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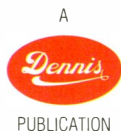
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READER DIFFICULTIES

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

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THE GET OUT CLAUSE

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

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Menu

Fridge freezers. On the face of it an unlikely subject to find under discussion in a hi-fi magazine, but hereby hangs a cautionary tale.

A couple of months ago I came home to find the kitchen floor covered in several gallons of spaghetti bolognese sauce and various other unidentifiable substances. The tired old fridge freezer that had been taking up one corner of the room for the last decade or so had finally given up the ghost and gone to add its CFCs to the big hole in the ozone layer.

Thus the search was on for a replacement and armed with a large wad of non-consecutive numbered fivers I entered one of those emporiums commonly referred to as 'a high street multiple'. There I was met by one of the most amazingly ignorant sales people I have ever had the misfortune to encounter. On being asked how many kilowatt hours of electricity would be consumed by a particular unit I was informed that the answer was 24, on account of the fact that the unit had to be left permanently plugged in in order to operate at its best.

Not content with displaying his astonishing lack of knowledge about the product I wanted to buy, he then proceeded to try and interest me in a rather dubious looking rack system of indeterminate parentage. For a mere £200 I could become the proud possessor of a record deck, twin cassette, tuner, CD player, amplifier and speakers. The fact that I wanted a fridge freezer was glossed over by reference to the fact that the hi-fi would only be available until the end of the week and was thus an unmissable offer. When I pointed out that the speakers had the tweeter units painted onto what passed for a front baffle he was momentarily at a loss, but then proceeded to spout reams of rubbish about every technical specification under the sun.

I use the above point to illustrate just how poor a standard of service is on offer in some shops. Obviously this can't be the general standard otherwise they would all have gone bust long ago, but it really was a most entertaining experience. However, this is the sort of service that many members of the general public must be prepared to put up with for the sake of saving a couple of pounds. I know that times are a bit hard at the moment but it really is extremely short sighted to try and save a couple of quid by buying what is quite a major investment from a shop so obviously unsuited to selling it.

The moral of the story must be that if you want hi-fi then buy it from a specialist dealer and be prepared to pay the extra as recompense for the standard of service that you receive. If you don't support your dealer then the next time you go to buy something it may well be that the only option is a £200 'super' system, complete with painted on tweeters.

Andy Benham



Cover photograph by
Chris Richardson.

Contents

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

The Front End

4

UPDATE

What's new in the world of hi-fi? You'll never know if you don't peruse the *Choice* news pages.

11

SHOW REPORT

Every year the forces of high-end audio gather at the Winter CES in Las Vegas to tamper with the one armed bandits and display the cutting edge of new consumer technology. Howard Woo reports from the city of silver dollars and digital filters.

16

CHOICE SESSIONS

More digital-pokery as Andy Benham auditions a pre-production Philips loudspeaker incorporating digital signal processing while Roy Gregory auditions a new line-only preamp from Michell.

18

STATEMENTS

Jason Kennedy gets to grip with the Audio Note *Neiro* amplifier, complete with paper in oil capacitors and age annealed copper wire. Meanwhile Andy



The sky's the limit: the receiver reviews start on page 91.

Benham has to make do with a £2,000 pair of portable electrostatic headphones and Alvin Gold puts the Monitor Audio *Studio 20* speakers through their paces.

32

INTERVIEW

What is the first and most important link in the system chain? Probably your local hi-fi dealer. Andrew Cartmel talks to BADA's Michael Lewin.

34

COMPETITION

Enter our competition and you could win a pair of KEF 105.3 loudspeakers.

37

READERS WRITE

Your chance to pick our brains with your system problems and queries or to air your views about monstrous software prices. And you might win a record token or a pair of Quart headphones.

45

21ST CENTURY FOX

Barry Fox reports on the rocky road to Digital Compact Cassette. Word has it that retailers are fed up with the format, and it hasn't even been launched yet!

Aspirations

24

SMUGGLING IN THE HIGH-END

Dan Houston and Chris Richardson visit an audio enthusiast with a pair of Martin Logan *Quests* and a brace of magpies at the bottom of the garden.

Cassette Decks

53

CHOOSING AND USING CASSETTE DECKS

Things to make you go wow and set your heart fluttering. Alvin Gold surveys the state of the art in cassette and DAT machines.

54

THE REVIEWS

Hey mister — want to play a tape? There was never a better time to buy a cassette deck, as manufacturers battle with each other to offer the most features for the least money. Let Alvin Gold be your guide with detailed reviews of 22 of the latest cassette and digital audio tape machines. Fast forward to page 54.



It takes tubes to tango: the Audio Note Neuro gets a glowing report in Statements.

85

TECH TALK

Interested in the more technical aspects of tape and tape players? Alvin Gold will be happy to trim your bias.

87

CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

The summarised results of this month's review survey.



Michael Lewin discusses dealers, BADA and the future of hi-fi in Britain.

Receivers

91

CHOOSING AND USING RECEIVERS

It's music, it's invisible and it's free — Paul Miller tells you how to pick up those sneaky little radio waves and take full advantage of this medium.

92

THE REVIEWS

This month we lure ten of the latest receivers into Paul Miller's lab and listening room.

104

TECH TALK

What do you get when you cross a tuner with an amplifier? Paul Miller

105

CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

Which of this month's receivers are worth your hard earned money and which should be quietly buried in an unmarked spot on a dark night?

The Directory

121

THE CHOICE DIRECTORY

Looking for just the right hi-fi component? Don't have the time to visit every shop in the UK? Well, you've come to the right place. Put your feet up

and browse through a comprehensive summary of all the relevant products ever reviewed in our pages. Concise information, prices and what we thought of the equipment. The best in the business.

Choice Matters

8

COMING UP

Loudspeakers and personal CD players are in store for the next issue of *Choice*.

43

BACK ISSUES

Tantalised by a particular piece of hi-fi? Want to read the full story? You can order your back issues of *Hi-Fi Choice* on this page.

47

CHOICE SUBSCRIPTIONS

Your newsagent is a nice person but so is your postman. So why not have *Hi-Fi Choice* delivered directly to your door every month? You save money while giving your dog a chance for some exercise. Here's the coupon.

106

READERS' OFFERS

Audiophile goodies available from the *Choice* mail order pages.

152

PERSONAL MESSAGES

In this month's column Paul Messenger braves the slippery slopes of system changing.



You're surrounded: the latest cassette decks and DAT players in our main review.

Choice



Update

NEWS FROM

AROUND THE WORLD

Naim branching out into CDI

No, the sages of Salisbury haven't gotten into CD Interactive, this is just the rather confusing name of Naim's first foray into one box CD players, the I in CDI standing for Integrated. This new player is essentially a cut down version of the £3k CDS. It has the same multibit DAC and transport but the isolation system for the main circuit board and transport is different, and the power supply is more modest. It costs £1,598 and is designed to appeal to CDS fanciers who have limitations on their budgets.



Naim dropping: the new, lower priced CD player.

Unusually it doesn't have a digital output, so you can't use it purely as a transport. This is because Naim feels that the

losses incurred in carrying the signal from one unit to another are too high for it to be worthwhile.

QED smashes the DAC barrier

QED has smashed the entry price for standalone DACs with the £125 *Digit*. This Bit Stream unit employs a Philips SAA 7323 convertor chip in a functional rather than glamorous case. QED has managed to reduce the price by limiting input sampling rates to 44.1 kHz, hence you can't plug a DAT machine into it. Casework is made out of injection moulded plastics (though it is still fully protected against RFI). Input is coaxial only, again reflecting the budget asking price.

To complement the *Digit* QED has also produced a digital interconnect called *Digitflex*. This is a 75ohm coaxial cable with a solid centre core and double screening. It's 75cm long and costs £19.

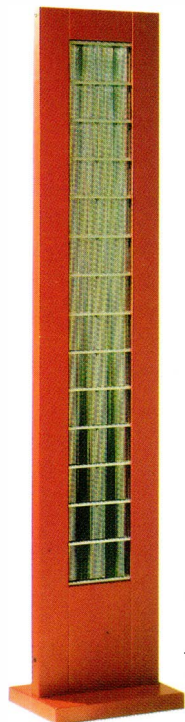
Extended freak out

Audiofreaks has been extending and its range of high-end components with some new and revised products. First up is the Audiostatic range of Dutch electrostatic loudspeakers, which consists of three full range models and three matching

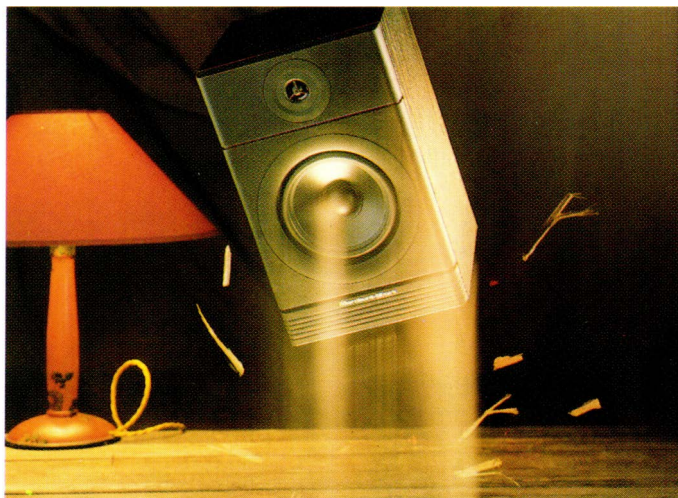
subwoofers. Prices range from £1,995 for the tall, slim *ES100* to £3,000 for the flagship *ES300RS*. Unlike other 'statics these are reasonably efficient; the bigger model claims 88dB and has a nominal impedance of 8ohms. They are available in a range of 16 different colours at no extra cost.

The Eminent Technology *ET2* air bearing, parallel tracking tone arm is back. This exotic arm is available in two different versions depending on the type of air pump to be used. The basic *ET2* costs £990 without a pump, the factory supplied pump adding an extra £105 to the price. The high pressure manifold version needs a more powerful pump such as the £299 *Wisa*.

VPI has been updating its turntable range with mods to the *TNT* (£3,800) which is now in *Series 2* form. These include a heavier platter (25kg) which has had an aluminium layer added to its acrylic, lead and cork sandwich, modified main bearing and revised springs to cope with the extra mass. The new *HW19 Mk4* (£2,300) or poor man's *TNT*, incorporates the platter, main bearing and springs of that model.



Seeing red: an Audiostatic speaker from Audiofreaks.



Cutting a long story Mordaunt-Short

Mordaunt-Short Limited of Hampshire is celebrating its 25th anniversary by re-launching its *MS3.10* loudspeaker.

The *MS3.10* has proved to be one of Mordaunt-Short's most popular designs and is quoted as having been the top selling British-made speaker in the UK back in 1990. The speaker is a vented design with rear facing reflex port intended for use on rigid shelves, floor stands or wall brackets. Its compact dimensions make it suitable for multi-speaker installations or sites where space is limited. Subsequently superseded by Mordaunt-Short's *Series 5* range, the *MS3.10* is now returning from loudspeaker heaven and will reportedly be retailing at its original 1990 price of (just) under £100.

A Natural Progression for MPI

MPI Electronics of Manchester (famed as home town of *Hi-Fi Choice's* Production Editor Janet Moorhouse) is now the distributor of high-end components from US company Counterpoint, including the *Solid* range of power and 'control' (American for pre-) amps, *Natural Progression* mono amplifiers and the Counterpoint *DA-10* DAC.

Described as an 'upgradeable 20-bit D/A convertor' the *DA-10* looks solidly and attractively styled (don't be put off by the 'Handcrafted in California' slogan). It features six inputs, 'totally discrete' (California again) analogue and current-to-voltage stages, an adjustable



All the way from California: Counterpoint's DA-10 DAC.

Most Significant Bit facility and a pair of 'updatable' 20-bit DACs which can be upgraded by simply purchasing and

plugging in new boards as upgrades become available. All this plus gold plated connectors can be yours for £1,600.

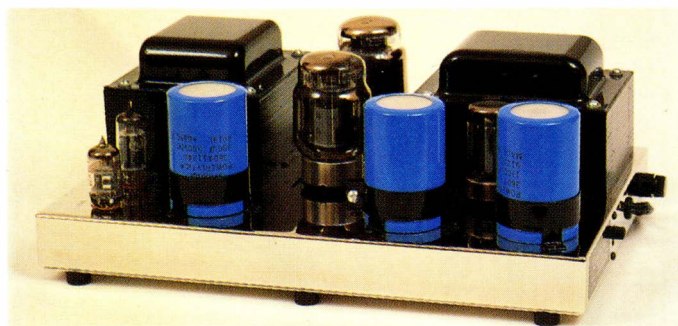
Like Quicksilver

Quicksilver Audio valve amplifiers have returned to these shores courtesy of Studio 2000, a new distributor from East Sussex. The Californian Quicksilver Audio range includes a preamp and two monoblok power amps rated at 60 and 80W. The preamp costs £1,745 and features five inputs including phono, dual volume controls and a fully isolated power supply. The 80W *Silver Mono* power amps utilise a pair of KT88 output tubes per channel and are completely hand built without recourse to PCBs. Each pair will set you back £2,150 and comes with a three year guarantee (excluding tubes) and a bias meter. The 60W model comes in two versions depending on output tube type, priced at £1,545 and £1,845.

Studio 2000 is able to service and upgrade old Quicksilver amps, contact Simon Vincent on (0892) 784696.



Quicksilver's preamp (above) and Silver Mono power amp.



TDK's noise reduction

Hot on the heels of the *Hi-Fi Choice Purifier* comes TDK's *NF-C09* Digital Noise Absorber. Like the *Purifier* this is a clip-on ferrite cylinder that's designed to absorb high frequency waves emanating from or penetrating the cable and thus reduce the spurious noise in an audio, video or computer system. Suitable for both digital and analogue cables of up to 9mm in diameter the TDK clamps cost £8.95 for a pack of two.

Linn expands amplifier range

Linn's recent flurry of new products continues with the introduction of a new power amplifier, the £465 *LK100*.

Styled to match the other products in the *LK* series, the unit is intended to be used with Linn *Kairn* or *LK1* preamps and is also reported to be ideal for use in distributed sound systems.

Multiple outputs facilitate bi- or even tri-wiring and the unit is rated at 50watts into an eight ohm load. Protection is provided against both excessive current demands and overheating.



The Linn K100 power amp.

In Brief

The ever unpredictable Hi-Fi 92 show, which is usually in Bristol, but was recently moved to Cardiff over the Easter weekend, has now been cancelled. Hi-Fi 93 will revert to the original venue.

Hi-Fi Choice is moving a mile or so west to 19 Bolsover Street, London, W1P 7HJ. So in future please send all your letters and reader queries to the above address. Competition entries need to go to a different address which can be found on this month's competition entry form.

The National Vintage Communications Fair will be held at the NEC, Birmingham on May 3rd. Anyone interested in buying or selling vintage radios, telephones, televisions, jukeboxes, gramophones etc should get down there and check it out.

Harman Kardon has streamlined its distribution and reduced its prices by up to 15 per cent, so H/K's entry level amplifier, the *6100*, has been reduced from £170 to £159, and in all but one case its Compact Disc players have been reduced by £50.

78rpm fans with grubby shellac need look no further. KAB Electro Acoustics of New Jersey has produced a special wet or dry cleaning brush with four inch ultra fine nylon filaments that are designed to scrape the detritus out of the bottom of the groove. Price is \$16.95 plus a buck for shipping, as they say in NJ. Write to KAB, Box 2922, Plainfield, N.J. 07062-0922 USA.

ATC Loudspeaker Technology has scored big in Hollywood where Todd AO, the largest film scoring stage, has just acquired a set of *SCM300s*, ATC's biggest monitors.



The Pioneer A400 amplifier.

As recommended
by these
speakers.

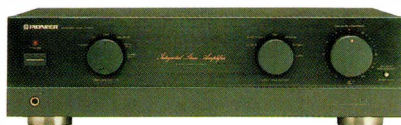
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WHAT HI-FI? OCT 1990. "THERE IS SOMETHING INEFFABLY RIGHT ABOUT THE A400." ALVIN GOLD.

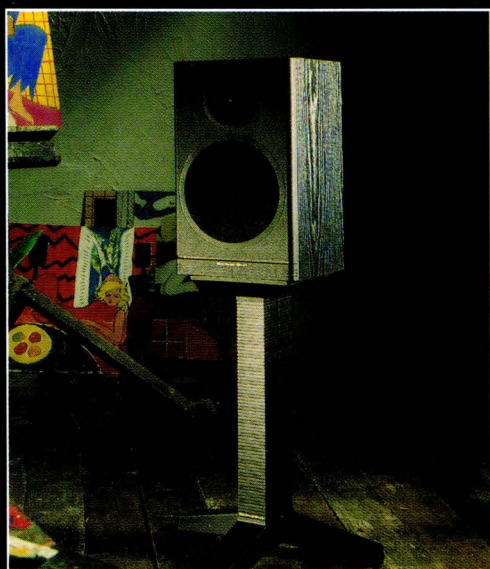
HIGH-FIDELITY. SEPT 1990. "IT LOVES MUSIC, THE A400. IT LOVES IT WITH A VENGEANCE." MARK PAYTON.

