recommendation	No remote, no digital out; basic control features		83
Harmon Kardon HK7500 £299	Average+ Average+	Decided improvement over 7300 in all respects. Still fairly unimpressive sound	Remote, hdph + vol, remote vol, good programming, A-B repeat etc.		83
JVC XL-Z1010 £499	Good Average—	Despite some high tech design and a good lab result this model did not deliver good sound quality	32 track prog., disp off, auto fade, 2 digital op		76
Kenwood DP-8020 £500	Excellent Very Good	Fine build and finish, a fine performer in the lab, and in sound quality	Comprehensive remote inc volume, display off, opt & coax digital output, versatile	R	83
Marantz CD50SE £330	Very Good Very Good	Souped up CD50 delivers reference performance in its class. Worthy successor to the '65SE legend	Full remote, power (7 step) volume. Hdph, (fixed), FTS disc memory. Good programming	BB	83
Marantz CD60SE £380	Very Good Very Good	Luxury '50SE with superior remote volume and variable headphone socket: a fine performance all round	Optical digital output, full remote, power vol. FTS, hdph	BB	83
Marantz CD12LE £2800	Very Good Excellent	This top of the range two-box player may be very expensive but it is very well made. Technical performance is very good and the sound is the best from Marantz yet	Two box, digital processor, FTS, optical connection, hdph socket, comprehensive display, balanced output etc	R	70
Meridian 203 £495	Very Good Very Good+	Exceptionally lucid, transparent and solid sound 'bitstream' converter. Always tidy and easy on the ear, but doesn't bulldoze the craggy bits	Stand alone converter, 32-48kHz, optical/electrical i/p	BB	87
Meridian CD206 £800	Very Good Very Good	Fine build, finish and styling, very good sound, classy	Good programming, remote, coax digital output	R	83
Meridian CD208 £1490	Excellent Excellent	State of the art CD sound combined with a decent preamp and full remote control	Opt & coax dig. output, fixed and variable output. Hdph + remote level. Programming, phase invert	R	83
Micromega CDF1 Classic £1400	n/a Very Good	A very well made and stylish player from France, the CDF1 is a CD player for analogue lovers or as close as we've come across	Basic remote, digital output, suspended chassis	R	72
Micro Seiki CDM100 £3850	Very Good Good	One of the hernia inducing bricks of hi-fi, the Micro is extravagantly styled, finished and built. The good lab performance led to an 'only good' sonic display when the price demanded excellent	Balanced output, remote, display blanking		72
Mission Cyrus PCM II £400	Very Good Good+	Improvements in price and performance keep this classic remote player in the running	Remote vol, phase inv, display of, dig op. PSX option	R	83
NAD 5320 £169	Average— Average—	A low cost player devoid of features but at this low price it should still offer better sound	Budget facilities, 20 track program		76
Nakamichi OMS-1E £395	Good Good	This neat enough player doesn't really follow the Nakamichi tradition of providing exceptional sound quality while at the same time perpetuates that of selling at an above average price	Simple remote etc		58
Nakamichi 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-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
Philips CD630 £250	Very Good Good	Large clear display with an international flavour. Strong Philips style, high value CD player	FTS, digital op, versatile programming, remote, remote vol (7 steps) hdph (fixed)	R	83
Philips CDC875 £300	Average+ Average—	The changer works well and this machine is very well equipped. The sound quality is below par but may not matter too much in its likely 'muzak' application	6 disc changer/dig op remote, hdph, memory, shuffle		76
Philips CD840 £350	Good+ Very Good	Philips best yet and bitstream too! Very versatile programming and easy to Recommend. Fine stereo imaging for price	FTS, hdph + vol, full remote programming	BB	83
Philips CDV185 £350	Average+ Average	Hard to value with the video singles facility but it all works well enough for a recommendation	Video singles + CD scart + digital out etc	R	76
Pioneer PD9300 £499	Excellent Average	A mid price flagship of excellent build and lab performance but only average sound - interesting though	Remote, 24 track programming, 2 digital op		76
Pioneer PD-91 £899	Excellent Very Good+	Close to state of the art in nearly all areas - soundstaging, clarity and simple lack of artificiality. A well made and sophisticated player	Track entry remote, calendar display, index search, etc.	R	64
Proton AC-120 £180	Average Average—	Fine styling, low price but barely average performance	15 track memory, simple design, remote, hdph		76
Radford DAC1 £895	Good Good	Fine but slightly dated and costly package in performance terms - but flexible, musical and well built	DAC with 2 electrical + optical i/p, tape out		87
Radford WS1 £1095	Good Good	This player fails only in subtle ways. It is not the most engaging of players, but it is strong, forceful and dynamic, and it remains one of the better Philips 16-bit clones	Programming, intro scan etc	R	87
Revox B126 £649	Very Good Good	Made in Switzerland so the build quality and technical performance is high but then so is the price and the sound quality is only good	Programming, Revox remote system compatible		70
Revox B226S £840	Good Average	Top quality build and finish for the Revox system enthusiast. For high value sound look elsewhere	Remote vol, hdph, 19 track memory, digital op		76
Rotel RCD-855 £250	Good Good+	Stripped for action this well built Philips technology player delivers fine performance and sound. First rate value	Remote, 20 track prog, 1 audio op, 1 digital op	BB	76

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# THE DIRECTORY

## CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Rotel RCD-865</b> £300	Average Good	Curious mixture of bold musical presentation and foreshortened imagery. Grows on you though. One to audition with care	'bitstream', remote control	R	87
<b>SAE D102</b> £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
<b>Sansui CD-X711</b> £550	Excellent Very Good	Luxury features, finish and sound from this classy Sansui; no excuses required here	Balanced and normal op. Digital: opt & coax; hdph + vol, remote full programming	R	83
<b>Sharp DX150</b> £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
<b>Sharp DX750</b> £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
<b>Sonographe SD1 (by CJ)</b> £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
<b>Sony CDP-228ESD</b> £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
<b>Sony CDP-338ESD</b> £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
<b>Sony CDP-X7ESD</b> £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
<b>Sony CDP-R1/DAS-R1</b> £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
<b>Stax Quattro</b> £2995	Very Good Very Good	Now in mkl 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
<b>Teac PD470LE</b> £279	Average Average	With the LE upgrade the 470 has improved to a just average position	Remote, hdph, 20 track prog		76
<b>Teac ZD880</b> £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
<b>Technics SL-P277A</b> £160	Very Good Average +	High value, budget priced, yet well equipped and finished, a strong example in its group	Remote, programming, hdph + level. No BB digital op.		83
<b>Technics SL-P550</b> £220	Very Good Average	Superb, slick presentation, well equipped, average sound, fine build	Remote vol (6 steps) hdph + var, remote programming, edit/fade, digital optical only		83

## CD MIDI SYSTEMS

So you want a hi-fi, but you don't want to make a fuss about it. A pre-packaged system with everything matching up and no aggravation may not rank with carefully chosen separates on **sound quality**, but there's no denying the attractiveness or popularity of this approach – the market for pre-packaged component hi-fi systems is at least as big as that for separate items, even ignoring the vast numbers of low-cost single unit stacker systems. The arrival of compact disc led to a new fashion for shelf-standing compact systems, or 'midis' as

they are known in the trade, as a replacement for earlier floor-standing rack systems (themselves the upmarket development from music centres). Only some 330mm wide, midis can more or less match full-size (430mm) rack components for performance, and are certainly cheaper to make, ship, sell and buy.