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

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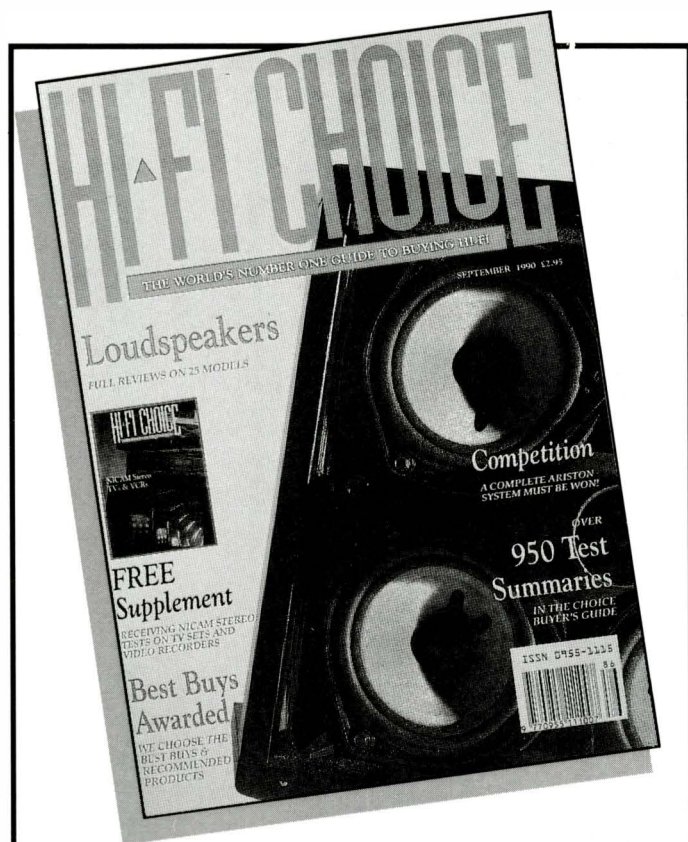
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Superfi, Hull 048224051

ISLE OF WIGHT

Russells, Newport 0983523864

KENT

Howes of Southborough, Tunbridge Wells 0892528682
 0892 537288
Kimberley Hi-Fi, Bexleyheath 081-304 3272
Panatec Sound & Vision, Gillingham 0634573141
Panatec Sound & Vision, Maidstone 0622661488
V J Hi-Fi, Folkestone 030356860
V J Hi-Fi, Margate 0843 226977
Whitstable Tele-Radio, Whitstable 0227272028

LANCASHIRE

Cleartone Hi-Fi, Bolton 020431423
Kenneth Gardner, Lancaster 052464328
Norman Audio, Blackpool 0253295661
 0772 53057
Norman Audio, Preston 077255769
Romers Hi-Fi, Blackburn 0254887799
Wigan Hi-Fi Centre, Wigan 094237977

LEICESTERSHIRE

Mays Hi-Fi, Leicester 0533625625
Parker High Fidelity, Loughborough 0509269888
Stuart Westmoreland, Melton Mowbray 0664411511

LINCOLNSHIRE

Superfi, Lincoln 0522520265

LONDON

Babber Electronics, W13 081-5796315
Brians Hi-Fi, W1 071-6311109
Covent Garden Records, WC2 071-3797427
Hi Spek Electronics, N3 081-3491166
Kamla Electronics, W1 071-3232747
Light & Sound, E6 081-4721373
Myers Audio, E17 081-5207277
Spatial Audio, W1 071-6378702
Stereo Regent Street, W1 071-2872458
Superfi, NW1 071-388 1300

MERSEYSIDE

Beaver Hi-Fi, Liverpool 051-709 9898
Tisdails, Southport 0704 531500

MIDDLESEX

Heathrow Hi-Fi, Hounslow 081-5721135
Musical Images, Hounslow 081-569 5802

NORFOLK

Adcock & Sons, Watton 0953881248
Martins Hi-Fi, King's Lynn 0553761683
Martins Hi-Fi, Norwich 0603627010

NORTHAMPTONSHIRE

H.G. Rapkin, Northampton 060437515

NOTTINGHAMSHIRE

F.L. Smith Electrical, Mansfield 0623655684
 0909479770
F.L. Smith Electrical, Worksop 0602622150
Forum Hi-Fi, Nottingham 0602786919
Nottingham Hi-Fi Centre, Nottingham 0692476377
Parker High Fidelity, Nottingham 0602412137
Superfi, Nottingham

OXFORDSHIRE

Sound 'n' Vision, Bicester 0869 246491
Witney Audio Centre, Witney 0993702414

SHROPSHIRE

Shropshire Hi-Fi, Shrewsbury 0743232065
 0743232317
W. Owen, Telford 0952613818

SOMERSET

Paul Roberts, Taunton 0823270000
Telefringe, Frome 037362598

STAFFORDSHIRE

Active Audio, Hanley 0782214994
Active Audio, Tamworth 0827533555
Purkiss Hi-Fi, Hanley 0782265010

SUFFOLK

Avalon Audio Vision, Ipswich 0473281922
Peter Watts, Bury St Edmunds 0284 703045
System Sound, Sudbury 078772348

SURREY

Audiolite, Thornton Heath 081-6533657
 0932854522
Cosmic, Adlestone 0932851753
Tru-Fi, Leatherhead 0372378780
Tru-Fi, Redhill 0737766128
 0737767404

SUSSEX EAST

Smythe & Barrie, Eastbourne 032329192
Sunderland Electronics, Brighton 0273774113

SUSSEX WEST

Cristavision, Chichester 0243 775444
Sunderland Electronics, Worthing 0903201187
Sussex Audio, Burgess Hill 0444 242336

TYNE AND WEAR

Bill Hutchinson, Newcastle-upon-Tyne 091-2303600

WARWICKSHIRE

Carvells of Rugby, Rugby 0788541341
The Hi-Fi Company, Leamington Spa 0926888644

WEST MIDLANDS

Bridge Hi-Fi, Walsall 0922640456
Coventry Hi-Fi, Coventry 0203440529
Naam Hi-Fi Vision, Birmingham 021-633 4944
Naam Hi-Fi Vision, Coventry 0203632086
Superfi, Birmingham 021-6312675
Universal Electronics, Wolverhampton 090223741

WILTSHIRE

In-Phase Audio, Swindon 0793520948
 0793 526393

P R Sounds, Melksham

0225 708045

P R Sounds, Trowbridge

0225 777799

WORCESTERSHIRE

Oavid Waring Cameras & Hi-Fi, Worcester 090527551

YORKSHIRE NORTH

Maxwells, Northallerton 0609773535

Scarborough Hi-Fi Centre, Scarborough 0723374547

Vickers Hi-Fi, York 0904629659

YORKSHIRE SOUTH

Superfi, Sheffield 0242723768

YORKSHIRE WEST

Amrik Electronics, Bradford 0274 722530

Amrik Electronics, Leeds 0532752285

Eric Wiley, Castleford 0977 553066

Superfi, Leeds 0532449075

JERSEY

Fotosound, St Helier 053459990

NORTHERN IRELAND**CO. DOWN**

Hi-Fi Experience, Belfast 0232249117

LRG Sound & Vision, Belfast 0232732452

0232451381

CO. ANTRIM

LRG Sound & Vision, Larne 0574 272757

Nicholl Bros, Ballymena 026649616

SCOTLAND**GRAMPIAN**

Autosonic, Aberdeen 0224573777

Holburn Hi-Fi, Aberdeen 0224585713

0224 572729

MIDLOTHIAN

Bill Hutchinson, Edinburgh 031-667 2877

STRATHCLYDE

Bill Hutchinson, Glasgow 041-2482857

TAYSIDE

Robert Ritchie, Montrose 067473765

WALES**CLWYD**

Lloyds TV, Video & Hi-Fi, Wrexham 0978364168

Owens, Colwyn Bay 0492530982

GLAMORGAN

Tele Electrical Services, Bridgend 0656 654156

GWENT

Hi-Fi Western, Newport 0633262790

GWYNEDD

Owens, Bangor 0248362951

FROM GENESIS: A REVELATION




Genesis
TECHNOLOGIES, INC.

IM 8300
3 way, Imaging Module



mpi electronic UK Ltd - Wood Lane - Manchester M31 4BP - tel. 061 777 8522 - fax 061 777 8533

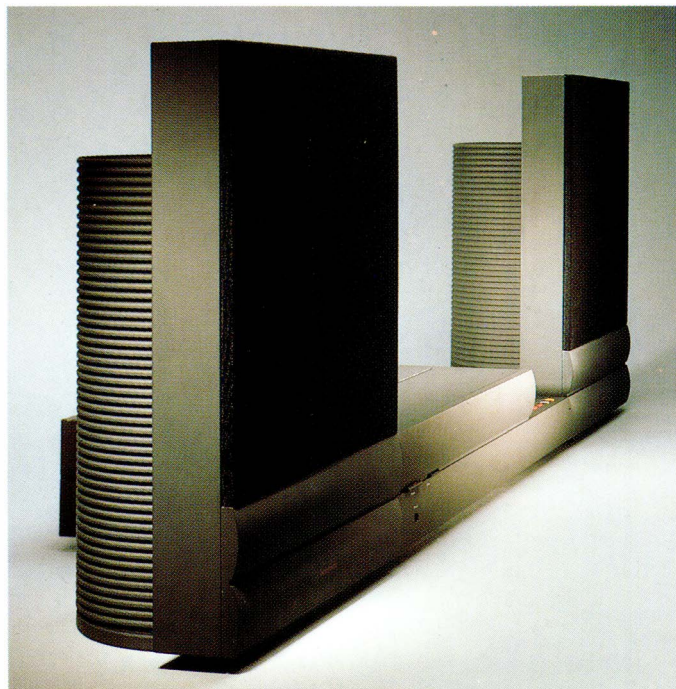
Widgets, gadgets and the latest technologies were on view for the consumer electronic trade, at the 25th Winter International Consumer Electronics Show held in Las Vegas in January. One of the most interesting events was the opening speech on the first day. Traditionally the keynote speaker has been a notable personality from the consumer electronic industry, such as Akio Morita of Sony. However, this year the speaker was from the computer industry, John Sculley, the chairman and CEO of Apple Computer Inc.

Sculley made two important and profound points in his speech: consumer electronics and personal computers are converging on an "inevitable and potentially wonderful collision course," and they are doing so because of the great difference between analogue and digital technologies.

According to Sculley, "At the most general level, analogue technology is passive. While it brings the user a wide variety of material, it has its limitations. It does not allow users to interact with the information. Nor does it allow customisation or editing. The end user is exactly that — the end user. Digital technology, in contrast, can be interactive. Users can customize the material, edit it, and exchange it with others. Most important, the user is in the driver's seat, controlling what, when and how they receive the information . . . And for the consumer electronics industry, this means the creation of whole new product categories and tremendous new opportunities."

It must be remembered that audio data is just one type of information that can be encoded and decoded in the digital domain. The show in Las Vegas is no longer an audio or audio-video exhibition, but a digital information show in which audio and audio-video products are, for better or worse, just a few of the players in the marketplace.

Everyone was talking about DCC and perhaps in the latter part of 1992, the marketplace in the United States, Japan and Europe will finally see quantities of Digital Compact Cassette players. Most analysts agree that in the first full year the US market could see a minimum of 50,000 pieces shipped into the trade. Spearheading the drive for DCC were Philips, Technics, Tandy, Carver, Marantz, Sharp, and Sanyo, who



Going to LAS VEGAS

Las Vegas is called the city that never sleeps. Howard Woo previews the new technology millions of madly gambling insomniacs may be listening to soon.

all showed machines. Denon announced that it would be launching both DCC and Mini Disc in the latter part of 1992.

Philips was very specific in its timetable for the launch of DCC. A campaign aimed at building awareness in the consumer electronics industry, dealers, and technologically receptive consumers will begin in April 1992. In April/May, the first DCC recorders will be available for demonstration and evaluation purposes. A 'pre-launch campaign' will be con-

ducted from June through August 1992 and a number of pre-recorded titles will be made available to support demonstrations during this phase. DCC home decks will become generally available in Europe, Japan and the United States in September 1992. It is anticipated that approximately 500 pre-recorded titles will be available from the music industry. Within a year, personal portable, mid-system and car audio will appear *en masse*. Major tape manufac-

Nakamichi's Concept 7 and Pioneer's PD-T09 with the Legato Link convertor.

turers TDK, BASF, and Maxell announced during the show that they will be producing blank DCC tapes. An important point to note was that the players shown in Las Vegas, both decks and portables, were pre-production models and not mock ups.

One of the major players in the world of digital audio, Philips Consumer Electronics, showed two innovative products, the first Digital Compact Cassette player and a unique digital loudspeaker system. The DCC deck, the *DCC 900*, uses bitstream A/D and D/A conversion, PASC data compression techniques, and allows the playback of analogue compact cassettes with Dolby B and C noise reduction. The player accepts digital and analogue inputs, and also has a 12 character semi-dot matrix display for text capability.

The second product which aroused much interest was the digital loudspeaker, a product many people feel is the missing link in the transition to digital audio-based home entertainment systems. Philips engineers at Dendermonde in Belgium have developed a unique and innovative digital loudspeaker system that achieves excellent sound reproduction by integrating a powerful digital signal processing (DSP) circuit and an amplifier in the speaker enclosure. The DSP circuit, one of the most powerful available, offers several significant benefits to the listener. These include extended flat frequency response, digital phase compensation and the elimination of crossover errors. The *DSS 930* has two amplifiers on board.

One of the benefits of the *DSS 930* is that it can be connected directly from the digital output of a CD player or DCC. However, with the *DCS 950* digital system controller, seven analogue or digital inputs can be accommodated. The unit has an A/D convertor for non-digital signals and also functions as a source selector with multi-room capability. Through the infra-red receiver in the speakers, the components can be selected and controlled from different locations. In addition, the listener can control the tonal balance separately from each room.

With the realisation that DSP will have a bigger role to play in

THE LISTENER

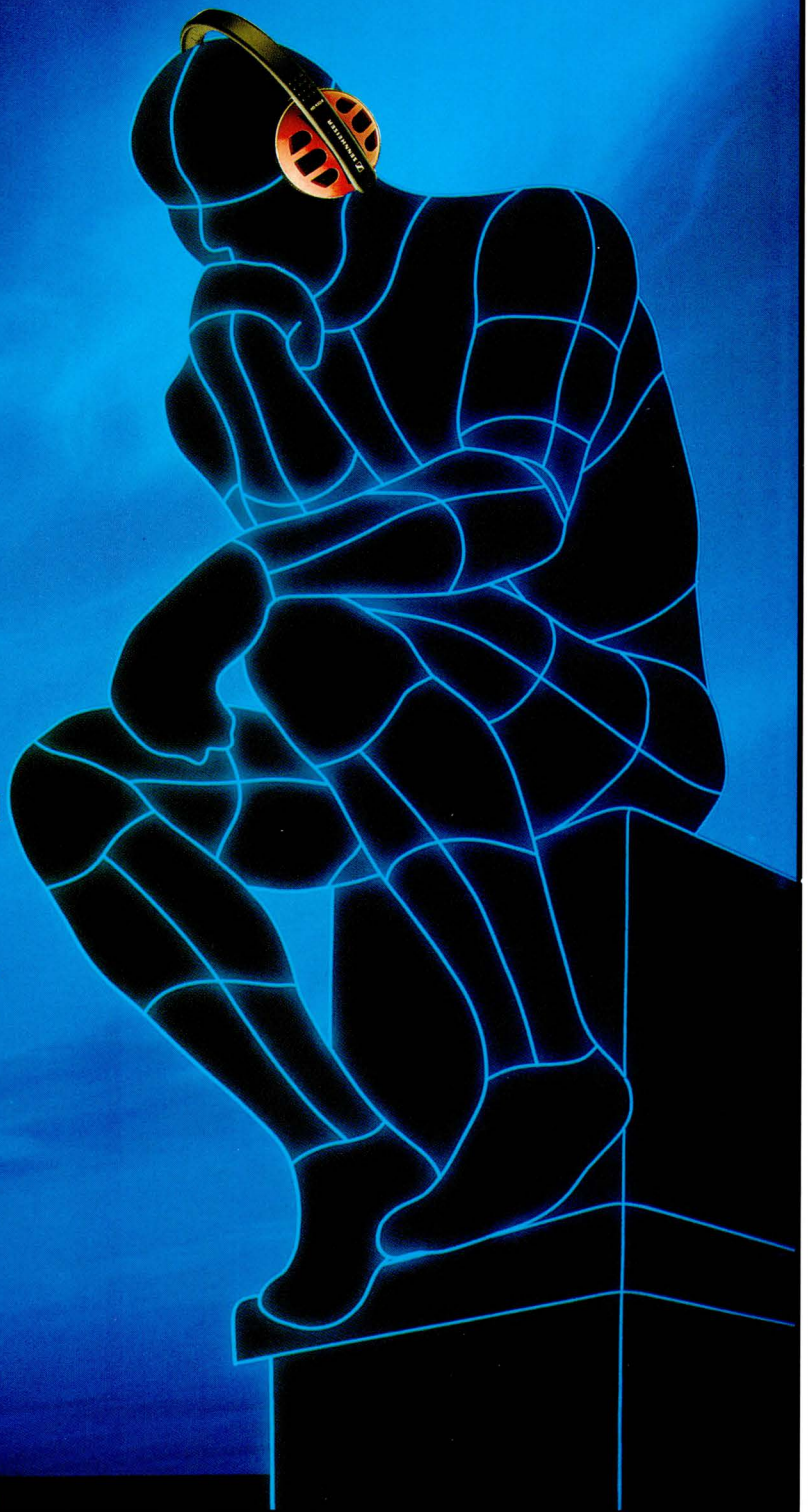
You'll hear better if you use your head

Ringing telephones, vacuum cleaners, traffic — and you thought CDs meant the end of background noise. Think again.

At Sennheiser we have been putting thought into producing high-quality headphones since the HD 414s (released in 1968). We're also highly thought of — worldwide critical acclaim has included six awards in *What HiFi* magazine.

The new Sennheiser range continues to excel in terms of sound quality. All our headphones come with a two year warranty, plus our assurance that all parts are and remain replaceable (nearly a quarter of a century on, spares are still available for the HD 414s). And with all products entirely developed and manufactured by us, backed up by 100% quality testing, the craftsmanship is guaranteed too.

That's the background. Now listen. Unbeatable sound quality — no noise.



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 **SENNHEISER**

speaker performance, Celestion introduced the Digital Loudspeaker Processor (DLP) for the Celestion *SL600/SL600Si* loudspeakers. The current state of the art digital signal processor is the Marantz *AX-1000* audio computer. Used to re-launch Marantz as a premium audio brand in the US, it is the only interactive DSP unit in the marketplace. Supplied with an AKG mic, it will measure the acoustic characteristics of the listener's room and digitally correct its sonic deficiencies.

Technology being one of the main themes of the show, Pioneer was promoting its *Legato Link* conversion system, which utilizes an integrated circuit to infer frequencies above 20kHz, which are eliminated in most digital recordings.

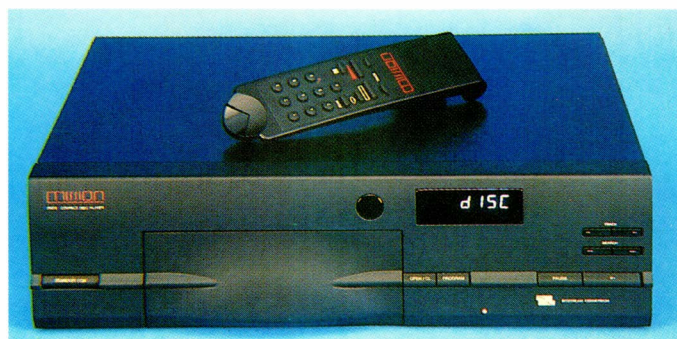
During the standard digital recording process, ultra-high frequencies are omitted to simplify the A to D conversion process and the exclusion of these high frequencies, which are not directly audible to the human ear, slightly alters the reproduction of the original instrumentation and subtly affects the way digital music is heard. According to Pioneer, by preserving the sound atmosphere created by frequencies above 20kHz, the *Legato Link* system improves the overall sound quality and creates a warmer playback signal which has the ambience of original analogue recordings. This process is achieved by the use of a 1-bit D to A convertor and an eight times oversampling digital filter that more effectively 'elicits triangular wave responses' from the original music. This conversion method, Pioneer maintains, recreates the lost sounds by combining them with the binary code in existing CDs during digital signal processing.

One of the most aesthetically pleasing CD players was shown by Denon, using a new technology called the ALPHA system. ALPHA is an acronym for advanced line pattern harmonized algorithm. The heart of ALPHA is a unique digital pattern analyser which studies the 16-bit digital audio data coming from the disc, discerns the pattern of the waveform, and then generates an additional four bits of data to 'complete' the signal pattern to a full 20 bits.

New technology was also in evidence in the world of Laser Disc at the Pioneer display on the



Celestion's Digital Loudspeaker Processor.



The DAD5 CD player from Mission.



The Marantz DD700 Digital Compact Cassette player.

main floor of the show. Shown for the first time in America by Pioneer, the *VDR-V 1000* videodisc recorder uses laser technology to change the way broadcast professionals record and playback audio and video. The unit offers virtually instant access. The system is targeted on broadcast applications, such as news, sports, commercial insertions systems, on-line and off-line editing, and still libraries. It also holds promise for computer graphics animation. The unit stores 57,600 frames per side, or 32 minutes of full motion video. The magneto-optical media facilitates unlimited play without signal degradation and can be recorded on more than a million times. Will this be the home

product of the future for video? Only time will tell.

Compact Disc Interactive (CD-I) marketed as the *Imagination Machine* was launched in the United States in mid-October 1991. With over 900 outlets in major US cities for the player, sales of the product have been very successful for Philips so far. It is my understanding that product availability is limited because all the initial stock has already been shipped to retail outlets. My visits to retail outlets in the San Francisco area indicate that the public awareness of the product is very good. There are currently over 50 titles available for the player. The machine itself is a digital multi-purpose format player, suitable for use as a CD

Audio, Photo CD, and CD-I player. Philips and Kodak have announced the development of a method for software publishers to issue five inch Photo CDs with text, graphics, and audio, as well as still colour photos. These pre-recorded discs can hold up to 800 digital video images or 72 minutes of digital audio, or any combination of the above and can be played back on any Photo-CD, CD-I or CD-ROM XA players.

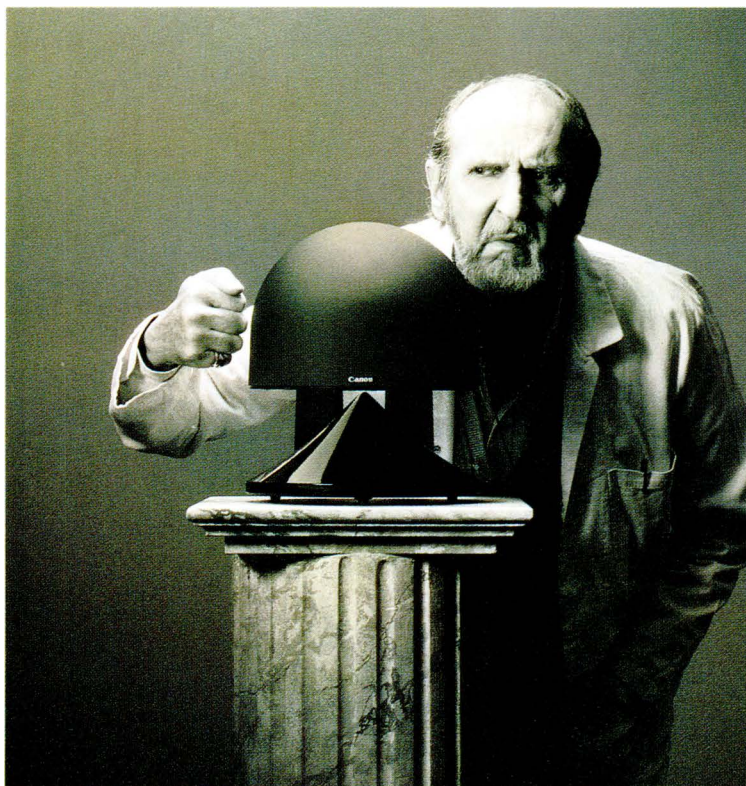
Most of the technological advances since last year's show were in the digital domain. Yamaha, for instance, launched a multi-rooming system. The core of the system is the *MCX-10* Master Controller. Its function is to receive and distribute infra-red signals and control the dedicated amplifiers, loudspeakers, and components in as many as five listening zones. Two *MCX-10* controllers can also be linked together to further double that capacity, serving up to ten zones and ten audio systems. The *MCX-10* allows you to monitor the status of the system in all zones, control access to each zone, and shut off the entire system from one central location. Meanwhile, Nakamichi revealed its long awaited life-style integrated system, the *Concept 7*.

Mission Electronics was also active, launching its long-awaited *DAD5* CD Player. This machine is produced by Philips Hasselt to the exacting specifications of Henry Azima, Mission's chief designer. The unit uses the Philips 7323 single-bit DAC with second order noise shaper.

The accompanying digital to analogue convertor using TDA 1547/DAC 7 will be available in March 1992. Concurrent with the launch of the CD player, Mission exhibited two new speakers, one to add to the current range in the UK, the *762*, and the *753* which currently is available only in the States.

This year's Winter Consumer Electronics Show marked a turning point in the electronic industry. Whether we as consumers or retailers or journalists desire it or not, the predominance of digital technology is now a fact. Digital information available on the five inch CD format will continue to grow and expand into other areas, moving beyond audio and video. It is on this note that I leave the city that never sleeps and wonder what new developments will greet me upon my return in 1993.

Who knows th black magic do



Never mind the mysteries of Stonehenge. Forget the riddle of the Wiltshire corn circles.

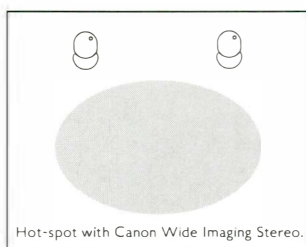
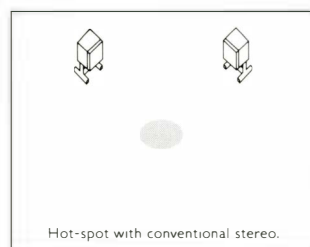
Here's a phenomenon that's got Britain's boffins well and truly baffled.

Exactly how have Canon

as you move closer towards it?

More to the point, why?

Well, allow us to remind you of one of the basic problems that has plagued stereo reproduction ever since it was invented nearly half a century ago.



made a speaker that appears to sound louder as you move away from it? And sound less loud

In order to hear correctly balanced stereo sound from a pair of ordinary speakers, you have to

be exactly midway between them.

This position is known by hi-fi buffs as the 'hot spot.'

Er, no

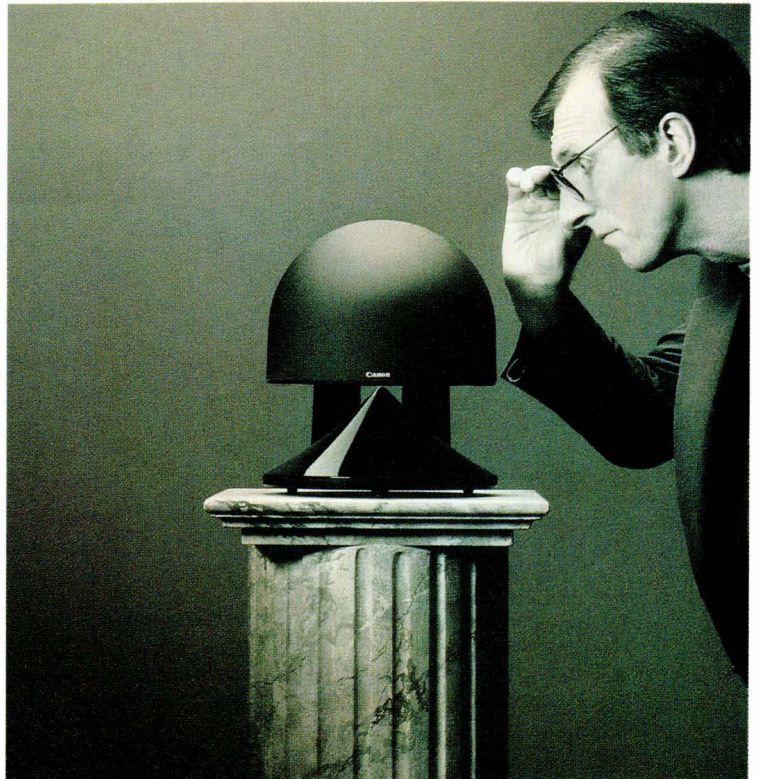
The trouble is, the hot spot usually has space for only one listener inside it.

Everyone else has to make do with a rather lop-sided, unfocused version of the stereo sound.

This state of affairs struck the research team at Canon Audio as a little unfair.

How, they wondered, do we create a much bigger hot spot?

the secret of the dome-type things?



body.

One that can accommodate an entire sofa and a couple of armchairs, say?

Clearly what was needed was a radical new speaker design.

And as the appearance of the Canon S-50 suggests, that's exactly what they came up with.

For a start, the speaker cone faces not outwards, but is aimed downwards onto a precisely

positioned 'acoustic mirror.'

The sound is then reflected out into the room, producing what is called an 'amplitude compensating dispersion pattern.'

This results in something no professor in the country can fully explain.

A psychoacoustic effect that 'fools' the ear into thinking that the speaker furthest away sounds louder, just as the speaker nearest sounds softer.

Inexplicable or not, the S-50 can produce a stereo hot spot

six times the size achieved by any ordinary speaker.

Canon have called this remarkable breakthrough 'Wide Imaging Stereo'. If you'd like to hear it in person, call in at your local Canon Audio outlet and ask for a demonstration.

Oh, and if anyone does discover the secret of the black magic dome-type things, we'd be awfully **Canon** grateful if **WIDE IMAGING STEREO** they'd let **LOUDSPEAKERS** us know.

The final link

Philips is close to completion of its digital loudspeaker project, Andy Benham has been listening to the fruit of its labour.

The last couple of years have been punctuated by the regular arrival of press releases proclaiming the appearance of a digital loudspeaker. So far, however, no one has come up with a speaker that takes a digital feed and turns it into analogue music, at least not directly. A famous April spoof story came up with a design employing some 64,000 drive units, one for each information bit, but so far any real digital solution has appeared unobtainable. There are, however, a number of loudspeakers which can claim to be digital in the sense that the speaker system is fed a digital datastream, which is turned in to music by a DAC situated in the speaker itself, before being fed to an onboard amp and hence to the drive units. Meridian's D6000 is an excellent example of such a system.

So when Philips called up and announced that it had a digital speaker prototype in the country and would I like to have a quick listen, the answer had to be yes, if only to find out just how the Dutch multi-national sees the market developing.

Philips' version of the digital speaker is closer to the Meridian implementation than the 64,000 drive unit approach but really that is only the start of the story.

As our residentspeaker guru Paul Messenger often points out, every speaker design is a compromise. If you concentrate on one particular aspect of the design, say bass extension, then by the very nature of the job some other aspect will probably suffer. Philips approach to this problem is to design a reasonably competent speaker and then equip it with one of the most powerful DSP facilities available and use digital processing to correct the deficiencies of the box and drivers.

The nature of the correction can be broadly separated into four categories, frequency response, phase compensation, crossover distortion and time alignment. The frequency response of the new speaker is quoted as being accurate to an astonishing half a decibel over the range 40Hz to 20kHz, but it is in the other areas that things really start to get interesting. Crossovers have always been a difficult area of speaker design because splitting

the signal in the analogue domain has always been a very difficult job. The Philips speaker, however, splits the signal in the digital domain, where it is a (relatively) simple matter of mathematical manipulation to design a filter with the required characteristics, and more importantly none of the unwanted side effects associated with conventional crossovers. Once the signal has been split it is then fed to a pair of bitstream DACs and thence onto a pair of dedicated power amplifiers, one for each drive unit.

Digital processing is also used to compensate for the slight physical difference in depth between the tweeter and the mid/bass drivers, delaying the high fre-

quency information so as to create a time aligned source.

Apart from the DSP capabilities, the speakers have another trick up their sleeves. Not only do they read the musical information in the datastream, they can also read control information as well. You tell each speaker whether it is a left or a right unit and then use a remote control handset to adjust the volume. However, you can connect up to six speakers to a single digital output and have them operate as three distinct pairs, each with its own volume, bass and treble settings. Moreover the communication can work both ways, so with a system controller attached to your hi-fi system you can change sources by pointing the remote control at any one of the three pairs of speakers. In short, you can assemble a sophisticated multi-room system with nothing more than a digital ring main, not only do you save a fortune in expensive speaker and control cable but it is also extremely easy to install.

The actual units themselves look fairly conventional, a slim design of roughly average volume distinguished only by the fact that each has a captive mains lead along with various sockets and switches on the back panel. Used in their most basic form, a pair of these speakers are daisy chained to the digital output of your CD player or drive, a Meridian 200 in my case. A remote control then takes care of all the functions handled by a conventional preamp.

I promised the Philips engineer that I wouldn't say too much about the sound of these units as they were only prototypes and the finished speakers won't be available until later this year but I'm sure they won't mind me saying that this pair sounded nothing short of superb. The quantity, and more importantly the quality of bass available from these comparatively small boxes was astonishing. And we are talking about real bass here and not just a 50Hz hump engineered to fool the ear. If the production units can be built to the same sort of standard then Philips could be onto a real winner with these. Even the asking price of approximately £1,500 doesn't look unreasonable when you realise that all you have to do to create a complete system is to add a CD drive.

An interesting thought is that the sound quality could be good enough to interest those analogue diehards who haven't yet come round to using Compact Disc. A



CHOICE SESSIONS

This month Andy Benham has been investigating Philips' digital loudspeaker, and Roy Gregory has become an Argo-naut courtesy of Michell.

Rock Reference driving this system through a decent A/D convertor is a system I'd love to hear but one which will have to wait until the first production samples arrive in this country.

Key Argo

Michell has produced a line preamp to complement its Iso phono stage, Roy Gregory has been sussing it out.

The *Argo* is one of that increasingly common breed, the line-only preamp. As such, it represents both a continuation of Michell's foray into electronics and a departure from the company's previous preoccupation with analogue replay. It's a sign of the times that the move is neither unusual, nor unexpected.

Michell's first foray into electronics was the *Iso* moving coil phono stage, one of those rare products that not only sets new standards, but does so at a realistic price, and to universal acclaim. The *Iso* is a natural product for a turntable manufacturer to create, bringing the analogue source into line with its digital competition, in an electrical sense at least. The *Argo* steps beyond that into the realm of amplification proper and will soon be joined by the *Electo* 80 wpc monoblocks, and *Arion* DAC. But the real question is, does the *Argo* maintain the standards set by the *Iso*?

The short answer is yes, but there's more to it than that, and it's worth taking time to appreciate the subtleties. Even from the outside, the *Argo* is a distinctly different unit. The casework is contoured MDF, with a glass front panel and nicely proportioned nylon knobs (dual-concentric for volume/balance). The perspex back plate holds all the socketry and is labelled clearly both the right way up, and upside down. As well as the input and output socketry, there's a three pin connector for the external power supply.

The *Argo* is the result of a cocktail contrived by John Michell, electronics designer Tom Evans, and Greek audiophile Panayotis Theodorou, the object being to keep costs and metal content to a minimum. The result is both simple and elegant, and in the absence of the prohibitively expensive perspex, still matches the class of Michell's other products.

Facilities are in the best straight line tradition, with five inputs, a tape loop and three sets of outputs to allow easy bi-amping and integration with A/V systems. Look inside and you won't find much. At least not in quantity terms. What you will see is an incredibly high spec PCB (down to matched track lengths!)

loaded with hand matched, high quality components selected for sound quality and size (yes, I'm afraid the big is beautiful philosophy is following its main adherent, the dinosaur, into long overdue oblivion!). Look underneath and you'll find a glob of X-ray proof gloop covering the clever bits — Mr. Evans' phase corrective circuitry.

Hera lies obsession

My sample arrived with two, different power supplies. The first is an off the shelf moulded block that is included in the £689 purchase price. The other is called *Hera* and is an add on upgrade, available for £139. This contains a massive 350VA transformer wound on a special core and has two outputs, one for the *Argo* and a second to power the *Arion* DAC. Its superiority is so marked that I questioned Tom about the relevance of the giveaway unit, and for once the justification made sense. Just as the giveaway supply for the *Gyro* can be improved, so can the one for the *Argo*. But for those on a budget the standard supply offers a cheaper starting point. But it didn't stop me wading into listening with a full *Argo/Hera* setup.

The *Iso* achieves its performance with a clever circuit and care in its execution. The *Argo* goes to similar lengths and sounds just as good as the *Iso*, except that you don't realise how good the latter really is until you get the whole Holy Trinity set up together.

In hi-fi terms you can list their strengths as follows; transparency, focus, timing, dynamic range and resolution, and neutrality. But these are only a very small part of the whole. The quality which sets the *Argo* and *Iso* apart is the ability to reas-

semble all that energy and information into a coherent whole. The soloist retains his identity even in the most dramatic crescendos, the musical prompts and punches, the subtlest interventions by the orchestra take on a new clarity. In fact, the word which best summarises the *Argo's* influence is access. Access to the music, to the performance, to the venue and to the mix.