Whereas specialist hi-fi is moving steadily towards ultra-simple 'no frills' components, midi systems tend to be sold on a feature count at a price point, usually with little opportunity for

demonstration and comparison. Our test programme includes extensive auditioning and lab testing, while making allowance for the different aspirations of designers and expectations of users. Key features valued highly by customers include system remote control, automatic switching, double 'dubbing' cassette decks, and elaborate equaliser tone controls. And the top end of the market is developing with surround sound audio/video-ready packages.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Aiwa NSX-800</b> £550	Average Poor	Undetailed, undynamic and largely unmusical system which throws it all away for an excessive range of tape related features	One box miniature plus remote control & speakers with dual auto reverse cassette mechanisms, mic mixing etc		89
<b>Aiwa X-D80K</b> £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
<b>Aiwa X-D100</b> £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
<b>Akai FX-800CD</b> £700	Very Good Very Good	Well thought through as a functioning system. Lacks the usual surfeit of controls, and sound quality is of an unusually high order. An excellent buy even at this price	Twin record & auto reverse cassette etc with 'intelligent' remote	BB	89
<b>Ferguson HFD28</b> £300	Poor Poor	Similar to Goodmans 5000 system but with greater power and marginally superior sound	One-piece, semi-remote		77
<b>Grundig Studio Line 1</b> £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
<b>Hinari DK200 Disc Deck</b> £300	Poor – Poor –	Confused user interface is matched to inadequate electronics. Poor – and poor value	Single unit, two cassettes, CD, tuner, remote		77
<b>JVC Midi-W53</b> £500	Average Average	A potentially excellent middle price system spoilt by the loudspeakers and – to a lesser extent – the record player	Midi system with SEA equaliser		89
<b>JVC Midi-W900CD</b> £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
<b>JVC Midi-W91CDM</b> £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
<b>Kenwood M-54CD/CDS</b> £600	Average + Average +	The M-54CD is the version without speakers and is the one to buy. The control system is A1 and the range of facilities offered is dazzling, but the amp and CD player are crude	Dual auto-reverse cassette, tuner/timer, CD, turntable with or without speakers	R	89
<b>Memorex System-550</b> £500	Average Average +	Above average electronics let down by very poor loudspeakers. Worth considering if the latter are replaced	Dual auto reverse cassette deck, tuner/timer, dual CD player, semi-auto turntable & speakers		89

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

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## CD MIDI SYSTEMS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Pioneer P500</b> £400	Good Very Good	Inexpensive yet but high grade compact with excellent consistency between sources and plenty of presence	Compact system, remote control, dual auto-reverse cassette	BB	89
<b>Pioneer S-11</b> £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
<b>Pioneer S-555</b> £800	Good Good	Confusingly well equipped, in some respects rather gimmicky system, weak on record performance (surprise!) but quite or very good elsewhere	Full feature midi system with graphic equaliser, dual disc CD player	R	89
<b>Pioneer S-330D</b> £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
<b>Proton AI-3000II</b> £650 w/o spkrs	Average Very Good	Simple facilities and good, no-nonsense engineering combine to produce a system with genuine class. It's as easy to listen to as it is on the eye	Single box amp/tuner/CD/cassette with remote control, no loudspeakers	R	89
<b>Sanyo 39CD</b> £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
<b>Sanyo 49CD</b> £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
<b>Sanyo SYS-801CD</b> £360	Poor Poor	Typical low end midi system: simple controls, adequate CD and tuner, poor turntable and cassette, awful loudspeakers	Remote control midi system		89
<b>Sanyo 59CD</b> £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
<b>Sharp CD-X17E</b> £500	Average Average+	Highly specified miniature with detachable speakers. AC mains power only. Good sound let down by crude upper midband and treble. Expensive for what it is	CD luggable with dual cassette & tuner, detachable speakers		77
<b>Sharp 320E</b> £500	Poor Poor	Poor quality system featuring tacky styling, a lack of sophistication – and overpriced	One box midi & turntable with surround matrix		89
<b>Sony Compact 302D</b> £400	Average Average+	Fine low to middle price system whose only significant weaknesses are the poor tuner behaviour with weak signals and the turntable	Auto-reverse record, unidirectional play cassette, graphic equaliser etc.	R	89
<b>Sony LBT-V702D</b> £700	Average+ Good	Creditable up-market system with reasonable speakers and excellent cassette deck, amplifier, and a relative absence of superfluous gadgetry	Twin auto-reverse cassette deck, tuner/timer, video in/out circuitry	R	89
<b>Technics CDC30</b> £600	Good Good	A fine record player-less system whose electronics are well made and of moderately good performance, it's rescued from anonymity by excellent loudspeakers	5 disc multipley top loading CD player, twin auto-reverse cassette, tuner	R	89
<b>Technics CDX50</b> £750	Very Good Very Good	Conventional, well built but button bound sound system with a nearly adequate turntable and excellent loudspeakers etc.	Dual auto-reverse cassette system (tested with optional equaliser)	R	89
<b>Yamaha AST-C10</b> £530	Average+ Very Good	Brilliant if flawed luggable with weighty, powerful bass, and a rare combination of expressiveness and clarity unprecedented from such a small package. Good features.	Mains portable twin cassette/CD/radio system detachable speakers, remote	R	77
<b>Yamaha YST-C11</b> £600	Average+ Good	The cassette deck is a little wobbly in tone, but CD and FM are excellent, and bass depth is unusually prodigious from such small loudspeakers, though paid by with some loss of subtlety	'Astarte', dual auto reverse cassette, luggable, with remote control		89

## 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
<b>Akai AT-52L</b> £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
<b>Akai AT-93L</b> £250	Good+ Good+	By AM standards presentable (good) while FM delivers the goods	All bands, aerial switch	R	65
<b>Arcam Alpha</b> £120	Good Average+ +	Attractively classic British analogue tuner with sound quality comfortably better than most	FM/am analogue	BB*	50
<b>Arcam Delta 80</b> £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
<b>Harman Kardon TU920</b> £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
<b>Harman Kardon Citation 23</b> £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
<b>Linx Theta</b> £475	Good Very Good	A Magnum Dynalab on the cheap with the hallmark styling of this small British newcomer. Some of the best midrange from any tuner	Manual analogue tuning, no presets, signal strength meter	R	72
<b>Magnum Dynalab FT101</b> £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
<b>Marantz ST35L</b> £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
<b>Meridian 204</b> £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
<b>Musical Fidelity TI</b> £300	Good+ Very Good	Top class FM stereo sound on good signal strengths from this audiophile model. Watch out for local CBI	FM only, analogue box dial, manual tune, signal meter	R	55
<b>Naim NAT 01</b> £1294	Very Good Very Good	There may be better sounding tuners in the world, but we have yet to hear one	No presets. Two box, flywheel tuning FM only. Analogue	R	50
<b>Nakamichi ST-7E</b> £750	Good+ + Good+	Exceptionally good for weak-signal areas, and good all round	16 AM/fm presets, Schotz enhanced sensitivity, auto time digital		55
<b>Onkyo T9090 II</b> £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
<b>Pioneer F91</b> £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