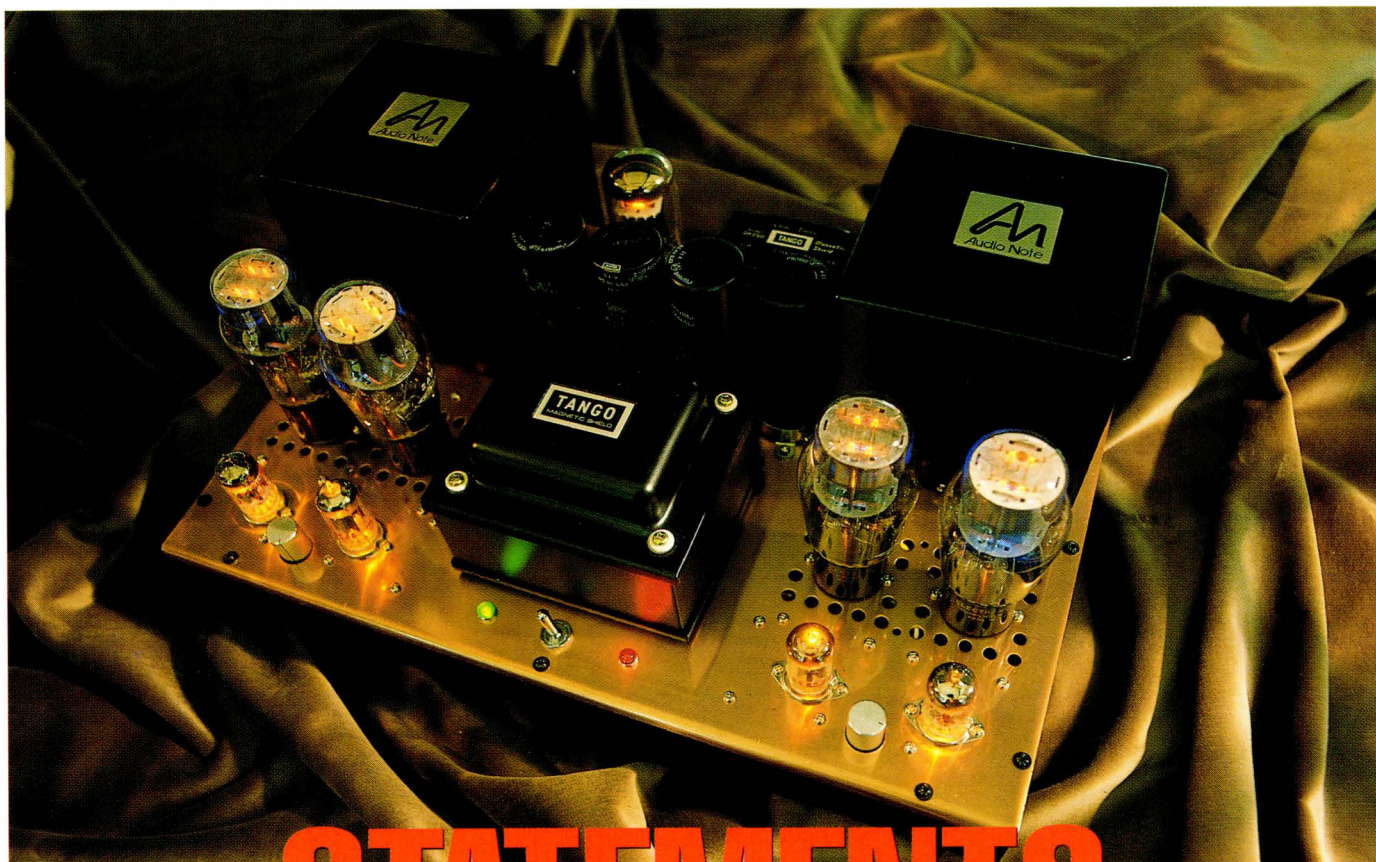
Whether you're listening to Antal Dorati or Frank Zappa, you'll get back more of what the performers put into the recording. When I reviewed the *Iso* I drew attention to its ability to separate the character and qualities of individual performers, to illuminate their lasting qualities. Add the *Argo* and the differences become wider still. Take a good recording of a great musician and you'll find the suspension of disbelief all too willing. It's simply easier to hear the music, and easier to forget the system playing it.

But the fragile beauty of Tebaldi or Milanov and the caustic humour of *Joe's Garage* have at least one thing in common. They are easier to destroy than to recreate. Unless you take the utmost care in set-up and system tuning you won't begin to explore the potential performance of a unit like the *Argo*. It'll never sound bad, but unless you pay attention to all the trivialities of system performance, the low level detail and dynamics that it seizes on and puts to such astonishing use will simply sink into the mud.

The *Argo* is a unit which stands comparison with the best available, and yet it costs less than many high quality passives. As such it realises the promise inherent in the *Iso*. Together they deliver high-end sound at a fraction of high-end prices.



Argo along with that: high-end sound at a fraction of high-end prices.



STATEMENTS

Avid readers will remember my review and subsequent ravings on the Audio Note *Ongaku* amplifier, a mortgage and hernia inducing handbuilt, silverwired, valve power amp.

The *Neiro* is from the same stable, Audio Note being renowned as a small but nigh on perfectly formed company which produces a range of tube amplifiers and loudspeakers for the well heeled. The *Neiro* is a seven and a half watt single ended, zero negative feedback design that's available in two versions. The dearer model, retailing at £8,950, uses handmade silver foil capacitors whereas the model reviewed here, and priced at £6,950, uses paper in oil versions.

The amp looks great, a substantial copper plate chassis and chunky transformer housings contributing to the hefty bulk. Seven grand for an output that wouldn't inspire an *AE1* to sneeze may seem pretty steep. But this being a single ended tube amp with a pair of paralleled 2A3s per channel, these are seven and a half of the cleanest watts around. They are fed to the speaker terminals via output transformers that are wound with age annealed copper wire (apparently this stuff is stored whisky style for 10 to 12 years before it is wound on the double C cores).

Jason Kennedy leads the seven and a half watt single ended triode amp revival while Andy Benham asks if he's found the ultimate portable hi-fi and Alvin Gold shakes the floorboards.

But of course, however powerful or dynamic each of those class A watts are, you will still have to have speakers with an efficiency of at least 90dB and preferably more before you're going to be able to move much air. However, there are a few around these days and most of the large models from the likes of Naim, Tannoy, KEF and B&W should be OK.

For the purpose of this review I used the Audio Note *AN-Es* that have been impressing me with their effortless transparency over the last couple of months. Paul Messenger measured them at 92dB which makes them more than suitable for this application. Other equipment used included a Voyd/Audio Note arm and *lo* cartridge, Audio Note *M7* phonostage and an Ariston *Maxim*/Micromega *Duo* digital

source. Equipment support was provided by Mana, and Audio Note silver cable (*AN-Vx*, *AN-SP*) carried all the signals. The *Neiro* has a single pot per channel so preamplification isn't absolutely necessary, though the single input makes this a somewhat impractical approach unless you enjoy switching interconnects every time a different source is required. I started off using a passive preamp but abandoned it when it became clear that it was acting as a filter for certain upper mid and treble frequencies. With this, and for that matter most, power amps it would seem that active preamps are the only avenue to full bandwidth fidelity, unless great care is taken with impedance matching.

True faith

I won't say that using the *Neiro* was easy. The process of evaluation was not without a few hiccups of the loose connection/faulty valve variety, but it was extremely enjoyable. The amp arrived after a period spent with somewhat more modestly priced transistor amps and I must admit that anything with tubes on it would have been a welcome relief, but this really restored my faith in recorded music.

In true Audio Note tradition the *Neiro*

manages to escape the usual limitations of the components used, ie triode tubes, and reproduced music with the focus and power of a good transistor design allied with the naturalness, dynamics and purity of a valve amp. My *Second Audios* sounded positively blowsy by comparison. The *Neiro* is just so clean, open and precise that it wiped the floor with anything I had to compare it with. A pair of Marantz MA-24 class A monoblocks sounded overly mellow and slow by comparison. The M7/*Neiro* set-up, with the aid of the other components in the system, proved to be the most transparent and analytical combination that I've ever used. It was like a magnifying glass on the source material, the better discs sounding quite stunning with extraordinary depth. The size and shape of the recording environment became strikingly clear, as did the fact that both of my sources could be better. Now I know why the *Voyd Reference* was created.

The low output rating didn't seem to hold things back either, there being no lack of power, courtesy of the phenomenal dynamics on tap — which could catch you out on occasions. OTT classical productions like Rachmaninov's *Symphonic Dances* (Athena) had me diving to turn the volume down. And serious bass excursions from the likes of Jan Garbarek led to concern about the structure of the building. You don't get Naim style onslaught; in fact it's quite the opposite. The sound is so clean that you don't need that much absolute volume to get the full impression of the musical occasion. Some early live Zappa material was reproduced with all the energy of the event, the system bringing out the atmosphere and size of the small club in a formidably tangible fashion — and this was on CD!

The Audio Note *Neiro* is another masterpiece from Audio Note's fabled Kondo San. You need the finest of ancillaries and very efficient (see large) loudspeakers to appreciate the fact, but if you want to open the audio window this wide there are few alternatives. Long live the single ended triode amplifier.

Jason Kennedy

When you think of electrostatic headphones, portability isn't the first word that springs to mind. Sitting there on the tube listening to your CD walkthing, Gameboy, or whatever, you are far more likely to be using a cheap pair of intra-aurals. However, all this could be set to change with the introduction of the Koss ESP/950, a cool £2,000 worth of electrostatic headphones that come complete with their own battery pack, making them ideal for

the more discerning mobile user.

The reason that up until now no one has been able to produce a portable electrostatic lies in the fact that most designs use a mains powered 'energizer' to supply the high polarizing voltages required by the electrodes either side of the diaphragm.

Koss has got around this problem by means of a high efficiency, switch mode, power supply which makes battery operation a distinct possibility. A battery pack is provided for this purpose that takes six chunky C type cells.

For more normal operation, the control unit can be driven by the plug type 9V transformer that is also supplied with the unit.

The other clever part of the design is the diaphragm itself, this is an ultra thin polyester former coated with an electron beam deposited semi-conductive material (phew). Koss claims an astonishing frequency response of 1.6Hz to 50kHz.

As you would expect of a design at this price, the headphones come complete with just about every accessory known to man

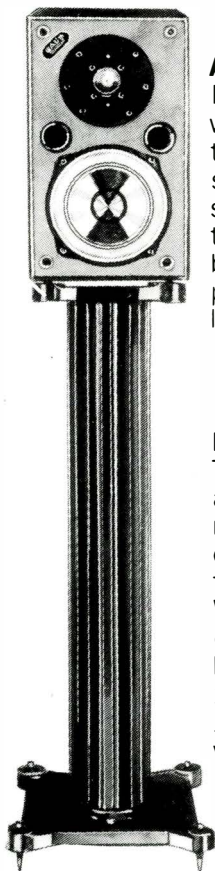
including a gorgeous calf skin leather bag. As well as enclosing all the accessories supplied with the headphones, this has a pocket at either end big enough to fit a CD personal so you can actually use the bag to carry around the ultimate portable hi-fi system. Three different interconnects are supplied with the system, which, coupled with the provision of both phono and minijack sockets on the control unit, means that the headphones can be connected to just about anything in the way of domestic audio equipment. The headphones come with a four foot Kevlar lead and an eight foot extension cord is also provided.

The easiest way to connect up the control unit is via the line level phono sockets, either directly to a CD player or to the output of your preamp, and of course tape loops will also suffice. Apart from the phono sockets themselves, you have a 9V DC input, a volume control, an on/off switch and telltale LED and the aforementioned minijack socket, although this is rather inconveniently situated on the front panel.



ESP certainly does exist — and it's £2,000 for a pair. The Koss ESP/950 headphones.

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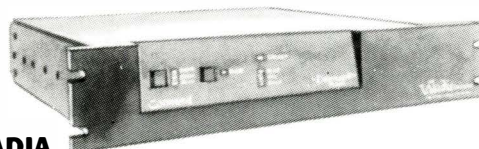
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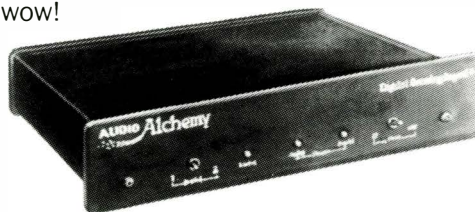
Readers of Hi-Fi Choice cannot fail to have noticed the recent review of the FORTÈ model 50 D.A.C. Well, the reviewer was right, it is the best sound we've heard for just over £1000 and what's more it has the most delightful matching pre-amp to go with it (model 40) for around the same price.

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What more can be said about Wadia that hasn't already been said! Generally accepted as 'state of the art' all it requires is for you to come along and hear it for yourself. The exciting news is the introduction of the brand new WADIA 6 – a complete all in one player with remote control level operating in the digital domain! It also has optional fully balanced output and will sell for under £2400. Wadia sound quality plus full remote – wow!



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I tried out the phones with a Meridian 200/203 combination, fed via the supplied interconnect. The results were immediately impressive with astonishing bass extension. The treble, however, was a little brash and tended to shout, while vocal sibilants were exaggerated. Moreover, there wasn't the same sense of freedom that you get with the very best electrostatics.

Fortunately, we had been playing with the headphones in the office before I took them home, and had some excellent results driving them with a Rotel RCD-965BX, so I knew there had to be a problem somewhere. It turned out to be the interconnect which was messing things up. Substituting a length of Furukawa FA71 sorted out the problems and the sound opened up to show the headphones in their true glory.

Apart from Sennheiser's £9,000 tour de force, the *Orpheus*, these are probably the best headphones available for rock listeners. The bass goes unbelievably low and is so fast that it takes a bit of getting used to. The midband is exceptionally well integrated and stereo image superb. The *ESP/950s* aren't quite as transparent as some of the better electrostatics (Stax for example) but, to my mind at least, make up for this with a better, faster bass and dynamics that give life and power to the music.

On the down side there are non-rechargeable batteries, and the construction of the headband is slightly plasticky, the review sample requiring the judicious application of a bit of Superglue to keep them together. Apart from these slight moans however, the Koss *ESP/950* is a great rock and pop headphone and the added portability factor makes it one of the best toys in the box.

Andy Benham

UnCLE Mo Iqbal — Mr Monitor Audio — takes a pride in providing more and more exotic finishes each time he delivers a new loudspeaker. The Monitor Audio *Studio 15* was launched in a stunning lustrous black paint finish with rounded edges. For the enlarged *Studio 20* MA has provided a flawless mirror black piano gloss enclosure, again with the same chamfered edges.

Under the skin the changes are both more and less than they seem. Acoustically this is a *Studio 15*, with the same driver complement and the same internal volume, which is partitioned off internally and then extended down to floor level. The spiked base section is hollow, and should be filled with sand, or a sand/lead aggregate. Tall and slender, the *Stu-*

dio 20 stands 93cm high and is designed for use in open space. The moving parts consist of an aluminium cone bass driver — now with a metal centre cap where the *15* uses a synthetic filled plug, and the all-singing all-dancing version of Monitor Audio's usual metal dome tweeter.

Happily, Monitor Audio knows what makes metal domes tick, and has not been slow to source from SEAS in Denmark when its own metal dome was either not up to scratch or was unsuitable — though this one I am assured is made at AEL, Monitor Audio's drive unit subsidiary.



Tall, dark and nicely veneered: the Monitor Audio Studio 20.

Past form suggests that Monitor Audio doesn't allow its tweeters to stick out and add an almost visible zing to the reproduction of music as some do, nor does it throttle the tweeter back so as not to cause offence to a few hyper-critical listeners (and passing bats). The *Studio 20* continues the tradition of getting it just right.

This defines the *20's* similarity with the past, but there are differences too. The older *Studio 15* has been criticised by some for sounding lazy or uncontrolled in the bass; and while I believe this assessment to have been based on a misunderstanding of what the *15* was about, its skills were always slightly understated with the effect that it tended to be extremely system dependent.

Under similar conditions, the *Studio 20* is a little sharper and more lively; there is more stereo projection and greater lev-

els of detail. The *20* also has a more gutsy feel in the midband. Yet the speaker retains all the old qualities: the silkiness, the charm and elegance, even the polish, are all undiminished and in certain cases even enhanced.

Right now for example, I'm listening to the late, great Leonard Bernstein conducting the NY Philharmonic in Mahler's *2nd* (the so-called *Resurrection*) *Symphony* and specifically to the section of almost complete stasis before the great choirs start to carry the music onwards and upwards towards its resolution. The product-related point here is that the sense of a journey being undertaken, of a great organic whole seen through the eye of a great interpreter, is one that came across with unbridled clarity and passion through these speakers (driven by an Audiolab *8000C/P* pre/power amp, which could have been designed with the *Studio 20s* in mind).

Of course no individual piece of hi-fi hardware has privileged access to the heart and soul of any work, however trivial or great, yet to say merely that the *Studio 20* is transparent to the qualities of the music would be to understate the contribution it makes. It does act as a largely open window, but it is also unusually fluid and organic, qualities that come at a premium at any price level.

The *Studio 15* had many of these same qualities, but was not quite as capable as the *20* in coping with the raw, blazing peaks, such as the discordant blast near the end of the scherzo. And yes, although the *Studio 20* is on the compact side for a truly full range loudspeaker, the bass is just man enough to make the earth, or at least the floorboards, shake at the finale.

And I've been playing a lot more than just Mahler. Even as I write Dire Straits' *On Every Street* is playing at an unbelievably high volume level with scarcely a trace of compression (metal drivers are good in this respect). The bass is deep, and lucid, and the band has set up shop at the far end of my listening room as though it means to stay. All this for £2,000 (£2,700 if you want a piano lacquered pair).

The effect is undeniably realistic; and equally undeniably exciting. When Dire Straits is over I shall be tuning in for Radio 3's Mozart day.

Alvin Gold

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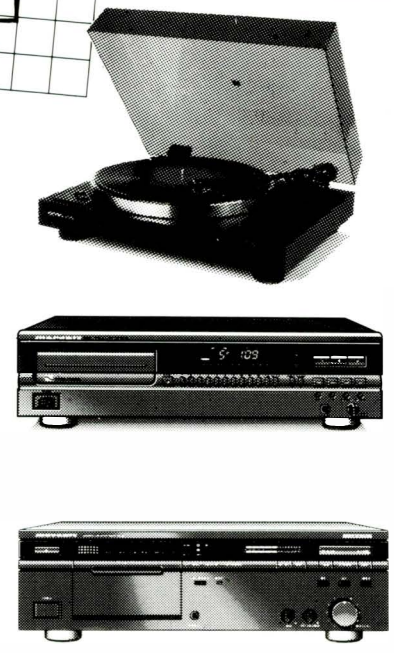
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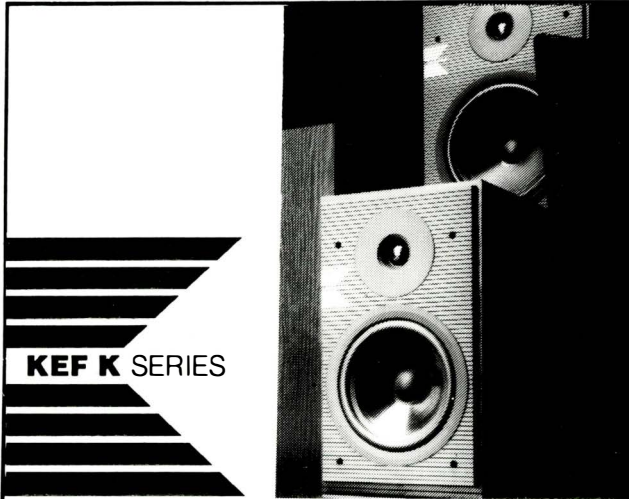
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Smuggling in the **HIGH-END**

The quest for high-end hi-fi tends to be a solitary one. Once embarked upon it the audiophile can expect little sympathy from those for whom the quality versus cost ratio seems irrational, or even quixotic. For most people the perception of hi-fi is as a tool rather than a luxury, and it has not yet broken that mould, although sportscars, expensive watches or cameras and bespoke clothing — even fitted kitchens — are all aspirational, no questions asked.

So it was understandable when our host this month, Guy Dellal, told me he had been circumspect, not to say misleading at first, over the price of his system when it arrived before other 'essentials' in his new Kensington home.

The system is purist high-end audiophile kit based on a Meridian two box CD player with Audio Research amplifiers and tall Martin Logan hybrid electrostatic loudspeakers. It cost a cool £13,000, and was bought from Paul Tam of the London Listening Rooms who was present during our visit.

"At first I tried a pair of KEF 107s in here and my wife had a problem with those, so I can't tell you what she said when these Martin Logans arrived," Guy joked. "I think Paul told her they cost £500! She thinks I get these incredible trade ins; I walk out with a six year old Walkman and come back with a pair of Martin Logan loudspeakers saying: 'Darling I get these amazing deals!' For some reason she thinks furniture is more important," he adds, confirming the abnormal priorities of a committed music lover.

The system is set in one end of a light and airy drawing room on the ground



Dan Houston discovers that there's more to installing a dream system than merely being able to afford it. Pictures by Chris Richardson.

Don't let the wife see those cables: A Martin Logan Quest loiters inconspicuously on the parquet flooring outside the conservatory.

floor of the house which Guy believes was built at the turn of the century. With the furniture at one end and the system at the other the room has a spacious uncomplicated feel, with a few abstract oil paintings breaking up the expanse of wall space.

The room was carpeted when the Dellals moved in last August but some original parquet flooring was discovered underneath, and has subsequently been revealed. With a lack of carpet and curtains the acoustics are hard, though not as reverberant as one might think. There are wooden shutters on the windows but Guy's intention is to hang curtains and lay a rug which will probably tone down the live acoustic.

One end of the room opens into a conservatory festooned with green plants. The lawn at the rear of the house, complete with a pair of magpies, ends in trees belying the metropolitan setting.

On the other side of the hallway from the drawing room is a similarly sized games room which also has wood flooring, and panelling around the walls, with more colourful abstract oil paintings. It houses a half size billiard table. "It came with the house — I can't play," Guy says. A couple of steps from this room lead into a cosy TV lounge where he was watching some imported (NTSC) films on his dual standard Sony Laser Disc player and 27 inch Trinitron TV as we arrived. His old JBL 120 Ti speakers provide the main stereo channels while a second pair of JBL Control 1s sit on tables behind the sofa for the rear channel effects. The speakers are powered by a Yamaha DSPA 1000 digital sound processing amplifier. If a Laser Disc isn't available he can turn to tape, from a Sony Nicam stereo VCR. This audio-visual system is nearly aspirational in itself, bearing in mind that the Laser Disc machine plays normal audio Compact Discs as well as videos. The surround

channel effects are extraordinarily, and realistically, close in the confined setting. For Guy the sound effects almost take precedence over the dialogue: "With this surround sound I find myself skipping back to listen to what the actors just said because the effects going on all around are so good!"

Considering the reasonably affordable price of this equipment, and with the ears now playing a fundamental role in the theatrical suspension of belief, domestic AV at last looks set to take off, with LDs set to win the heart of the serious collector who wants the longevity and quality which video tapes just can't supply.

Back to purism. Guy first came across

the recently launched *Quests* in Paris, although he was aware of the Martin Logan brand from hearing *Sequels* at the Listening Rooms. "I think it was at the Audio St Louis shop," he recalls. "They were playing them with a pair of Audio Research monoblok power amplifiers. I had been listening to the KEFs at home and I had found them a little boomy, or rather bass heavy in here. I thought they were fantastic for a full enclosure loudspeaker, and I had been used to the JBLs before, but I don't think they had the detail of these new speakers. I like loud music and I needed the detail and separation of the Martin Logans. I find that the bass, which is great, is balanced by the treble and sounds more natural — there is no feeling of being overwhelmed.

"I had heard the Audio Research amplifiers with the system in Paris, but I had a problem with aesthetics in that I didn't want something (like a brace of huge monobloks) to stand out." As it is, Guy uses an Audio Research line level preamplifier, the *LS 1* and the *D240* stereo power amplifier.

He had considered buying the Audio Research DAC but came across the Meridian 602 and 606 CD drive unit and DAC which were cheaper, sounded good and matched aesthetically. "I couldn't afford the ARC DAC and so the Meridian was a good compromise — although it's not one in terms of engineering. And for my ears I couldn't tell the difference; plus it's got nice styling which is important."

As well as the Audio Research boxes, Meridian source equipment and a CD collection, Guy's equipment shelves contain a Nakamichi *BX300E* cassette deck which he already owned and a Sony *Pro Walkman* which was linked to the system. It's no secret that a *Pro Walkman* lying about in an expensive system is de rigeur for audiophiles to show off that they consider the humble cassette is only good for sound while on the move, or in the car. But while the machine is an excellent analogue recording

Not your average black rack stack: Guy's equipment shelves are adorned with Meridian, Audio Research and Aaron Neville.

device, it can also make sense when played through a system like this.

Compact Discs were the only software to be seen, and our host uses them in the car as well. "I think the place you really get to know a recording is in the car," he said, "the fact is most people don't have a lot of time to listen to records at home, but I may spend a couple of hours a day in the car, and I tend to keep just one or two discs in there so I listen to them a lot."

Scratch that

"I have a record collection but it was played on a cheap old Garrard with a Shure cartridge and most of the LPs are badly scratched," says Guy.

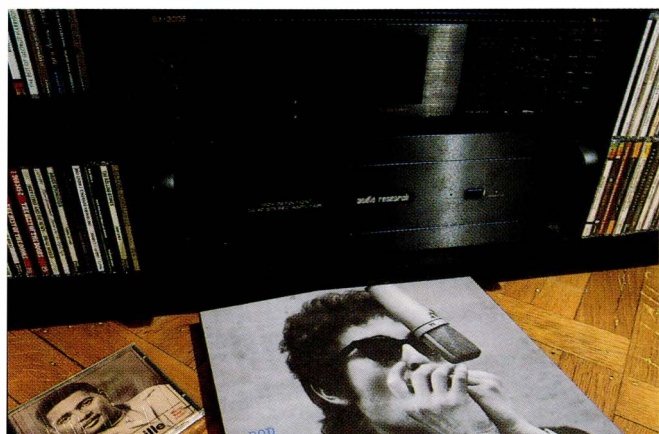
He describes listening to this system as 'an event', but says that sometimes it becomes tiring. "It's like the surround sound, it feels as though one is listening to so many separate bits of information, or that I'm listening to the system itself as much as the recording."

The set-up is certainly revealing with the Martin Logans providing a clear window onto the recording situation. The use of a single cone driver at the base of each speaker works well, giving some attack to the low bass. The electrostatics don't seem to struggle at all in the setting, which is a demanding one for any speaker. Listening to an Aaron Neville recording (*Warm Your Heart*) they make you aware of every instrument and note, placing them across the soundstage at the end of the room.

Because the system has this revealing capability it wasn't surprising to hear Guy complaining about the quality of some CDs. "I knew a lot of the Stax recordings from the Fifties — some of them were in mono but they sounded incredibly good. But I was really disappointed with the CD transfers." He describes his burgeoning collection as varied: "It's mostly soul and blues with some Motown, that sort of thing, but I've also got some heavy rock from people like U2 and I love the new Guns and Roses album."

These he listens to loud. "I've never been able to play music loud before because I have always lived in an apartment. That was frustrating because the system I had before needed to be run at high levels before I felt I was getting any clarity from it. This system sounds just as good at low levels, but I still play it loud in the mornings to wake myself up. I need loud music to get me going."

Guy found out about the Listening Rooms through an acquaintance and immediately liked the shop because there was space to park! He opines that in gen-



ASPIRATIONS

eral buying hi-fi is a 'fairly scary business': "In a way it's easier to find what you want with high-end equipment because the products don't become obsolete quickly. To a purist the less gadgets and controls on a hi-fi system the better, but it's the opposite with most hi-fi where changes are made every year and there is a vast amount of product around."

Home visit

When he visited the Listening Rooms he took his own CDs and made his choice based on them. Paul Tam also visited his home to get an idea of the likely setting before giving any advice. Products such as the KEF 107s were tried on approval before money changed hands.

Paul also discussed the possibility of running a system through the house with speakers in many rooms fed by one

source, but wiring would have proved tricky since the house was already decorated. "In any case I think it's much better to have one top end system which is in one room rather than having background music everywhere. I like the purism of this," says Guy.

As to what non-audiophile friends think, Guy doesn't seem too bothered. "They like the speakers, which in any case look fairly sculptural," he comments. And what about Mrs Dellal? "Oh she really likes the sound quality and she uses it as well. This system is very easy to operate."

And what about the price? "Er, I haven't told her yet."

The Dellals' unobtrusive little hi-fi system, as seen from the ideal listening point at the far end of the drawing room.

The system:

Meridian 602 transport:	£1,750
Mod Squad Wonderlink to DAC:	£150
Meridian 606 DAC:	£1,350
Audio Research LS 1 preamplifier:	£1,797
Audio Research D240 power amplifier:	£3,292
Nakamichi BX300E cassette deck:	N/A
Sony Pro Walkman cassette 'deck':	£250
Martin Logan Quest loudspeakers:	£4,595
Linn LK20 loudspeaker cable:	£3/m
Tara Labs Space and Time Quantum One interconnect:	£72/m
Total cost:	£13,134

System supplied and installed by:

The London Listening Rooms, 161 Old Brompton Road, London SW5 0LJ. Tel: (071) 244 7750.





KEEP IT IN THE FAMILY

Once upon a time all you had to know about CD was that it was five inches in diameter, silver, and played music. However the disc has spawned a whole family of offspring, including CD-I, CD-ROM, Photo CD, CD-R and CDTV. Our man with an eye to an acronym Barry Fox (BF) sorts out the rapidly evolving world of the silver disc.

It all began with videodisc. In the Sixties everyone thought it would be a nice idea if a 12inch disc could carry a feature film, both colour pictures and sound. In the Seventies videodisc became a reality, Philips' optical laser disc winning the standards battle which ensued: a 12inch disc holds an hour of analogue videopictures on each side. Whereas early discs had analogue stereo sound, later versions switched to digital soundtracks. There are now also smaller versions (five inch and eight inch) with shorter playing times. Thanks almost entirely to Pioneer's efforts, videodisc became commercially successful in Japan and (to a lesser extent) the USA, though so far it has failed in Europe (see *Hi-Fi Choice* December 1991).

Philips had also been experimenting with a miniature version of the 12inch optical disc, which stored digital audio instead of analogue video. The company joined forces with Sony and in 1980 the two companies jointly set the so-called Red Book standard for what we now know as the audio Compact Disc. CD Audio went on sale in 1982/83. The familiar five inch disc holds up to 75 minutes of digital stereo on its single side with the three inch CD single, launched five years later, holding 20 minutes of digital sound. At around the same time there was a clumsy attempt by Philips at re-naming all sizes of optical videodisc as CD Video or CDV. This failed and now common sense has prevailed and the optical video disc is generically known as Laser Disc.

Combi players are currently available which can cope with all sizes of laser video discs and audio discs. In the future they may also cope with the new multimedia CD formats which are beginning to appear.

ROM with a view

In 1985 Philips and Sony wrote the Yellow Book which set a loose standard for using the audio CD as a giant (650 megabyte) store for digital computer data, mainly text and graphics. This is CD-ROM. The loose standard created a mess of incompatibility which has limited the growth of CD-ROM technology. A finely balanced mixture of skill and luck is needed to set up a computer and CD-ROM drive to play a selection of CD-ROM discs.

To cater for consumers who do not want to become computer buffs, the 1986 Green Book set a tight standard for CD Interactive, or CD-I. This is a multimedia disc which mixes sound, pictures, animation, graphics and moving video on the buy-and-play principle. The CD-I player simply connects to a TV set and stereo

system and any CD-I disc bought anywhere in the world will play on any CD-I player. The players are tailored to the local TV standard.

The CD-I player will also play CD audio discs and CD+Graphics discs. CD+G discs are conventional CD audio discs with simple text and graphics buried in the data stream. The format has been sold in the USA and Japan, most notably by JVC, but has never really caught on.

A smooth takeoff

Consumer CD-I was launched in the USA in October 1991 and is promised for Europe this summer. So far Philips has handled the launch of CD-I very efficiently. The US launch in October 1991 coincided with players and software reaching the shops, along with well-designed demonstration kiosks. The launch in Europe was scheduled for mid-1992, around June, so that all players can incorporate Full Motion Video (FMV) decoding chips, from day one. This will let them play discs which contain moving video sequences, like video tape. (The US players will need a plug-in modification to play FMV discs.)

FMV grew out of a watershed demonstration, in 1987, by RCA's research facility in the USA. Despite the collapse of the company (caused by the disastrous failure of its Selectavision CED videodisc system) RCA's engineers had been working on Digital Video Interactive, a system for putting over an hour of moving video pictures on a standard sized CD-ROM. Until then it had been widely accepted that there was no hope of storing full screen images of smoothly moving colour video on a CD. This is because the disc delivers a maximum data rate of less than 1.5 Mbits/s; when TV pictures are converted into digital code the raw data rate is over 200 MBit/s. But RCA made breakthroughs in digital compression, comparable to the breakthroughs in audio compression which have made Philips' Digital Compact Cassette and Sony's Mini Disc possible. And as RCA finally broke up, and was sold off, chip maker Intel took over the work.

Digital Video Interactive has so far been used only for industrial applications as an add-on to an IBM-compatible Personal Computer (eg pub games machines and a visitor's guide to Paris' Charles de Gaulle airport). But Matsushita (Panasonic) has been quietly developing a consumer version.

Responding to the Digital Video Interactive challenge, Philips and other partners in CD-I developed their own system for putting at least an hour of full motion

video on a five inch CD-I disc. The standard for FMV has now been agreed by the MPEG (Moving Pictures Expert Group of the International Standards Organisation) and decoding chips are promised in time for the European launch.

No one yet knows whether the FMV system will be used to release movies on five inch disc, as a direct competitor to 12 inch Laser Disc or whether FMV will be used only for domestic 'edutainment', such as advanced video games which blend moving pictures with animated graphics. The best information indicates that the industry's target for the mid-Nineties is a 'high density' CD, with smaller pits, which will store four times the current amount of data. This would hold a two hour movie on a single sided disc, with better-than-VHS picture quality, and stereo sound using the same compression system (known as PASC) that is used by DCC.

In 1990 Commodore announced CDTV, another multimedia ROM disc,

launched the format as a consumer CD product. It now admits it made a complete hash of the launch and has already changed the name of the standalone player to the Amiga CDTV, and is switching emphasis from worthy edutainment to straight games. Commodore's only real hope of saving CDTV now is to stop pushing standalone players and switch to selling add-on CD-ROM drives for Amiga 500 computers. These drives, which let the Amiga play CDTV discs, will go on sale for £300 in April or May.

Also back in 1990 Kodak and Philips announced Photo-CD, a disc which stores a hundred digitized photographs, transferred from snapshot film and which has a good degree of compatibility with the CD-I format.

This neat and orderly approach, which in the long term offers 'buy and play' world compatibility between all the different disc types, follows from an agreement signed after Philips and Sony coaxed computer software company Microsoft

into creating a link between the consumer and computer worlds. Microsoft has grown rich from the horribly unfriendly MS-DOS operating system used by all IBM and IBM-compatible Personal Computers, so it took quite a bit of persuading to move towards the buy and play simplicity which consumer products must offer.

Take it to the bridge

Originally, CD-ROM and CD-I had been regarded as quite distinct, with CD-ROM for professional and business applications, CD-I for domestic use. But in September 1988 Philips, Sony and Microsoft finally agreed to develop a 'bridge' between the two formats, building on the Yellow Book standard for CD-ROM. The bridge format is called CD-ROM XA (extended architecture) and it exploits hooks in

the original standards (the 1985 Yellow Book for CD-ROM and 1986 Green Book for CD-I). XA defines a way of indexing stored data (eg text, graphics and pictures) as well as storing various compression grades of sound on the same ROM disc. The XA data is in a format which can be read either by a CD-I player (as defined by the Green Book standard) or by a CD-ROM drive (as defined by the Yellow Book) tailored for XA operation and controlled by a computer which is loaded with XA control software. Essentially the



Sound and vision: some of the new digital formats for audio and video.

incompatible with CD-I. This system has been on sale for nearly a year now but has made little or no commercial impact. Commodore promises to make CDTV capable of playing FMV discs in the future but it is unclear whether current CDTV players will be upgradeable to the new standard.

Even though CDTV is based on the Amiga 500 computer, Commodore

disc starts with the digital 'I-label' which a CD-I player looks for and uses to control the reading of the disc.

This creates a one-way compatibility bridge. An XA bridge disc will play on a CD-I player (because it has the 'I' label which the CD-I player looks for) but an XA CD-ROM system will usually not be able to read a CD-I disc.

Signed, sealed and . . .

In May 1989 Sony and Philips joined with Matsushita to promote CD-I and develop the market, with Matsushita later hedging bets by making CDTV players for Commodore and developing Digital Video Interactive decoders.

In February 1990, Philips, Sony and Microsoft finalised the XA standard and demonstrated a 'bridge' disc which proved the claims for compatibility. Kodak made Photo-CD a bridge disc and in May 1991 Philips demonstrated how a Photo CD disc would play on a CD-I player.

The pictures on a Photo CD disc are stored with higher photographic quality than the TV standards to which CD-I is tuned, and both systems use different digital data compression. So, to play a Photo-CD disc the CD-I player must play a clever trick. As it reads the Photo CD, it decodes the image, re-codes it into CD-I format, and then decodes it for display. All this happens "on the fly", so the Photo CD disc just plays on a CD-I player as if it were a CD-I disc.

In June 1991 Commodore announced that "the CDTV Interactive multi-media player is planned to be compatible with Kodak's new Photo CD system". This promise immediately brought a strong reaction from both Philips and Kodak who had jointly developed Photo CD.