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## TUNERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Proton AT-300 £199	Good Good	The AT-300 is pretty on the outside, orthodox on the inside and rather dear. AM – poor	FM/mw only	R	65
Quad FM4 £329	Very Good Good+	Fine sound, excellent ease of use, good build and finish and a more than satisfactory technical performance	7 presets. Digital	R	50
Revox B260 £1120	Excellent Very Good	Sophisticated and expensive, the B260 is ideally suited to the rest of the Revox range and should also work well in other systems	FM – virtually everything	R	60
Rotel RT-830AL £110	Good+ Good	Fine sounding budget audiophile material, no frills, no fuss	Manual dial analogue, FM, MW, LW	BB	55
Rotel RT-850AL £160	Good+ Good+	Scoring well on listening tests and one of the best sounding tuners at its price level, it was a bit let down on AM but RF performance was good	FM/am, digital	BB	50
SAE T-102 £449	Good+ Good+	Expensive for all the radio you get, but sounds interesting. AM – poor	FM/mw only	R	65

Rating refers to original, tested model

## HEADPHONES

There are a variety of different approaches to headphone design, and examples of each turn up in this group. Amongst the more expensive esoteric models, electrostatic drivers are used in square open-backed phones such as the Jecklin and Stax models. The majority of these come with some form of transformer which takes the signal initially from the speaker terminals on the amplifier. The actual speaker cables then travel from this unit *via* a

bypass switch to the loudspeakers

The more down to earth models feature dynamic drivers in circular open-backed designs. The advantage of open backs seems to be a correspondingly open sound and a less claustrophobic feel to the music. One can also of course hear external noises and irritate people on public transport.

The third category are closed-back designs,

which are useful in situations where it is necessary to block out background noise.

Another means of distinguishing different types is the way they sit on your head or ears. There are three styles: circumaural models enclose the ear and rest on the side of the head; supra-aural designs press on the outer ear (pinna); and intra-aural types rest inside the ear and are popular amongst users of personal stereos.

NAME PRICE	COMFORT SOUND	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
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 highish 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
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 DT990 £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

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## HEADPHONES

NAME PRICE	COMFORT SOUND	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
<b>Quart PMB 25H</b> £40	Good Good	Despite a somewhat unconventional suspension system the 25s put in a convincing and enjoyable performance with warm yet lively balance	Circumaural, open-back, dynamic	BB	55
<b>Quart Phone 70</b> £70	Good Good	Competent performers that were hard to criticise but lacked the life and sparkle of which some of the competition are capable	Circumaural, closed-back, dynamic		63
<b>Quart PMB 65</b> £70	Good Good	Quite revealing and neutral albeit with the usual closed back sound, this competes well with more established models	Circumaural, closed-back, dynamic	R	55
<b>Quart PMB 85</b> £90	Fair Very Good	These more expensive Quarts bear a striking resemblance to the Jecklin Float models and use two drivers per ear. Sound is a bit bass heavy but not bad overall	Circumaural, open-backed, dynamic		63
<b>Realistic Pro-X</b> £25	Poor Average—	Robust, unanimously uncomfortable and heavily veiled in sonic terms – not a great success	Supra-aural, closed-back, dynamic		75
<b>Ross RE2530 CD</b> £20	Average Average	Rather an 'average' £20 phone that some found uncomfortable due to high pressure on the ears. Sonic balance is on the bright side	Supra-aural, closed-back, dynamic		75
<b>Ross RE2560 CD</b> £25	Good Average+	If you're not too fussy about quality of finish and don't have an elfin head then these British phones warrant attention. Sound could be smoother	Supra-aural, semi-open, dynamic		75
<b>Ross RE-2760</b> £35	Poor Fair	Stylish white cans from the only British firm in the business. Unfortunately sound quality is not up to par in this price range	Supra-aural, closed-back, dynamic		63
<b>Sennheiser HD40</b> £20	Very Good Good—	Very light and comfortable headphones with an even sonic balance that will suit most sources, but jack is 6.3mm and not suited to personals	Supra-aural, semi-open, dynamic	BB	75
<b>Sennheiser HD450</b> £35	Good Fair	Modern, simple and lightweight phones that are remarkably robust and which turned in a relaxed if weighty performance that was at worst pleasant	Supra-aural, semi-open, dynamic	R	63
<b>Sennheiser HD480</b> £45	Good Fair	Using the same shell as the 450s, the 480s were a little softened and unrevealing by comparison with their competitors	Supra-aural, semi-open, dynamic		63
<b>Sennheiser HD520</b> £65	Good+ Good+	A very comfortable and musically capable headphone. If you've got this sort of bread to blow on cans, give 'em a blast	Circumaural, semi-open, dynamic	R	75
<b>Sennheiser HD530</b> £75	Very Good Good+	One of the better dynamics in its group, the 530s create a sense of space that eludes most sub £100 cans, and they're dead comfy to boot	Circumaural, semi-open, dynamic	R	75
<b>Sennheiser HD540 Ref Gold</b> £160	Good Very Good	The 540 Golds prove that dynamic headphones can be subtle, informative and capable of creating a remarkable sense of space	Circumaural, open-back, dynamic	R	55
<b>Sony A21L</b> £20	Good— Good—	Forward facing in-ear drivers on a folding plastic band provide exceptional clarity for such an inexpensive phone. However, no bass, and fit isn't to everyone's taste.	Intra-aural, semi-open, dynamic	BB	75
<b>Sony MDR V3</b> £30	Fair Good	Portable stereo oriented phones that are very nicely made and combine clarity with a pleasant lack of distortion	Supra-aural, closed-back, dynamic	BB	63
<b>Sony MDR V7</b> £70	Very Good Very Good	Classy sounding cans that are very slick and work well with all types of music, setting the standard in their price range	Circumaural, closed-back, dynamic	R	63
<b>Sony MDR-CD999</b> £120	Good+ Very Good	A very nice headphone in all respects, the 999s are worthy of the best headphone outputs and high quality sources	Supra-aural, semi-open, dynamic	R	75
<b>Sony MDR-R10</b> £2500	Excellent Very Good+	Costly state of the art sealed moving coil design built to the highest standards using the finest materials. Sound quality reflects this care, being big, clear, sweet and refined	Circumaural, closed-back, dynamic	R	72
<b>Stax SR34</b> £140	Fair Very Good	The least expensive Stax headphones around, the SR34s are lively and rhythmic with good tight bass and a sweet midrange	Supra-aural, open-back, electret		55
<b>Stax SR84</b> £210	Very Good Very Good	The stepping stone between dynamics and full electrostatics, these electret phones are revealing, open and highly enjoyable	Supra-aural, open-backed, electret	R	63
<b>Stax Gamma pro/SRD-X pro</b> £296/£230	Very Good Excellent	The Gamma pros are like a stethoscope for your hi-fi, revealing subtleties that many loudspeakers fail to resolve	Circumaural, open-backed, electrostatic	R	63
<b>Stax SR Gamma</b> £299 (inc. SRD-6 Adaptor at £100)	Very Good Very Good	The next model down the Stax range from the Lambda, the Gamma is an excellent headphone with little to criticise but the price	Circumaural, open-back, electrostatic	R	55
<b>Stax SR Lambda Pro</b> £545 (inc. SRD-7SB Mk 2 Adaptor at £185)	Very Good Very Good	A bit of an industry reference the Pros are frighteningly revealing, bringing across more information than loudspeakers costing twice as much	Circumaural, open-back, electrostatic	R	55
<b>Stax SR Lambda Pro</b> £360/ <b>SRM-1 energiser</b> £635	Very Good Excellent	This combination extracts layers of information that other headphones only hint at. The SRM-1 has more edge than the SRM-T1, but it's good	Circumaural, open-back, electrostatic	R	75
<b>Stax Lambda Signature/SRM-T1</b> £470/£895	Very Good Excellent	The Signature when combined with the SRM-T1 valve driver must be the most transparent headphone available	Circumaural, open-backed, electrostatic	R	72
<b>Yamaha YHL-006</b> £30	Average Average	Unusual personal stereo oriented phones that curl up when not in use. Earphones are like golf balls and balance is well suited to Walkmans	Supra-aural, open-back, dynamic		75

## PERSONAL STEREO

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than all manner of domestic systems and as such demand some attention. Now that personal CD players have joined the ubiquitous Walkman in the market, the variety and standard of sound quality is huge, with obscurely named cassette players practically falling out of your cornflakes packet and Discmen going for £300.