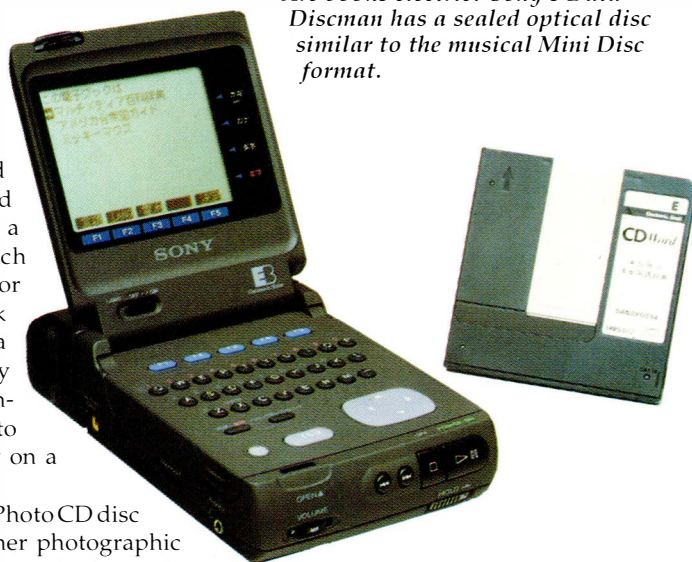
Said Kodak, "Nonstandard has yet been finalised for Photo CD, so no licensing terms are yet available".

Said Gaston Bastiaens, Director of Philips Interactive and Media Systems: "Commodore has given out misleading information. They should have to come to Philips for more information. Their system cannot play Photo CD. To be Photo CD compatible they would have to conform to the CD-ROM XA standard which provides a bridge to CD-I."

As the CDTV system is based on the Amiga computer, which is completely different from the computer hidden in the heart of a CD-I player, it remains unclear how Commodore will make CDTV play Photo-CD discs. As the European launch of CD-I draws closer, CDTV begins to look dead in the water.

In January 1992 Kodak and Philips built further on the bridge and agreed a format for mixing sound with photographic images on Photo CD discs. These 'picture book' discs will play back on any Photo CD player, CD-I player or CD-

Are books electric? Sony's Data Discman has a sealed optical disc similar to the musical Mini Disc format.



ROM XA system. This will let Photo CD serve as a carrier for pre-recorded Photo CD software (for instance a collection of prize-winning photographs) as well as a personal storage medium for a professional photographic library or an amateur photographer's own snapshots, transferred to blank disc by a photo lab, with the option of sound effects, background music and perhaps later the snapshotter's own commentary.

As Photo-CD and CD-I get closer, the Photo-CD player looks increasingly likely to be a CD-I player with a few internal connecting wires snipped off.

The orange book

Future developments of CD-I (eg giving people the chance to do their own interactive programming) build on the new Orange Book standard for CD-R (or recordable CDs) agreed in autumn 1991. The Orange Book sets a standard for a new kind of player which does not rely solely on the table of contents which is at the beginning of every audio CD, and indexes the data on the disc. It also lets a

new type of disc recorder produce discs which will play on existing CD players.

Whenever a CD audio player is loaded with a music disc, it reads the table of contents before playing the music. The table tells the player where the music tracks begin and end, and thus provides all the familiar control features available from CD audio. This system obviously presents problems with "write-once" CD-R discs which cannot be erased. To be playable the disc must have a table of contents; and once the table is written, it cannot be changed. So the CD-R blank is effectively "filled" at the time of the first recording, even if only a few seconds of sound were recorded. But the Orange Book offers solutions to this problem.

Firstly it defines a new kind of player which can read past the TOC and into an index which is open-ended. This is how Photo-CD players will be able to access photos stored on the disc at different times. It will also let new ROM and CD-I drives work in the same way with data discs, although it is not yet clear whether this option will be built into all drives.

Making CD-R recordings compatible with existing drives and CD audio players is a much taller order which the Orange Book solves with a standard for what is known as 'multi-session' recording or writing. An Orange Book recorder can add to the CD-R disc, piecemeal, until it is full. An Orange Book player can also play these piecemeal recordings. But the CD-R disc will only play on existing drives after the Orange Book recorder 'finishes' it by adding a standard table of contents.

The very low prices quoted by Kodak for Photo-CD recording pave the way not just to low cost domestic CD-Audio recording, but home CD-I making; for example it is easy to envisage a personal address list on CD-I disc made on a home CD-I recorder. To round off a neat package, Philips and Sony announced that the 8cm Electronic Books discs used for Sony's Data Discman, would be made compatible with CD-I.

Are books electric?

Data Discman is a portable CD player for three inch discs, with small keypad and black and white LCD screen. The system offers easy search access to dictionaries, business directories, encyclopedias and even classic novels. The three inch Electronic Book disc can store 200 megabytes of data, a third the capacity of a five inch CD-ROM, and more than enough for many volumes of paper print.

The compatibility announcement made sound sense because, when Sony launched

Data Discman in Japan last July, the three inch Electronic Book discs would only play on Sony's own unit. Although the discs adhere to the Yellow Book standard for CD-ROM, and can easily be mounted in a five inch adaptor, all the search software is stored in chips inside the Data Discman player, and none is on the Electronic Book disc. When Sony followed through with a launch in the USA, the discs remained similarly incompatible. Then came the joint announcement at the Frankfurt Book Fair, as Sony launched Data Discman in Germany.

A question of standards

Gaston Bastiaens, Philips' CD-I supremo, told a meeting of publishers at the Fair that the agreement was a "further step in establishing CD-I as the ultimate electronic multi-media publishing format".

Nobuo Kanoi, Executive Deputy President of Sony, added: "The upward compatibility from Electronic Book to CD-I is of extreme importance for the future of the electronic publishing industry".

"While existing Electronic Books can only be used on dedicated CD-ROM players, new versions will, as a result of the announcement, also be able to be used on CD-I players," confirmed Philips.

Unfortunately Sony's idea of compatibility is very different from what paying customers are likely to expect. In mid-January 1992, Sony announced that Data Discman and a range of Electronic Books would go on sale in Britain in April.

But Data Discman still has the search software in the player, not on the disc. So existing Electronic Books will not work on CD-ROM drives. Nor will they work on CD-I players already in the pipeline. But John Whitehead, Sony's Marketing Manager for Telecom and Electronic Publishing still claims compatibility between Data Discman and CD-I: "Theoretically you can play Data Discman discs on a CD-I player. But you need emulation software, which configures the CD-I player as a Data Discman."

A CD-I player is 'dumb' and does what it is told. It could be made to emulate a Data Discman. But it has no floppy disc drive to allow the user to load the emulation software. So the only way to load Data Discman search software into a CD-I player is to put the search software on a CD. John Whitehead says this can be done in one of two ways.

There could be a new version of Data Discman discs, which contain the search software. Or owners of CD-I players could buy a CD which contains only Data Discman search software and play this

disc ahead of playing the Data Discman Electronic Book disc, so that the CD-I player is temporarily configured as a Data Discman player. Philips confirms that this is "possible in principle". But Sony has no firm plans yet to produce optical discs containing Data Discman search software.

Neither has Sony any firm plans to put Data Discman search software on floppy disks so that it can be loaded into a PC controlling a ROM drive, so that the ROM drive can play Electronic Books. So the Data Discman Electronic Books currently on sale in Japan, the USA and mainland Europe, and soon to be sold in the UK, will not play on any CD-ROM drive or on any CD-I player. So much for compatibility between Data Discman and CD-I.

This is bad news all round. Compatibility between CD-I and Data Discman would benefit both systems. Although Sony 'launched' Data Discman in the UK in January, sales will not begin until April. The early "launch" was clearly designed to push software publishers into releasing Electronic Book discs for the UK market. Despite a lot of cotton-wool talk about "over a dozen UK titles" at launch and "around 50 more sourced from Britain" within a year, very little has been finalised. The core library is 85 titles available from the US, Japan and mainland Europe, including such unmissables as an information disc on US Presidents.

Also, although we know the Data Discman will cost £350, disc prices are hazy. The few prices quoted (£60 for a Dictionary of the *Living World* and £40 for Harrap's *Multilingual Dictionary*) are not encouraging. Nor is the small monochrome LCD screen which is so hard on the eyes, and smears so badly on scrolling motion, that Sony always demonstrates Data Discman connected to a TV monitor.

Sony is justifiably proud of sales of 100,000 players around the world, since the Japanese launch last July. But only 200,000 discs have been sold which suggests that people buy and quickly tire.

Reports of my death

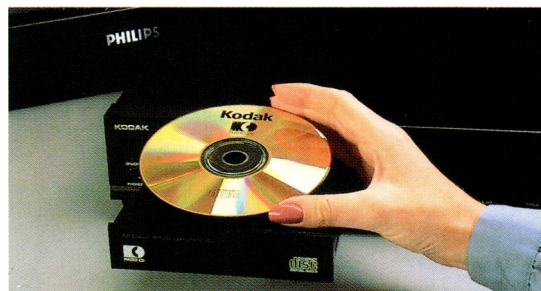
In America, Sony gave journalists discs and players, in an effort to stimulate confidence and favorable reports. Comment was muted and sales have been slow. "I tried reading the works of Mark Twain (from the *World Library* series)" one New York journalist told me, "but very soon gave up". The *World Library* also offers an equally awkward to read *Collected Adventures of Sherlock Holmes*.

As Sony justifiably counter, Data Discman comes into its own as a tool for searching information; like how many

times Sherlock Holmes says "elementary" or how to say "gasket" in German if you break down on the Autobahn. Personally, I think I would rather point to the gasket than get out my Data Disc, load a disc and search through a tree of multilingual car service terms.

Sony talks of British Telecom putting telephone directories on Data Discman discs. That would be a real use for Data Discman, but as it costs £2,200 for a year's subscription to BT's own CD-ROM Phonedisc, this sounds like pie in the sky.

In addition to Data Discman there are now many, many variants of the CD-



Snappy digits. Will Kodak's Photo CD replace the dreaded family album?



Decking tape. CD-R may be the home recording format of the near future.



Get interactive. Philips' CD-I machine will soon be on sale in the UK.

ROM format (both five inch and three inch) either ready for release or under development eg from NEC and games firms Sega and Nintendo. Irrespective of size these may deliberately be made incompatible with each other. In the video games market incompatibility can be an advantage because it locks hardware and software sales together.

I'm sitting on a candy striped sofa surrounded by umpteen thousand pounds worth of high fidelity components. There is an attentive person on hand to painstakingly swap equipment around and dig out any audiophile esoterica I might request. My every whim will be catered for. I am about to listen to the sort of monster high-end hi-fi system I would have to sell my mother to buy, and these nice polite patient people are willing to sit through whatever bizarre or obnoxious music I choose to play.

There is only one place in the universe I could be; in the demonstration room of a reputable hi-fi dealer.

To be more specific, I'm at Graham's Hi-Fi in North London and I'm here at the invitation of Michael Lewin, the opera-

some kind of a rare disability, they are just facing what can be a very real problem for any ordinary mortal who is looking to change or upgrade systems. And this is where a good dealer, and the BADA approach, comes in.

Singing a different song

Hi-fi reviewers are a privileged breed. They'll listen to a very wide range of equipment that automatically comes their way. They'll go home with an interesting new component, connect it up in the comfort of their own home, settle down and play a familiar, favourite piece of music. And they'll actually hear a difference; good or bad, they'll hear a difference.

Now consider the ordinary mortal. He or she doesn't have the opportunity to

what a good dealer will do; he or she will ask you to bring in a selection of your own music; you will be encouraged to isolate a particular instrument or section of a song and compare it as the system changes (Michael Lewin describes this as 'a valid criteria you can constantly use'). They will build a suitable system for you in the listening room and alter it one component at a time, giving you a chance to register differences. Obviously there are as many approaches as there are dealers but Graham's represents an optimum of the BADA philosophy. "Finding a dealer you can get along with is rather like choosing a tailor," says Michael Lewin. There are certainly reputable dealers around, both inside and outside of the Association, so what does he feel gives BADA an edge?

For a start, there's the two year guarantee which is offered by any shop in the Association. Various kinds of guarantees are commonplace and it would be a very dodgy piece of garden shed technology that didn't come with some kind of promise of back up, and an even dodgier shop which would consent to stock it; but the BADA system is interesting because it's a transferable guarantee. "There may well be some first rate dealers who aren't members of BADA. The problem comes when you buy from them and then you move to away from the area."

Then there's an exchange guarantee which is not unique but is consistent throughout the BADA membership and which must provide some very welcome peace of mind for the poor bewildered customer. If you choose a piece of gear as the result of the dealer's advice and once you get home you find that audio Nirvana isn't quite as near as it seemed in the shop, then you can return it for another component or even (and this is a distinctive feature) get your money back. "And I will personally lean on any dealer who doesn't adhere to this," says Michael, showing a sudden glint of steel.

But perhaps the most revealing item in BADA's code of practise is its stand regarding something called spivving. You might be forgiven for not knowing what this term means; possibly the word 'spiv' conjures up the sort of dubiously flashy dodgy-dealing character played by George Cole in endless dreary black and white English movies. But in hi-fi circles the phrase has a more precise, though closely related, meaning. Spivving is any form of promotion where a manufacturer offers incentives to staff to sell specific products; usually the sort of incentives which feature portraits of the monarch on one side and George Stephenson on the other. It may not always be dirty rolls of

Dealing with your DEALER

Choosing a decent dealer is the hardest, and most crucial step in setting up a decent system. Andrew Cartmel visits Michael Lewin to discuss hi-fi retailing in general, and the role of the dealers trade association, BADA, in particular.

tions officer and one of the guiding forces behind BADA, the British Audio Dealers' Association. Michael sees that I'm sitting comfortably with my pint mug of filtered water then leaves me here, the proverbial child in a sweetshop.

At *Hi-Fi Choice* we receive innumerable queries about systems and equipment. We give the best advice we can, but we always conclude with that critical warning: 'Listen before you buy. Find a good dealer and listen for yourself.' It's the only way to end up with a system that's right for you; and it's the sort of approach that BADA is committed to. Each dealer may have his or her own individual approach but the shared objective is to try and come up with something that pleases the customer.

This is neither as common nor as straightforward as it may sound. We regularly hear from readers who confess to the ultimate hi-fi sin. They have gone to a dealer, they have listened to various systems and they have been unable to hear any difference. Some of these people come away from the shops feeling beaten and terminally inferior. But far from suffering

routinely listen to dozens of new components. Buying just one can be a major task. They have to work up the nerve to go into what can be an intimidating and baffling environment. They may have a clear idea of some of the components they want to hear; but it's not going to be easy to stand by their guns in the face of an insistent dealer. Even if the customers get to hear the right equipment, will they hear it in the context of a familiar system? Will they be permitted to hear old favourites or is the dealer going to play them the Mercury *Balalaika Favourites* when what they really want to hear is the Justified Ancients of Mu-Mu? In the face of all this is it any wonder that it's sometimes difficult to hear a meaningful difference between Brand X and Brand Y?

By contrast, here I am on that candy striped sofa, relaxed and happy. "If you want, sing along with that guitar," says my attentive hi-fi guide. "Hum along with it." And I do indeed find myself warbling along to the Cowboy Junkies, realising that my poor companion must have had to suffer through some genuinely nightmarish singing over the years. But that is

fivers, but whether it's hard currency or book tokens exchangeable on great works of literature, the pattern is the same. Company reps go to the staff of the shops and promise them bonuses for pushing certain items.

A nice little earner

This may all come as a bit of a shock to anyone who believed that hi-fi was all gold plated banana plugs and oxygen free copper cables. Do such shady dealings actually go on? An anonymous informant, now gone on to better things, looks back on his adventures in hi-fi retail: "I used to work Saturdays for various retailers. And on those part-time days I'd only sell spivved product. I wouldn't rip the customers off but I'd make damned

sure they'd buy what I'd make money on. I could earn an extra hundred quid on a Saturday afternoon," he recalls with spine chilling cheerfulness.

So, spivving does exist, and needless to say it's unequivocally outlawed by BADA. But providing a code of practise for dealers is just part of the organisation's brief. In a sense it is crusading for hi-fi, on behalf of all of us: consumers, retailers, manufacturers and journalists alike. Michael Lewin is passionately committed to trying to improving the image of hi-fi in this country. "Hi-fi has an appalling profile in Britain. In 1985 it was number five in the list of desirable purchases. Now it's 14 going on 17. There's an appalling lack of interest here and it's a major problem that we have."

Why does he feel that we're in this situation? "Things have got worse in terms of public perception and disposable income is very low. There is an interest but it is not in quality. It would appear that the majority of people in Britain are more interested in what you might call 'mid-fi' or even 'lo-fi'. Not hi-fi. The British public doesn't yet understand hi-fi.

The changing market

"What we had twenty years ago was a better informed, smaller sector of the public. Now we are trying to appeal to a wider sector but one which is less well informed. Twenty years ago saw the change from the hobbyist to the mass market possibilities of hi-fi. This was the age before videos, before home computers, pre games systems. Other than television, hi-fi was the only form of domestic entertainment." Well possibly not the only one, but as the discussion turns to the serious facts of Britain in the Nineties, this hardly seems the place for cheap jokes.

"We build up large software collections but play them on appalling hardware," says Michael Lewin. And he has some tough comments to make about that software as well.

"The price of CDs here is absolutely ridiculous. One of the reasons the hi-fi industry isn't growing in England is because software is too expensive. And it's too expensive because of the sheer greed of the record companies. Sales of recorded music are declining. It's a classic case of the public being manipulated by major multinational corporations." Indeed Michael personally tends towards the view that we need something like a national boycott on all recorded music to shock the industry into recognition of the problem.

As new formats are launched and the digital invaders proliferate, Michael Lewin also foresees compromises in sound quality. "There's a great risk that compression techniques will be seen by the recording companies as the route to saving more money and cost cutting in production. There's a motion that the AES is considering which would apply the same compression techniques to master tapes. That's what really worries me."

There may be some problems ahead for hi-fi in the Britain of Danni Minogue, digital compression and cardboard cities, but it's comforting to know that there are individuals out there with Michael Lewin's level of commitment and awareness. And there may be a thousand ways of selling hi-fi, but the BADA approach is one that impresses with its sincerity and conviction.



Michael Lewin of BADA.

WIN £2,500 OF KEF LOUDSPEAKERS

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 (not everyone does) and send it to the address shown in bold type at the bottom of the form. Please mark your envelope **KEF Competition**.

The Prizes

The first correct entry drawn from our mailbag after the closing date will win the *105/3* speakers (retail price £1,995). The next correct entry wins the *Q60s* (£379). The third correct will receive the *K120s* (£159). Now get cracking.



Got your scissors ready to clip that coupon? Got the pen poised to answer those skill testing questions? Right. This month's first prize consists of a pair of KEF's statuesque Reference Series 105/3s, over 80 kilos and nearly £2,000 worth of serious loudspeaker featuring KEF's Uni-Q driver system. Also absolutely free to some lucky readers are a handsome pair of medium sized Q60s (again featuring KEF's coincident driver technology) and the compact two-way K120s.

The Questions

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

1. Pioneer has developed a new conversion system for digital recordings. What is it called?
2. What does CD-I stand for?
3. Who manufactures the *Neiro* amplifier?
4. Which amp was used by Alvin Gold while testing the *Studio 20s*?
5. Sony and Philips collaborated with Microsoft on a digital bridge format. What is the format called?
6. Where is the annual Winter International Consumer Electronics Show held?