Despite their diminutive size personals attempt to incorporate as many gimmicks and features as

possible, cassette players often incorporating tuners, graphic equalisers and Dolby noise reduction. CD players are still relatively expensive and don't tend to vary that much on the features front, rather the amount and quality of accessories differs. Most models come with a mains adaptor and some include remote control.

Sound quality on the cassette front seems to have a proportional relationship to price and integrity of construction – wow and flutter being quite obvious on the cheaper models. CD players

become less noisy as they get dearer and also reduce in size, one drawback of the latter seems to be that immunity to shock suffers as a consequence. Cassette players do, on the whole, seem better suited to the outdoor life than their digital counterparts, as does the software. Bear in mind that the sound and lab ratings given below cannot realistically be compared to those in other categories or between cassette and CD personals.

## PERSONAL CASSETTES

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Aiwa HS-PL300</b> £110	N/a Average	Good looking, simply laid out player with a sensible selection of features and reasonable sound quality for a small player of this price	Dolby NR, chrome/metal eq, remote		78
<b>Aiwa HS-PX303</b> £150	N/a Good	Chunky and macho styling combines with comprehensive features and a half decent transport to make a powerful personal	Dolby B & C, chrome/metal eq, remote	R	78

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## PERSONAL CASSETTES

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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 £200	N/a Good-	Beautiful little machine with all the necessary buttons'n'switches and a fundamentally exceptional sound quality, marred unfortunately by wow and flutter	Dolby B & C, chrome/metal eq, remote, folding phones		78
Sony Walkman Pro £249	Good+ Very Good	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, it takes other personals to the cleaners (except on weight and power consumption)	Dolby B, C, types I, II & IV, record, line in/out, varispeed	BB	52/56
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
Sanyo CP-12 £260	Fair Good+	Sonically amongst the more enjoyable personal CD players and capable of revealing the musical aspects of a disc in an interesting and entertaining fashion	12.5 x 2 x 12.7cm, 380g, wired remote, mains adaptor	R	66

## CD PORTABLES

CD Portables or Yuppie Blasters as we classified them are basically portable stereos gone digital, ie a compact disc player is included alongside the usual AM/fm radio and single or double cassette deck. Compact disc is a novelty that seems to add a fairly hefty premium onto the price of the standard ghetto blaster, but the improved sound quality over standard cassettes may justify this for some.

In virtually every case a CD output socket is

fitted which means that it's possible to play silver discs through a domestic amplifier and loudspeakers, thus they are some sort of substitute for standalone mains machines (as are the personal CD players). One drawback with having a CD player on board is that batteries are gobbled up even quicker than usual, up to ten batteries being required in some cases. Neither are the units particularly light, the heaviest weighing eight kilos!

However they do all run off the mains too, and come with an appropriate lead for this purpose. Other useful features common to most are spare input sockets to record from an external line source such as a preamplified vinyl disc signal, and microphone sockets for recording live events (although the usual lack of record level adjustment is a nuisance).

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa 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
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

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## STANDS AND SUPPORTS

It's becoming more and more apparent that all the components in a hi-fi system benefit from being placed on the right kind of support. It is already acknowledged that performance of electro-mechanical transducers, such as turntables and loudspeakers, can be greatly improved by using highly rigid supports. This notion has been expanded to include electronics such as amplifiers and compact disc players, and inevitably a broad range of stands and supports have been produced to cater for this requirement.

With loudspeaker stands there seems to be two

broad schools of design. The most common is the open frame type which uses square section steel tubing (usually less than an inch square) made up to form a tripod or quadropod stand usually fitted with spikes top and bottom to ensure good coupling to both floor and cabinet. However, for reasons of domestic harmony this latter option is often not pursued as eagerly as perhaps it should be. The alternative approach is to use mass. Larger section (approximately 3 inch x 2 inch) tubing is welded between square top and bottom plates and filled with sand and/or lead shot. Again, this type uses

spikes at the base but Blu-tack or the like for coupling with the speaker cabinet.

Equipment supports generally place isolation quite high on the list of priorities and usually use a lightweight steel frame to support an MDF platform. Once again spikes are used to minimise contact with the platform and ensure good coupling to the floor. Minimising weight without compromising rigidity seems to be the aim with turntable supports but those designed for electronics often employ some form of damping to kill vibration, sometimes in the form of mass.