Entry Form

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HFC/APRIL/92

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- 2.....
- 3.....
- 4.....
- 5.....
- 6.....

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- 6) The winners will be notified by post and the results will be published in *Hi-Fi Choice*.
- 7) Please notify us if you do not wish to be informed of any special offers and promotions.

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Audionote Ongaku, Niro & Oto amplifiers. "Probably the best amplifiers in the world", available here from the end of March.

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(Extracts: "Best Buy" HI-FI CHOICE)

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(Extracts: HI-FI CHOICE)

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Readers Write

CHOICE ANSWERS

Efficiency and serious bass on a budget

I wish to upgrade my hi-fi system to incorporate a CD Player and would appreciate some advice on equipment selection. My present, rather outdated, system comprises a *Rega Planar 3* turntable with a Linn K9 cartridge, a Sansui AU317 amplifier, and a pair of Tangent *TM1* speakers. I should point out that I have always been a fan of vinyl and I do not expect a CD player to improve upon the sound quality of the Rega. However, with the increasing unavailability of LPs, I feel the time has finally come to switch over to CD.

A few weeks ago I auditioned the following equipment, a Rotel RCD965BX CD Player, Pioneer A-400 amplifier and a pair of Cyrus 780 speakers. Quite frankly I found the result rather disappointing, the Cyrus 780s sounded tinny, but this may have been due to the fact that they had not been bi-wired. I then tried a pair of Tannoy 609s which were a significant improvement, although at the time I was not convinced enough to make a purchase. I still believe the Rotel to be the right choice of CD player, however I



If the A-400 isn't to your taste try one of the two Cyrus amps.

am not certain whether a change of amplifier would be beneficial, nor which speakers to go for. I have always liked my large Tangent speakers (good bass) but I feel I am losing out on detail at low volumes and would like something with rather more efficiency without losing bass performance. Can a small speaker deliver what I am looking for? I am considering Heybrook HBIs or Tannoy 611s, what do you

recommend? I have a budget of around £800-£900 to spend on CD, amplifier and speakers and I generally listen to rock music. J Somervell, Southwell, Notts.

I can't find a review of them in our records but if you like the TM1s it might be sensible to hang on to them. Speakers with good bass, ie those that go down a reasonable way and do so in controlled fashion, are not

particularly cheap. See if you can organise to lug the TM1s down to your dealer's dem room to try out with a few amps and CD players. You might find that with a better amp they do work well at low levels.

The Rotel does indeed seem to be a very strong contender in the silver disc player stakes but consider models from Pioneer, Ariston and Marantz as well, you might prefer them.

Again with amplification the A-400 manages to get most of the limelight review wise, but it's not to every one's taste and models from Marantz (PM40SE), Cyrus (either the I or II), Aura (VA-50) and Harman Kardon (HK6500) are well worth auditioning.

On the subject of loudspeakers, it's nigh on impossible to get good bass extension out of relatively efficient small designs, one or the other has to be compromised. If you can cope with the space they take up (and the expense) big is better than small, so if you can't get your Tangents to boogie consider some of the larger, more efficient (89dB+) models in the Directory.

Gimme some of that funky punch and crunch

Recent exposure to a friend's system has left me less than satisfied with my own. His consists of a Denon DRM 700A cassette deck, NAD 3130 amp and JPW Sonatas. The punch and crunch produced by this set-up was simply amazing and basically I want to get the same from my system, which is made up of a Technics RS-B605 cassette deck, Musical Fidelity B1 amp and Mission 707 speakers.

The question is which component do I need to change in order to give the system more welly? I'm thinking of moving up to a Denon DRM 710 cassette deck, but will this do the trick. Given a budget of £200-£350 what do you suggest? Humphrey Ginibun, Aberystwyth, Dyfed.

Basically your friend's system has a far superior cassette deck to the Technics you use and a

pair of speakers that specialise in gutsy sound. To compete with that you're going to need a new cassette deck but not the DRM 710 which has failed to follow in the illustrious 700A's footsteps. In fact you'd be better off trying to find an example of that machine, there must be a few left on the shelves. The other two decks that we'd suggest you investigate are the Akai GX-52 (£250) and the Marantz SD-50 (£230) but that's coming to the end of its shelf life as well, so you'll have to move fast.

As for the rest of the system, the amp is easily up to producing punch

and crunch but the speakers may not be, I'd suggest you get a new tape deck and then assess whether to go further. If

this proves to be necessary then listen to some of the followings models; Tannoy 609 (£250), Linn Index II (£235), Heybrook HB1S3 (£250), the Celestion 7 (£200), and the trusty Arcam Alpha (£200). Alternatively use the Quart 45X cans which you've just won!



Celestion's 7 gives a lively up front presentation that should up the crunch and punch rating of Humphrey's system.

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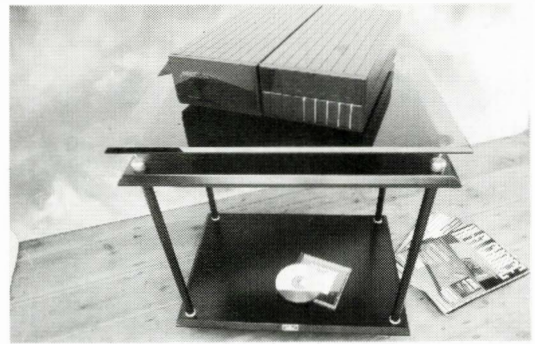
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A Little Bit of treble sweetness and bass slam

I would like to congratulate you all on producing arguably the best and most definitive hi-fi magazine on the market. It has been your magazine that has guided my many choices. But now I am faced with a major dilemma (mostly self-inflicted I'm afraid).

My system consists of a Rotel RCD-855 used as a transport with a Deltec Little Bit (optical) DAC, they are connected with the supplied 75ohm cable. The output then goes via Roksan interconnects to a Mission Cyrus I amplifier. The amplified signal is, in turn, carried by Cyrus Solid-core to Wharfedale 505.2s.

The problem is the speakers — which I have damaged physically by severely chipping the MDF casework and, damaged perceptually by comparing their treble performance with my Stax Gamma electrostatic headphones. The sound from the speakers is sibilant and splashy and the rhythm and coherence of the



Deltec's Little Bit DAC thrives on good clean mains power.

bass leaves much to be desired. I have a nasty feeling that it is the copious quantity of RF pouring out of the Little Bit and upsetting the Cyrus amp which is prejudicing the treble quality. The speakers then bodge the bass up quite significantly, not helped by their state of disrepair. What do you reckon I should do to improve the system? Should I replace the

speakers with, say, Epos ES IIs or Linn Index IIs to improve the bass? And somehow shield the RF coming out of the Little Bit? Or should I replace the amp (which seems a waste because it still seems to have quite some puff left in it)? Or should I attack the root of the matter by replacing the possibly inferior CD transport? Johan Khoo, Cambridge.

On the Little Bit front there are a couple of things that you could do to improve the situation. In his review Paul Miller discovered that using a mains filter of the Deltec Power variety (£100) tidied things up quite effectively with the sample he tested. It could also pay to go crazy with Hi-Fi Choice Purifiers (£16.90 per pair, Choice Offers) on your mains and signal cables around the CD combo, (and on the amp for that matter) these simple little devices are cheap, easy to fit and very effective at cutting down RF induced noise in a system.

The 505.2 is a good speaker and not renowned for sloppy bass and messy treble, unless you've significantly damaged them it would be worth getting some heavyweight stands and giving them a bit of room to breathe in. If new speakers are a must then consider the Arcam Alpha, Heybrook HB1 S3 and the Tannoy 609, as well as the two models you mention.

Jesus is a vinyl freak too

My system consists of an old Technics SL-1300 direct drive turntable with a Shure M95E cartridge, NAD 5425 CD player, Audio Research SP9II preamp and Musical Fidelity MA50 power amps driving KEF 104/2 loudspeakers. I use Kimber 4TC and PSB cables. I selected the power amps and CD player with the aid of your Directory and am very pleased with the results. I listen primarily to classical recordings with a bit of jazz and pop.

However, I have noticed that the weakest link in the system is the turntable, particularly my old cartridge which sounds very poor. I'm interested in purchasing a Glanz MFG-310LX or failing that an Ortofon 510, would these be compatible with my turntable? I suspect that a Shure VST-V would be too good for the SL-1300, what do you think?

Finally if I were to upgrade my turntable what would you recommend for a budget of up to £350?

Jesus Montemayor, Quezon City, Philippines



Freshen up your record collection with a Systemdek.

I can't find any reviews of your turntable in back issues of Choice, the closest we got was the SL-1700 which didn't do badly but wasn't recommended. However, this doesn't mean that the SL-1300 isn't good enough for a cartridge like the VST-V, it just means that you won't be hearing

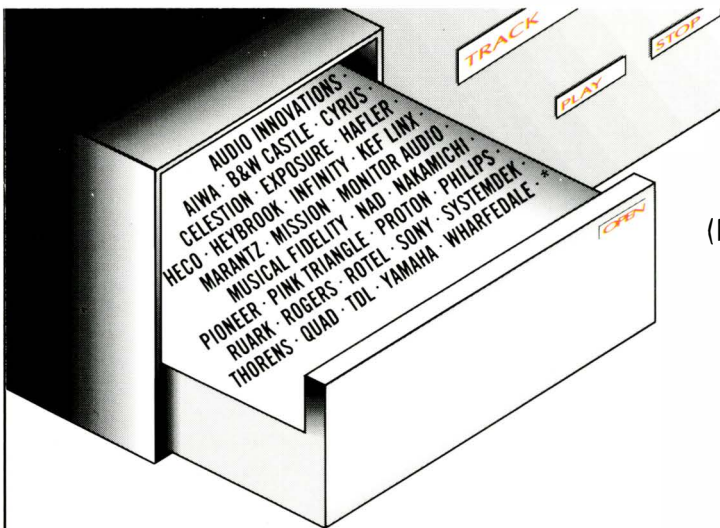
it at its best, it should still sound pretty good. On the other hand you would probably do better with something like a Systemdek IIX/900 turntable fitted with a Moth arm and something like the Glanz cartridge you mention or possibly one of the cheaper Denons such as the DL110.

Top tips

I would like to draw people's attention to the importance of two things which just about fall into the category of 'tweaking'. The importance of interconnects and supports is widely stressed, but other factors seem to be given less publicity, (possibly because they don't involve spending money).

Firstly, speaker positioning can be vital, with a few degrees of angle, or a few centimetres of distance from a rear wall making an audible difference. Similarly, the position of the surrounding furniture, and of course the listener, have a big effect.

Secondly, it's amazing what a difference a proper warm up period makes. I am convinced that my Cyrus I/Marantz CD60SE/Monitor Audio MA14 combination doesn't reach its peak until about 36 hours after powering up. I usually leave them on all the time. David Robinson, Whitacre Heath, Birmingham.



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Write on . . .

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

Keep the supply alive

Please rest assured, you are not the only one fed up with the exorbitant cost of CDs. Last summer I took an unguided leap into the hi-fi pool, buying a CD player despite already having a substantial vinyl collection. Since then I have been amazed at both the cost of CDs and the poor sound quality compared to my records, even when played on an old Panasonic deck. As a result, I buy very few CDs and shall soon be investing in a relatively sophisticated turntable.

As for DCC, I can safely say that I won't be investing in a tape format where the pre-recorded

software costs as much as a CD. It would take a lot to convince me that any mass-market tape source could match CD or vinyl for sound quality.

We should also be concerned about the effect which overpricing will ultimately have on the music industry as a whole. A quick glance at the top forty albums reveals mostly greatest hits collections, reissues or original albums by established artists. What about new young bands? Few people are willing to risk £13 on a disc which they might only play once. Record companies likewise will not risk

pressing discs which might not sell. We will ultimately be left with a stagnant pool of mega-selling OAPs and popular classical works. This may suit the record company executives but the prospect for music lovers is bleak. It will ultimately be left, I suppose, to companies like Linn to produce recordings that are both different and worth listening to. Perhaps the time has come for someone to invest not only in record pressing equipment but in the necessary facilities to produce LPs and thus keep the supply alive.

Andrew Stephens, Salisbury.

Gloria Estefan on 78

I have just paid £13.99 for the Queen *Greatest Hits II* album on CD, which is outrageous. Secondly, earlier this year you could pick up the older Queen albums, eg *News of the World*, *Day at the Races* etc for £7.49. Since Freddie Mercury died they appear to have gone up to £12.99.

I also have a Gloria Estefan CD single which I bought last year. Its sound quality has gone from normal to that of a badly misused 78! What do you think my chances are of getting a replacement disc gratis? If I want another copy I will have to scour the shops and pay a grossly inflated price, again. Which means that one CD single would cost me just under £8.

If CDs do last forever then I don't mind paying a premium, but as this doesn't appear to be the case I'm not too impressed. David McCarthy, East Grinstead, Sussex.

Japanese import CDs

How many people saw *The Money Programme* on the 12th of January? The subject was toy imports from the US into Japan. But at the end of the programme a spokesman from Virgin, Japan smugly told us how it was importing American and English CDs into Japan and selling them at 2200 Yen (under £10). He said this undercut Japanese retail prices by 200 to 300 Yen.

Perhaps Mr Branson can explain why we are being charged about £13 for a CD. Maybe the only hope is for a Japanese store to do the same as Virgin and open a chain here to undercut British retailers.

T Wilson, Tutbury, Staffs.

Pink circles versus Pink Triangles

A couple of years ago in another magazine, an American gentleman named Kenneth Kessler, who has a curious command of our language, exhorted us all to squirt an expensive liquid from Halford's over our CD collections in the vain hope of improving the visual quality of aural sound.

As he comes from the land where making tea consists of pouring a 'chest for the pot' into Boston Harbour, and, as I

say, it was another magazine, nobody took any notice.

But, what's this? On the February cover of *Hi-Fi Choice* there appears an illustration of a Systemdek turntable supporting what seems to be a vinyl record painted pink, while beneath the pick-up arm are two stalks of cereal.

Is this the latest fad? Does it work? Will Paul Messenger sermonise over it on the back page? No. It has nothing to do



Hidden messages: February's voodoo cereal stalks cover.

with hi-fi at all. I assume it is a subtle signal from your ever subtle photographer Chris Richardson to his art editor, Andrew Ryan, saying the following things: a pink circle is better than a Pink Triangle; I commute from Wheathampstead and I need

more bread; or I'm not getting my oats and need more than an arm over the turntable.

On the other hand, what will Ken say when he sees it? Walt Whitman, let alone T S Eliot, will revolve in his groove. Brian Rendle, Camberwell, London SE5.

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AUDIO NOTE PRE-AMPLIFIERS & NO FEEDBACK TECHNOLOGY

Much focus has been granted the Audio Note power amplifiers like the ONGAKU and the NEIRO, and no doubt the new benchmark products like the 300B amplifiers, KASSAI (£18,800.00) and KEGON (£46,600.00) or the mighty GAKU-ON, which uses the 845 triode and costs close to £90,000.00, will help move sonic performance in amplifiers well over the horizon, from where experience and understanding currently finds itself.

By comparison the Audio Note pre-amplifiers have been a little overlooked; this, however, is a very unjust oversight since the Audio Note pre-amplifiers excel as much in their part of the system as the Audio Note power amplifiers do in theirs.

Let me therefore make good the oversight and introduce you to the members of the Audio Note pre-amplifier family, starting with a small historical background.

Audio Notes' original M7 pre-amplifier set a standard for pre-amplifier performance when it was introduced in 1979, that has not really been equalled since.

It was, in true Audio Note tradition, a sophisticated and innovative product, using high voltage FETs in the audio circuit with a valve regulated power supply, no feedback, tantalum film resistors, paper in mineral oil capacitors and fully hardwired with silverwire, there was even a version with silver mains cable!

The FETs became unavailable in 1983 and the M7 production stopped as a result. But even today the M7 is a highly sought after and prized pre-amplifier, considered by many to be without equal, pretty good for a 10/12 year old product.

In 1988 I was presented with its successor, the M7Tube, which this time was an all-valve design, with valve regulation, all copper chassis and the usual Audio Note refinements. It has the usual inputs, with phono moving magnet, CD, Tape loop, etc. and represents a major development and improvement sonically over its predecessor, which is no mean achievement, considering how good the original M7 was.

The M7Tube is a highly versatile product that will get the best from almost any high quality power amplifier, and is well worth investigating if you own or are assembling a system where sonic excellence is the ultimate goal.

The M7Tube is available in two versions, one using our standard paper in oil signal capacitors and the other, the Silver, which has the Audio Note handmade silver foil signal capacitors, this adds a considerable premium to the price, not to mention to the sound quality.

The M7Tube costs £5,750.00, and the M7Tube Silver £8,450.00.

M7 PHONO

The ultimate phono stage for the real analog enthusiast! Made for the ONGAKU it is a pure, undiluted super RIAA stage, designed and made to the highest specification currently possible, and will lift ANY reasonable

system to new uncharted heights, provided your turntable is up to it. The M7 Phono is MM only and requires an MC transformer of very high quality to perform its best, preferably an AN-S7D, or the new AN-S5, built in this country using Audio Notes exclusive silver wired transformers, both are available for the Audio Note lo's or most other high quality cartridges.

The M7 Phono is yours for £9,300.00.

M7 LINE

Improved version of the M7Tube lineage, intended to match any high quality linesource like the M7Phono, to make a completely modular pre-amplifier. As is the case with the M7Tube, the M7Line is available in two versions, an economy standard version using our own paper in oil signal capacitors and a "Silver" version with the handmade Audio Note silver foil capacitors.

Both versions of the M7Line are highly versatile control centers that will give illustrious results with a great number of high quality line sources. They are capable of driving most good power amplifiers.

The M7Line standard costs £3,750.00 and the M7Line Silver £5,550.00.

NEW PRODUCTS

I mentioned the KASSAI, KEGON and GAKU-ON power amplifiers briefly in the introduction and a brief description of each of these amplifiers seems appropriate.

KASSAI

This stereo amplifier uses the legendary 300B power triode, it yields 17 watts in Class A+, in a parallel single-ended configuration. It uses a hybrid output transformer, where the primary section is wound from the age-annealed 12 year old copper wire also used in the NEIRO's and the secondary from Audio Notes 99.99% silver wire. The KASSAI further features silver input transformer, copper chassis, dual power supplies, valve regulation, silver foil capacitors and a hardwired silver wired circuit.

First sample of the KASSAI will "hit" the UK by the time you read this, and will retail at £18,800.00.

KEGON

Essentially a highly refined version of the KASSAI, with the original Western Electric 300B power triode and fully silver wired output transformers and made with much greater attention to detail.

Estimated UK retail £46,600.00.