## LOUDSPEAKER STANDS

MODEL PRICE	TYPE FINISH	COMMENTS	TOP PLATE SIZE HEIGHT	VALUE	BACK ISSUE FULL REVIEW
Appolo A820 £44	4 leg Fair	A light open-framed budget design slightly lacking in rigidity and subjectively superceded by other stands costing £10 more.	19 x 19cm 53cm		58
Appolo A10 £52.50	4 leg Fair	A robust and lightweight model, it would make an ideal upgrade for those still happy with the big boxes of old.	19 x 19cm 44cm	R	58
Audio Dimensions Classic 2 £110	4 leg Average	Built in the heavyweight tradition and damped with chalk. Solid, stable, tactile sound	20.3 x 20.3 x 52cm	R	83 supp.
Foundation Fred £70	2 leg Average	With sand filling the Freds made speakers sound tight and coherent with a more even balance.	19 x 19cm 36/43/59cm		58
Foundation Sir Fred £80	2 leg Good	Upgraded 'Fred' with special in-fills. Sweet sound but one that also lacks bite and edge	19 x 19 x 46.5cm		83 supp.
Foundation Maggi £159 to order	Pair Very Good	Made for Magneplanar and other similar panel speakers they seem to have a healthy effect on the sound quality thereof.	50 x 2cm 2cm	R	58
Foundation Pi £269 to order	2 leg Very Good	Overpriced in material terms the Pi nevertheless has a very positive effect on the low frequency performance of conventional speakers.	20 x 20cm 25/38/46/53cm	R	58
Goldring Black Satin £65	1 leg Very Good	Screw together stand tastefully hewn from medite. Some loss of bass but still pleasantly rhythmic	18 x 20 x 46cm	R	83 supp.
Heybrook Point 5 £55	3 leg Very Good	An unusual triangulated open frame stand that can help certain speakers sound more transparent and fluent – a good value stand	23 x 21.5cm 47cm	BB	58
Heybrook HBS1 £99	4 leg Very Good	With its new aluminium base frame the HBS1 fared very well in the listening tests. It allowed much of the speakers own 'sound' to remain intact.	23 x 21cm 47cm	R	58
Linn Kan II £79	4 leg Very Good	Built to support Linn's Kan speaker this stand is well suited to the task, but is less successful with other loudspeakers	19 x 16cm 59cm		58
Linn Sara £85	4 leg Very Good	The Sara exhibits some odd properties so its use other than with the Sara loudspeaker should be viewed with caution.	25 x 21cm 53cm		58
Monotrak Engineering M1 £58	1 leg Good	The M1 gave the mid and treble a commendably smooth and detailed presentation but bass sounded rather lacklustre and muddy.	19 x 18.5cm 48cm		58
Monotrak Engineering M4 £58	4 leg Very Good	Begging comparison with Heybrook's HBS1 the M4 maintained much of the openness and forthright detail of that model.	23 x 21.5cm 53cm	R	58
Monotrak Engineering M4S £58	4 leg Very Good	Its stature and stability would seem to mark it out as most suitable for smaller, lighter cabinets. The M4S possessed an open midband and clear treble.	20 x 17.5cm 53cm		58
Origin Live Three Leg £89	3 leg Good	An unusual tripod stand devoid of top plate and taking up more floor space than normal, subjective and technical performance was exemplary.	(support area) 22 x 17.5cm 52cm	R*	58
Origin Live Advanced £145	3 leg Good	One of three related tripod-like stands. Stable sound with good sense of depth and power	22 x 20.6 x 44cm		83 supp.
Partington PP4 £60	1 leg Good	The PP4 offers a rather mixed performance, though when damped with sand infill it was less ready to embellish the overall sound and low frequencies became tauter and quicker.	18 x 16.5cm 48cm		58
QED TS22 Tristand £60	3 leg Very Good	Most tracks sounded uplifted or buoyant, never thick nor coloured. It worked well with most of the speakers tried and encouraged a fluid and revealing midband	19 x 17cm 45/50/58cm	BB	58
Stand Design Z20 £70	1 leg Excellent	Well built and finished with optional sand in-fill. Ideally suited to Wharfedale 505.2's	16.5 x 19 x 50cm	R	83 supp.
Target T-40 £48	2 leg Very Good	Not very stable, tends to infer a slightly forward, ragged sound with diluted pitch	19 x 19 x 40cm		83 supp.
Target HS20 £60	1 leg Excellent	This monopod stand can be used either filled or unfilled and encourages different characteristics in the sound accordingly.	19 x 16.5cm 53cm		58
Target HJ15/3 £100	3 leg Very Good	Sound quality was basically very good though without the sand infill some loudspeakers may sound a little unbalanced as both bass and treble regions are subjectively exaggerated.	28 x 28cm 40cm	R	58

## EQUIPMENT SUPPORTS

MODEL PRICE	TYPE FINISH	COMMENTS	SIZE (H x W x D)	VALUE	BACK ISSUE FULL REVIEW
Alphason R444 £120	Rack Good	A heavyweight structure with stressed MDF shelves, ideally suited to the Sonata turntable	82 x 60 x 39.5cm	R	83
Audioquest Sorbothane Feet £40 for four	Feet Good	These large gumdrops are very useful for damping vibrations in amplifiers and especially CD players.	6.5 x 2.5cm (circular)	R	57
Cornflake TCS6 £60	Shelf Good	A squat and rigid frame supports a Medite top board with four adjustable spikes, better suited to suspended sub-chassis turntables.	43 x 23 x 33cm		57
Foundation Stable Table £100 (with Super Board)	Table Good	Similar to Stand Design's table though less well finished and certainly less stable	64 x 46.5 x 36cm		83
Origin Live Skyline Super £100	Table Good	An asymmetric table that helps provide a quick, lucid and solid sound with most decks	41 x 50 x 40cm	R	83
Roksan Equipment Table £169	Rack Good	An upgradable/expandable system suited to Roksan's Xerxes if not other competing turntables	65 x 52 x 38cm		83
Sound Organisation Table £55	Table Very Good	A deceptively simple structure that just happens to be engineered in a thoughtful, and ultimately successful manner.	37 x 45 x 35cm	BB	57

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## EQUIPMENT SUPPORTS

MODEL PRICE	TYPE FINISH	COMMENTS	SIZE (H x W x D)	VALUE	BACK ISSUE FULL REVIEW
Sound Organisation Wall Stand £40	Shelf Very Good	The first of its ilk and still amongst the best, this simple framework represents a vast improvement over standard furniture shelves.	27.5 x 43 x 35cm	BB	57
Sound Organisation Z022 £97	Table Excellent	A small but costly table made from thin steel tubing. Suited to the LP12 but not other decks	49 x 45.5 x 36cm		83
Stand Design Duplex £75	Table Very Good	Well made and nicely finished, this table is broadly compatible with most heavy turntables	63.5 x 46.5 x 36cm	R	83
Target TT1 £46	Shelf Excellent	This rigidly braced shelf offers both good sound quality and material value for money	26 x 46.5 x 35.5cm	BB	57
Target TT2 £55	Table Very Good	Standing up to the best in most areas, the TT2's only real foible concerns a slight loss of bass 'slam'.	52 x 46.5 x 35.5cm	BB	57

\* rating refers to original tested model

## CABLES AND CONNECTIONS

Although cables and connections are sometimes thought to be the least important items in an audio system there has been a growing awareness in recent years that they have a significant effect on sound quality. To this end there is now a vast array of exotic cables and interconnects available to those interested in experimentation. The key observation on cables is that they are much more than mere accessories. Carrying the audio signal, just as any amplifier does, it's really not too surprising that they can influence sound quality.

The characteristics of any cable are determined by the materials and topologies utilised in its construction. The purity of the conductor, nature of the insulator dielectric, mechanical construction, physical geometry, RF characteristics, efficiency of screening and finally the connectors themselves, all play vital roles in the sonic character. These factors tend to vary more with interconnect cables which are used to carry the signal between active components like pre and power amplifiers. The interconnects summarised here were tested in 1m

terminated lengths and therefore the results and prices relate to that length – some cables may well perform differently when used in longer lengths. What's more most cables are significantly cheaper if you are prepared to fit plugs yourself.

The features column contains information on the material make-up of the different cables with the following abbreviations: OFC – oxygen free copper, OFHC – oxygen free high conductivity (Audionote define the HC as high crystal), PC-OCC – pure copper by ohno continuous casting, LC-OFC – linear crystal oxygen free copper.

## INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Audioquest Livewire Topaz £35	Good Fair	Sounding 'bigger' and faintly richer than Reference 2, Topaz was also slightly 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
Chord Mono-t £27/1.2m	Average+ Average+	Offers a slightly rolled-off treble but its rich sound is an upgrade from patch-cords	Unsymmetrical 4-conductor cable		83 supp
Deltec Slink £32	Good Very Good	Ideally used in lengths of under 4 metres, it errs on the lean side of neutral but has an uncommon transparency in the midrange.	4 silver plated OFC strands PTFE dielectric	BB	59
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
Deltec Gortex Black Slink £152	Very Good Excellent	A true reference quality cable providing an exceptionally detailed and transparent sound	Symmetrical, 8-conductors. Gore-tex ins.	R	83 supp
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
Isoda Electric HC-05-PSR £54	Good Good	A pleasantly lively and fluid sounding cable though softens some subtle, midband detail	Aluminium + brass multistrand cable	R	83 supp
Kimber Kable 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-AG £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 300 £24	Average+ Average	A big, larger-than-life sound but with some emphasis of midband detail and loss of bass	Screened, symmetrical cable		83 supp.
Monster Interlink 400 £34	Good Good	Bass is solid and punchy, counterpointed by a slightly overblown midband which tends to make vocalists sound larger-than-life.	Multi-gauge	R	59
Origin Live Soli-Core Super £60	Good 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
Supra EFF-1 £60/0.75m	Average Average	A new, costly and mildly disappointing addition to the range. Edgy, smeared sound	Screened, symmetrical dir cable		83 supp

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## INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Thorens SAC 100</b> £50	Good Fair	Performance is undermined by a slightly coarse and splashy treble, not necessarily bright, simply rather confused – and fine detail lacks resolution.	Silver-plated OFC, coaxial		59
<b>van den Hul MC-D300II</b> £45	Poor Good	It tended to highlight some upper mid detail, but a generally open and spacious acoustic proved its saving grace. Slightly soft at LF.	Silver plated single strand VdH plugs	R	59
<b>van den Hul MCD-1021II</b> £69	Good Good	Possessing the same endearing qualities as the D300 it presented open and transparent soundstages and improved timbral resolution.	Twin axial silver plated copper	R*	59
<b>van den Hul Thunderline</b> £150	Good Fair	Thunderline essentially parallels the sonic performance of the cheaper D102. HF is occasionally tainted by a 'tizzy' 'coarseness', bass is tight and dry.	Silver plated 'matched copper'		59
<b>van den Hul MC-Gold</b> £250	Fair Good	It possesses a rich and beguiling treble balance that matches a weighty, slightly warm bass character. Seductive balance may prove worthwhile in some circumstances.	Silver & gold plated copper		59
<b>van den Hul MC-Silver</b> £750	Good Good	Although remarkably transparent for an asymmetric design this costly cable was not considered to be of 'state-of-the-art' standard, and is bettered by cheaper models.	19 silver plated copper strands		59
<b>Vecteur 8045</b> £49	Very Good Good	Sounding solid and forthright it might seem slightly cold in some systems but the treble 'edge' is mercifully clean. Very low frequencies were a little lacking in 'slam'.	LC-0FC signal & screen	R	59
<b>Yfere LC-0FC Quad</b> £85	Very Good Very Good	New cable with a very refined sound. Very transparent with good sense of focus and space	Symmetrical, star-quad with screening	R	83 supp

## LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Absolute Wire Force 4</b> £4.75 per metre	Good Fair+	By current standards there was a loss of fine, sharp detail at the frequency extremes, but it has a big and friendly sound	744 OFC strands, PVC dielectric		64
<b>Audio Innovations OR-200</b> £16 per metre	Fair+ Fair+	Open and detailed throughout the midband but a grainy coloration tended to corrupt subtle timbral information at very high frequencies	200 LC strands, polyurethane and cotton dielectric		64
<b>Audionote AN-SP</b> £100 per metre	Average – Excellent	A clean and open sounding cable that offered a deep and pleasantly detailed perspective. Bass was slightly restricted, but seemed tight and coherent nonetheless	15 silver strands, polyethylene dielectric		64
<b>Audioquest Livewire Black</b> £15 per metre	Good Good	It proved clear and punchy but with some grain across the treble. Nevertheless Black remains an interesting concept and proved better than Livewire Green	OFHC, surface only – foam core construction	R	64
<b>Audiospec Latitude L4</b> £3 per metre	Average+ Average+	Warm, ruddy but also mildly muddy sound with some slight emphasis of bass notes	Figure-of-eight multi-strand, PVC dielectric	R	83 supp
<b>Audio Technica AT6120</b> £10 per metre	Fair+ Fair	Compared to earlier LC-0FC cables this PC-OCC derivative sounded smoother and less aggressive	PC-OCC, PVC dielectric		64
<b>Bellwire</b> 12p per metre	Poor Average –	Broadly speaking it delivered a bright and tizzy sounding treble with a fairly open and detailed mid with little or no bass resolution	0.5mm single strand, PVC dielectric		64
<b>Deltec 8S</b> £144 – 5m pair	Good Good+	The unerring transparency and detail resolution of 8S throughout the midband makes it a far cleaner and more spacious sounding cable than others at the price	4 silver plated OF copper strands, PTFE	R	64
<b>Deltec Gortex Black 16</b> £528 – 4.5m pair	Very Good Excellent	Improvements in bass resolution, transparency and treble poise maintains status of this cable	Silver-plated OF copper with Gore-tex ins.	R	83 supp
<b>DNM Solid core</b> £3 per metre	Average Fair	A good general-purpose solid-core, though too bandwidth limited for high-end applications Sounds great in some systems	0.65mm single strand, webbed PVC dielectric	R	64
<b>Exposure</b> £2.50 per metre	Good Good	It could sound a trifle matter of fact but this emotive flattening was also somewhat dependent on the music program. It is also highly suited to long runs	56 OFC strands, webbed PVC dielectric	R	64
<b>Furukawa FS-2F09</b> £6 per metre	Good Average+	Some loss of bass weight but otherwise offers a fresh and open sound. Good value	Multi PC-OCC stranding, PVC dielectric	R	83 supp.
<b>Furukawa FS-2T15S</b> £50 per metre	Good+ Very Good	An advanced solid-core cable with a highly fluid, detailed and inherently musical sound	Single 1.5mm Super PC-OCC strands	R	83 supp.
<b>Kimber 4VS</b> £7.15 per metre	Average+ Average	Similar construction to 4TC but dissimilar materials infer a slightly tizzy sound	Open-weave, multi-strand with PVC ins.		83 supp.
<b>Kimber Kable 4PR</b> £54 – 5m pair	Fair Fair+	This directionally marked cable benefitted from an open and airy treble quality but seemed notably leaner than 4TC. Bass was well round and satisfyingly taut	4 x 7 copper strands per conductor, PVC dielectric		64
<b>Kimber Kable 4TC</b> £17.65 per metre	Good Good+	4TC made a great impression in the listening tests with an open midband, a smooth and unfatiguing treble with slightly rich but suitably weighty bass	OF copper, PTFE dielectric	R	64
<b>Linn K20</b> £2.20 per metre	Good Fair	Subjectively it erred on the forward and bright side of neutral but enjoyed an essentially clear and punchy delivery	56 OFC strands, webbed PVC dielectric		64
<b>Marantz ML-55S</b> £30 – 10m	Fair Fair	Subjectively this cable offered a loose and splashy treble which, though not overtly bright, did compromise both tonal and timbral accuracy	30 OFC strands, 3 conductors PVC dielectric		64
<b>Mission Cyrus</b> £2.50 per metre	Average+ Good	Because of its impedance characteristic this cable will deliver a smooth and unfatiguing treble balance with loudspeakers offering an easy load	0.8mm single strand, PVC dielectric	BB	64
<b>Monitor PC Silverline PC4</b> £5.75 per metre	Good Average	Sonically it laboured under a heavy and claustrophobic balance, lacking the see through transparency and lucidity of the better solid core cables	2072 x 0.07mm silver plated copper strands		64
<b>Monster SCI 16-4</b> £3 per metre	Average Average	Not as thick-sounding as early Monster cables but still slightly unbalanced. Versatile construction	4 x 16-gauge conductors. OF copper strands		83 supp.
<b>Monster Original</b> £4.50 per metre	Good Fair+	Original sounded relatively congested and murky at higher frequencies but possessed weight and conviction in the bass	Multistrand		64
<b>NVA LST</b> £6 per metre	Average+ Good	A light and breezy sounding cable best suited to short lengths, NVA benefitted from a clear and transparent outlook	7 x 0.25mm silver alloy strands, PTFE	R	64
<b>Origin Live Soli-Core Ordinary</b> £1.80 per metre	Good Fair+	Subjectively it bettered the performance of the costlier Super version, affording a pleasantly detailed and spacious soundstage with firm bass but slightly coarse treble	1.8mm and 0.5mm single strands	R	64
<b>QED 79-Strand</b> £1 per metre	Good Fair	For much of the last decade QED 79-Strand has been the first port of call for enthusiasts on the upgrading ladder, a tradition that should still hold true today	79 strand, PVC dielectric	R	64
<b>QED Incon Graphite</b> £2 per metre	Fair+ Fair+	This graphite version of Incon sounded cruder and generally more heavy handed than the cheaper unshielded type. Overall presentation was mildly restricted and cloaked in a faint aurai fog	OFHC, polymeric screen		64
<b>QED Flat 200</b> £2.20 per metre	Good Good	I detected a degree of confusion at low frequencies but this did not stifle the acoustic atmosphere which remained open and positive	200 strands, flat webbed PVC dielectric	R	64

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## LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Rotel Supra 4</b> £2.57 per metre	Good+ Good	Ideal for both long and short runs, it furnishes a big sound that benefits further from a smooth, unfatiguing treble	1,036 OFC strands, webbed PVC dielectric	R*	64
<b>Rotel Supra 10</b> £6.91 per metre	Good+ Good	Supra 10 provided a very free and open sound that was unhindered by any excess at low frequencies. Worth its weight in scrap copper!	2,562 OFC strands, webbed PVC dielectric	R*	64
<b>Solid core mains cable</b> 36p per metre	Fair+ Good	It enjoys much of the smooth treble and articulate midrange usually associated with the better solid core derivatives. Lean but taut and rhythmically coherent	1.5mm square, 3 cores, PVC dielectric	BB	64
<b>Sterling</b> £99 per metre	Fair Fair	This pre-production sample possessed a strangely muddled and reserved sound quality. It suffered from a progressive instrument modulation	Pure Silver, PTFE dielectric		64
<b>Townshend Isolda</b> £400 - 5m pair	Fair+ Good	Isolda possessed a truly dark background out of which rose a very solid and extended bass together with an excellent sense of transparency through the upper octaves	8 coax cables per conductor - very thick	R	64
<b>van den Hul CS-122</b> £5.95 per metre	Fair+ Good-	Characterised by a driving and powerful bass, CS-122 proved to be a heavy sounding cable. Mid treble detail was refreshingly clear but there was a slightly muted air about the extreme treble	19 x 0.45mm silver plated strands, webbed rubberised dielectric	R	64
<b>van den Hul CS-352</b> £12.95 per metre	Good Fair+	Subjectively it sounded like CS-122 only more so, the deep rumbling bass tending to overwhelm subtle musical details. It also appeared a trifle peaky in the treble	7 x 0.76mm + 168 x 0.125mm silver plated strands, rubberised dielectric		64
<b>van den Hul SCS-12</b> £29.95 per linear metre	Good+ Good+	SCS-12 set a high standard with a tight and well focused soundstage populated with tactile stereo images. Bass wasn't as extended or resolved as some other cables	19 silver plated strands of 12 different gauges, PTFE dielectric	R	64
<b>van den Hul SCS-2</b> £99.95 per linear metre	Good+ Good+	Overall it was commendably neutral and transparent but nothing less would be acceptable bearing in mind the tremendous cost of a stereo pair	665 silver plated matched crystal copper strands, PTFE dielectric	R	64
<b>Vecteur R-CV30</b> £4.99 per metre	Fair Good	Subjectively the better of Vecteur's three-strong cable line-up offering a neutral overall perspective but with a slight loss of detail resolution at both frequency extremes	4 x 0.8mm LC-OFC PTFE insulated strands	BB	64
<b>Vecteur S-CV90</b> £69 per metre	Fair+ Fair+	It seemed both less transparent and integrated throughout the midband than R-CV30, though both frequency extremes were spruced up with a tighter sharper delivery	6 x 0.7mm LC-OFC 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
<b>Alpine 7282L</b> £250	Good Very Good	A very attractive and seductive sounding player. The matt surfaced transparent preset keys are especially sexy	Bass/treble controls, 12 FM 6 AM presets, chrome eq., clock, 8W	R	61
<b>Alpine 7905M/3539</b> £650/£350	Excellent Excellent	An easy to use and attractive CD/tuner, partnered with a powerful and flexible amplifier to give an effortless source of in-car entertainment	Bass/treble controls, 12 FM, 12 AM presets, slide-out, 150W	R	68
<b>Clarion 916HP</b> £160	Good Average	With its rubbery buttons and touches of white this is a modest looking player let down by a weak cassette	Bass/treble controls, 5 FM, 5 AM presets, 9W		61
<b>Clarion 946HP</b> £250	Very Good Very Good	A good FM side let down slightly by AM performance. This Clarion is particularly nice to use with its nifty SAM tuning system	Bass/treble controls, 12 FM/6 AM presets. Slot-in, 15.1W	R	61
<b>Clarion CDC7000/10028HA</b> £650/£250	Very Good Excellent	Despite a slightly off-beat cartridge system the Clarion combo put in a performance that had the sonic edge over other CD/tuners in its test group	Bass/treble controls, 12 FM, 12 AM presets, security code, 80W	R	68
<b>Goodmans GCE229</b> £150	Fair Average	If knobs, switches and legends are your bag then the GCE229 is the one for you - a lot of gizmos for the price and it even sounds OK	Bass/treble controls, 6 FM/6 AM presets. Chrome eq., clock, MSS, 10.1W	BB	61
<b>Nakamichi TD-400E/PA-300 II</b> £495/£329	Very Good Very Good	If you want your in-car entertainment to compete on sound quality grounds with your domestic system, this combo offers a very strong challenge	Bass/treble controls, 5 FM, 10 AM presets, uni-directional, chrome eq., Dolby B, C, 75W	R	62
<b>Nakamichi TD-700E/PA-300II</b> £874/£329	Very Good Excellent	For those who appreciate the wonders of analogue there are few in-car players to really compete with this superb cassette/radio. You can even adjust azimuth	Bass/treble controls, 6 FM, 6 AM presets, music search, Dolby, 75W	R	68
<b>Panasonic CQ-497</b> £117	Fair Poor	The CQ-497 has a traditional style analogue tuning system making it easy to use. AM reception was good but the other sources are less encouraging	Bass/treble controls, chrome, NR, 7W		62
<b>Philips DC680</b> £180	Average Good	A colourful and musically competent player that despite a gammy volume knob is well worth checking out	8 FM, 4 AM presets 3.5W	R	61
<b>Pioneer DEX-M300/CDX-M100/ GM-3000</b> £300/£450/£280	n/a Very Good	Separate control unit and boot mounted multi play autochanger make this a bit of a hefty installation but it uses the same magazines as their domestic players and sounds fine	Bass/treble controls, 18 FM, 6 AM presets, 80W, removable fascia		68
<b>Proton 214CD/D275</b> £300/£175	Very Good Very Good	This Proton cassette/tuner offers good power and a level of fidelity appropriate to its price. Musically it has a Decca-like charm that is very appealing, plus a sensitive radio	Bass/treble controls, 8 FM, 8 AM presets, Dolby B/c nr, chrome eq., 85W	R	68
<b>Sharp RG-F816E</b> £200	Poor Average	Nothing if not novel the 816, with its unusual anti-theft system is custom built for the furry dice brigade, but is sonically a bit lacklustre	Four band graphic, 8 FM, 16 AM presets, ASP, Dolby, MSS, 10.9W		62

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

IN-CAR ENTERTAINMENT LOUDSPEAKER CABLES

HI-FI CHOICE

# Personal Messages

*A rather traumatic month in the Messenger household.  
Fortunately, the story has a happy ending.*

It all started with a rather rash decision to let/get Linn to update my turntable, a foolhardiness inspired by hearing the *Lingo* power supply whilst visiting Glasgow recently. Last month's *Sessions* describes how impressed I was by this £500 update (see page 38 for Malcolm Steward's full, detailed and equally enthusiastic lowdown on the device). I still rate the *Lingo* a very important step forward, but have to add the rider that inserting it into my own established system has not been an entirely painless experience.

This statement requires a fair amount of qualification. To start with, the motor drive side of my Linn (as was) had already undergone heavy modification by Naim Audio some years previously. Although never commercially available, Naim's so-called *Armageddon* modification, using a large outboard transformer, was to my ears a big improvement over Linn's standard *Valhalla* drive. Despite the point of principle that someone in my position ought really to use equipment which is generally available (giving readers at least an opportunity to relate their prejudices to mine), the sound improvement was so good I couldn't resist the temptation.

## Going legit

The arrival of *Lingo* therefore looked like the perfect opportunity to go legit again. The Glasgow session had left me in little doubt that this new crystal oscillator drive had at least the potential to match Naim's transformer, but an away-from-home engagement is never as satisfactory as trying something at home, with well known records and in familiar surroundings.

With hindsight, I should have insisted that only the motor drive power supply was changed, as was the original intention, at least

until I'd had the chance to do some listening. The Linn rep wanted to carry out a complete rebuild/update and since he was several hours late arriving, it just seemed simpler to get the whole lot done in one go. This 'whole lot' involved fitting the latest suspension springs and rubbers, plus a complete new main bearing assembly and inner platter. The motor drive might have been changed without interfering with the set-up, but the rest amounts to almost total dismantling and reassembly - a process which took several hours, partly because the guy in question (when he finally arrived) was unfamiliar with the set-up of my unipivot Naim ARO tonearm.

The moment of truth came late into the evening, and initial results seemed quite promising, even though the handling and set of the arm/deck had altered considerably. Slightly harsh at first, the sound started settling down nicely after the first half an hour or so, and I was already enjoying the startling midrange clarity and focus that is *Lingo's* trademark. I was a little unsure of the bass perhaps, but we bade farewell to the man from Linn and prepared ourselves for an extended late night session.

However, having started to settle down, the sound continued to do just that, becoming duller and duller, until, an hour or so later, in exasperation, we went for an early night instead. The sitting-up-'til-dawn-playing-records session actually happened a few days later, after I'd found the necessary several hours for one as inexperienced as I to have another go at the Linn suspension (which had seemed all too ready to send the ARO into odd oscillations in the original set-up).

Although I'd enjoyed my 2am-5am stint on day three, by the morning of day four the sound seemed to have

lost its magic again. Another few hours messing about with springs, spirit levels and whathaveyou, and I finally got to the point where things were at least pretty consistent, and pretty damn good as well. But, just what contribution is made by *Lingo*, and what is down to the set-up and the other new bits and pieces is impossible to say.

## Less 'grunge'

The *Lingo'd* Linn delivers a startling improvement in clarity and detail across an extraordinarily wide bandwidth, all of which is immensely impressive. Stereo focus is so good one starts to question whether *Isobarik* stereo is really as compromised as many people claim. The leading edges of vocals are remarkably convincing, while bass notes seem significantly stronger than before, and appear out of a mysteriously low level of background 'grunge'.

I can't argue with the speed or dynamic range of *Lingo*, but spent the first fortnight rueing the fact that the system now sounded significantly more aggressive than before. Surface and groove damage noise had become uncomfortably obvious, the sound had a tendency to hang around the boxes, and the bass had taken on a 'thickened' texture. Instead of enjoying my new toy, I was actually spending less time listening to records. Part of the explanation seemed to lie in the old adage about opening the window wider only to let more muck in, but that didn't explain the mis-timing and boxiness.

The happy ending was as unexpected as it was gratifying. More than one person recently suggested I should try out a contact cleaner called *Kontak* (made by Stilton and marketed by Path). Normally, I regard all such unguents and potions with the deepest suspicion, bullshit detectors tuned to

maximum sensitivity.

However, on this occasion, the tip-off originated from people of equal scepticism, whose ears I knew were trustworthy, so I had a go.

After a day or three pensively counting the number of contacts in a tri-amp system (literally hundreds), and calculating the number of man hours involved in the task (at least four), I took cotton buds in one hand and pipe cleaners in the other and got down to it. The effect on the power amplifiers alone was so astonishing I had to carry on and cover the whole system, aware that things were shaping up for another all-nighter.

By the time I was finished, the system was utterly transformed. Timing and coherence were back with a vengeance; surface noise and coloration were both much less audible and the soundstage had liberated itself from the boxes. *Lingo* at last started living up to its promise. By cleaning up the now wider open window, *Kontak* had achieved an improvement (admittedly on the sort of system most likely to benefit) of similar magnitude to that effected by a *Mana Sound Table* or *Lingo*, and all for twenty quid: bloody remarkable, I call it...

*Kontak* really deserves a whole column to itself, part of which would be devoted to various qualifications. But I'm not going to spend a complete column discussing a goddam elixir, however efficacious, and I am going to add the riders that I only did the treatment yesterday, so cannot vouch for its life or longer term effects, and reckon that £20 is a lot of money for two tiny bottles of fluid. However, so great was the effect that the price must be regarded as utterly irrelevant. Put *Kontak* at the top of your Christmas list - then infuriate the family by carrying out the treatment on Christmas Day.

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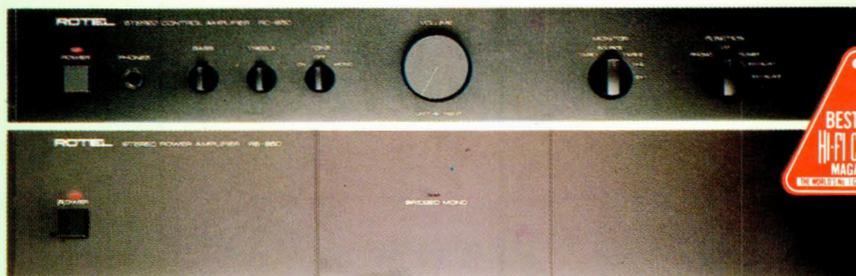
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