GAKU-ON

The top-of-the-range mono power amplifiers, based originally on the ONGAKU design, but now developed much further, using the 845 power triode, this time in push-pull. It will boast a full 50 watts of Class A, with hand wound silver wired input, driver and output transformers, silver foil signal capacitors, valve rectification and chokes in the powersupply, and many, many other refinements. It will no doubt take its

place as the world's premier amplifier. Not surprisingly, the GAKU-ON is estimated to cost a staggering £90,000.00 for a pair!

On Negative Feedback

Much has been written about the Audio by Design philosophy of avoiding, to the greatest extent possible, any signal regeneration.

As one of the originators of this idea, I feel it is time that I make my objections to the use of feedback clear.

Having spent several years (12 to be exact) studying the subject of signal regeneration (together with just about any other matters relating to circuit topology), I came to the conclusion early on that the advantages of feedback are at best elusive and at worst highly damaging to the signal. This highly controversial view led me to look at amplifying devices and circuits where the use of feedback was unnecessary, and has resulted in such revolutionary and historically important products as the Audio Innovations First & Second Audio Amplifiers, the export version of the ONGAKU, and such fiascos as the original Audio Innovations Series 200 power amplifier (which Keith Howard so kindly and correctly objected to!).

In my opinion it can be demonstrated, with very few possible exceptions, that any kind of circuit feedback or signal regeneration has a degrading effect on the signal being amplified, regardless of how the feedback has been applied. Amplifying devices that require feedback to operate linearly are generally inferior in their sonic qualities to devices that do not. Case in point being transistors and pentode/tetrodes against direct heated triodes.

Up to now, all the commonly used test methods for determining amplifier's performance rely on two fundamentally flawed assumptions.

1. Amplifier distortion is always determined using static or "constant" signals, like square or sine waves, and it is assumed that this describes the behaviour under transient conditions.

2. The amplifier's output is normally loaded with a pure 8 Ohm resistor, in some cases shunted with a small capacitor, the assumption here is that this load resembles a speaker load.

In both cases the signal at the input and the signal at the output is the same.

Let me try to describe the problems from the incoming signal's point of view.

Before a signal has been applied to the amplifier's input there is no feedback or error correction system in place and the amplifier is working in its natural state, this means that the input overload characteristics are very substantially different from the situation when the feedback is in operation. This results in both gain modulation as well as, in most cases, severe clipping, of the very

first transient to hit the input before the error correction has had time to respond. This distortion is then "fed back" to and subtracted from a new input signal that in the majority of cases will bear no relation to the feedback signal.

The assumption that the amplifiers error correction system (feedback) is fast enough to deal adequately with transient information, if it can deal satisfactorily with "fast" static signals like square waves is misconceived. All amplifiers introduce some forward propagation delay, and whilst this correction will work when the signal on the output is the same as on the input, under transient conditions the delay introduced by the amplifier itself, will result in "out of date" information being subtracted from a fresh input.

It is this "distortion" of all new input signals by subtracting an "out of date" signal that has already been passed to the speakers that in my opinion is the main cause of the problems we hear in amplifiers with feedback.

The zero crossing point displacements that are caused by continually subtracting waveforms, whose frequency content and amplitude characteristics bear no relation to the incoming signal, are very gross indeed. Blunting or exaggerating transients, and adding of a kind of electronic "echo", or an excessive and mechanical treble character are all aspects that I have found to be products of feedback, created as the system tries to correct its own errors, but ends up creating new ones.

Furthermore a feedback waveform does not disappear from the amplifiers circuit after its first trip, but decays slowly by successive attenuation, and it is constantly being added to by new feedback waveforms, creating a mish-mash of information trying to act upon and be deducted from all new incoming waveforms.

Our hearing system is very sensitive to duration and delay, far more so than to amplitude, and it is therefore very well equipped to pick up this kind of "distortion" of the amplified signals as they are passed from the amplifier to the speaker.

I shall elaborate further in my next advert, as the above only represents a part of the problems that the signal regeneration create. I shall be very interested in hearing any disagreeing voices, of which I am sure there will be many.

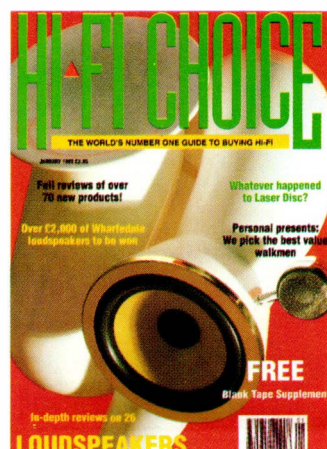
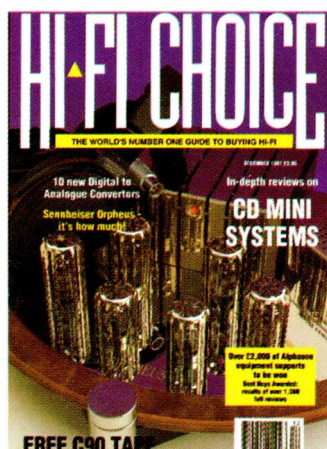
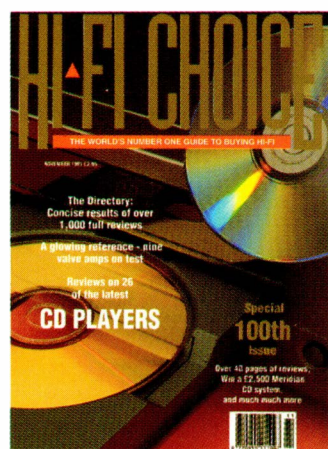
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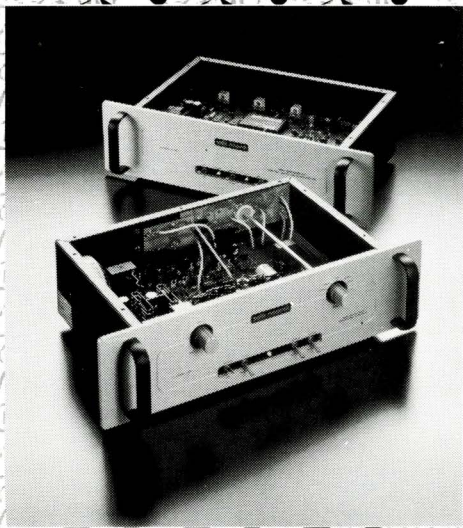
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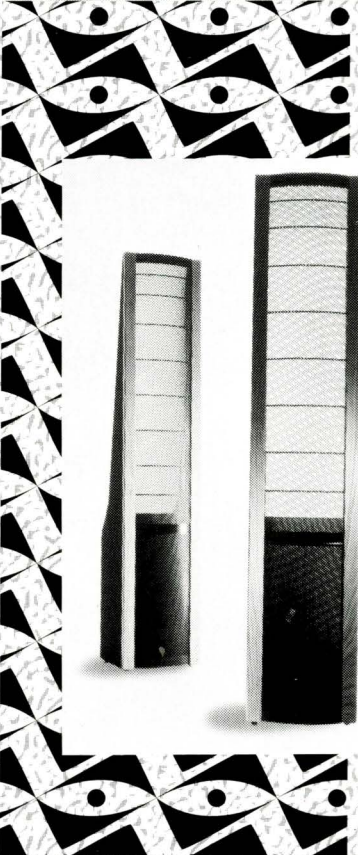
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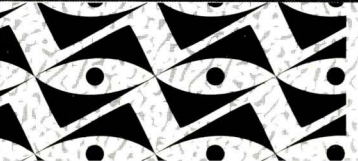
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21st Century Fox

On February 14th, St Valentine's Massacre Day, a deputation was due to meet representatives of Philips and Polygram, and ask them to change the design of the DCC cassette packaging. DCC, say members of the British Association of Record Dealers, is a 'marketing nightmare'. We were not consulted, says BARD. Neither were we consulted on Mini Disc.

This storm first blew up at a confidential meeting held at the end of January between the BPI, trade body for the record companies, and BARD. The dealers rejected the Philips/Polygram line that DCC is a good bet for retailers, because the new cassette fits into existing music cassette display racks. It would have been cheaper, say dealers, to install new racks for the new format.

Can you imagine what the retailers would have

It would seem that we're not the only ones moaning about DCC, Barry Fox has been talking to the retail trade and things aren't exactly running smoothly on that front.

said it we had told them to install new racks, asks Philips? And in any case, the dealers were consulted.

Philips spent a year on the DCC cassette and package design, trying to create a clear quality distinction over conventional cassettes. Instead of the conventional flimsy hinged plastics box, the DCC cassette slides into a stylish but tough plastics sleeve. The sleeve has a large hole on one side and the cassette carries a picture label on the front which shows through the hole. An inlay card is trapped inside the sleeve behind the cassette.

Fearing theft, record shops do not display CDs or music cassettes 'live', that it is to say in a rack with the recording in the box. They usually 'dead rack'. They keep the recordings behind the counter and display only the empty boxes.

This will not work with DCC, say the retailers. If the DCC is removed it leaves a sleeve with a hole on one side, and an inlay card which is difficult to remove, read and replace, and subsequently liable to get mangled or go missing. If the DCC is left in the sleeve it must for security be sealed in a bag or locked by a bar in the rack. The sleeve has a DCC logo stamped into the plastics but there is no DCC logo on the rear of the sleeve. There retailers reckon there is a risk of people buying the wrong tapes.

BARD gets angry

I had never heard of BARD, but tracked down Bob Lewis, the association's Secretary-General. He had never heard of me and was very cross to hear that details of the BPI meeting had been leaked. At first he said he would talk to me only if I identified the source of the leak. Of course I didn't. And eventually Lewis talked: "The DCC technology was well thought through. The backwards compatibility, which lets new players play old cassettes is good for consumers. The packaging looks good and feels good. In those

respects DCC is a brilliant concept. But Philips has failed on packaging and pricing policy. The same goes for Sony's ideas for Mini Disc, the miniature CD. Neither company talked to retailers about how to sell their systems. Although we are meeting Philips on February 14th we realise it may now be too late."

Of course it is far too late for major changes. At the BPI/BARD meeting samples of both DCC and Mini Disc were passed round. Many senior executives had never even seen a DCC before.

If Philips and Polygram have any sense they will concede on one point and put a clear DCC logo on the rear of the new cassette sleeve. It is clearly a ridiculous omission that it is not there already.

It emerged from the same meeting that all the major record companies have now followed Polygram's lead and are planning to charge as much for pre-recorded DCCs as premium CDs. How they will stand legally, under the European and American laws intended to prevent cartel price fixing, remains to be seen.

No-one has yet given a sensible justification of the policy which seems guaranteed to encourage home taping. Why buy a prerecorded DCC at premium CD price if you can make a perfect digital dub from the CD onto a blank DCC costing less than a fiver?

There are, I suspect, good reasons behind this apparently suicidal move, though, if you can find someone inside Philips and Polygram who is a) allowed to talk and b) has a grip on the strategy.

The price quoted for duplicating DCC (£1.70) is a red herring. For years pressing plants charged just under £2 per CD and the price has now fallen to a third that amount, while the shop price of premium CDs has of course increased.

The real reason for the same-price strategy is that Philips wants to steer DCC away from the 'low fi' image which comes from the use of compressed digital audio. Instead it would like to see more emphasis put on the 18-bit potential of DCC.

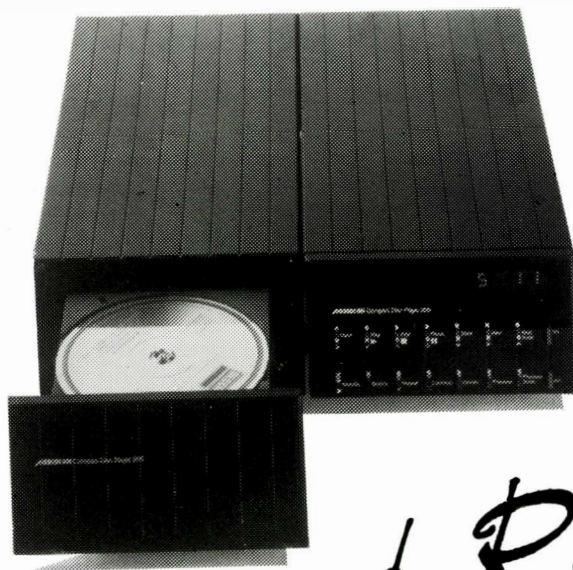
Theoretically at least

Early adopters will be quite happy to pay high prices for DCCs and will have neither the time nor inclination to home tape. As DCC sells to more popular ends of the market, the average price will fall. Premium releases will hold their premium prices, but there will be a more rapid introduction of budget releases and a wider price spread than with CD. So the average price of DCC will quickly fall.

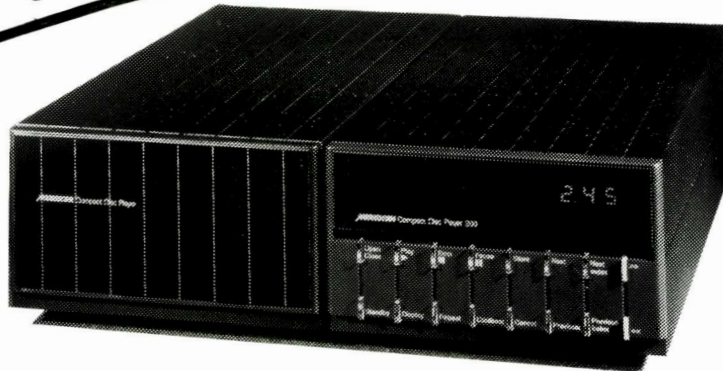
This is what Polygram means when it talks incoherently about DCC prices starting high and soon falling. It made the announcement on premium pricing early, to ensure there were no nasty pricing surprises to mar the launch of DCC.

Industry critics of the same-price policy argue that if DCC is going to take off, it needs the kick start of low software price, perhaps even as low as conventional analogue cassettes.

They foresee the very real danger that although buffs get all excited about DCC, as they did with DAT, the punter currently jogging with an analogue Walkman will greet the launch of a digital alternative with a resounding 'So What?'



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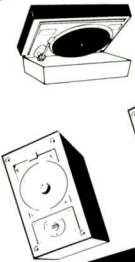
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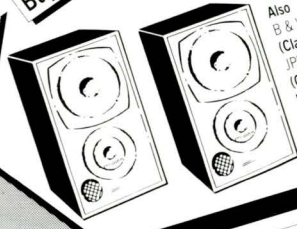
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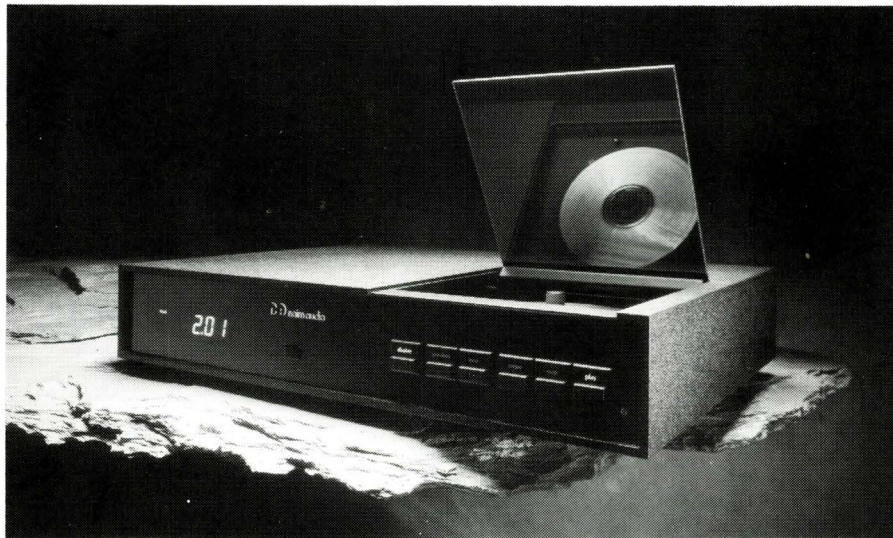
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Choosing and Using . . . Cassette Decks

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

Although DAT appears to be getting another marketing push now that the SCMS system has been agreed on, the message is that the humble cassette trundles into a new decade, consolidating rather than loosening its grip on the market. However, the imminent appearance of two new recording formats, Mini Disc and DCC, looks likely to upset the market. If either gets significantly backed by record companies we could all be using a digital recording system before the end of the next decade.

Potential buyers should take into account the introduction of a new noise reduction process called Dolby S, which is both extremely powerful and yet is

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

claimed to provide a degree of compatibility with Dolby B. That last claim should perhaps be taken with a pinch of salt, remembering that Dolby Labs said much the same of Dolby C. But it is also claimed that a Dolby S deck will perform comparably to digital media with respect to noise.

What other factors should you take into account? Obviously sound quality is a primary attribute, and is discussed fully in the reviews. Suffice it to say here that a good budget price deck (with the emphasis on 'good') costing say £100-£150, will be able to make recordings free of obvious problems like excessive noise, instability or varying pitch, at least when listening reasonably casually. However, something better will be needed for intensive use in a high resolution system, and you'll find rewards for paying extra, the point of diminishing returns becomes a factor only well into the several hundred pounds territory.

Types of tape

One advantage of better quality cassette decks is that they make more of the tapes you feed them. It's surprising how noise free a sympathetically chosen deck and tape combination can be, and omitting noise reduction processing generally adds clarity and articulation to the sound which is, literally and metaphorically, less manipulated. Dolby HX Pro assists here, since it helps prop up flagging high frequency dynamics on musical passages recorded at high level, keeping compression at bay a crucial few

decibels more than would otherwise be the case.

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

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

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

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

Different decks

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

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



Aiwa HD-S100

Aiwa (UK) Ltd, Unit 5, Heathrow Summit Centre, Skyport Drive, West Drayton, Middlesex, UB7 0LY. Tel: (081) 897 7000



The only portable in our survey was included to give a perspective on DAT working in an area where it is undoubtedly well at home. The *HD-S100* is intended for serious amateur or semi-pro location work where freedom from handling problems, low intrinsic noise levels and superb pitch stability make it a very powerful creative or working tool.

The *HD-S100* takes over from the *HD-S1*, one-time smallest DAT in the world. The *HD-S1* has lost that title, though much depends on exactly how the claim is couched, on whether batteries and the A/D convertor are included and so on. This player is all in one. A lead acid cell sufficient for about 70 minutes continuous use is housed internally (spares are obtainable and easily changed) and can be augmented by an external battery, shaped like the Aiwa's baseplate to avoid clumsy external boxes. The A/D convertor is also built in — it was housed externally in the case of the *HD-S1*.

The Aiwa feels solid and workmanlike with smoothly rounded corners to make it more 'grippy,' but you'll need to familiarise yourself with the scattered nature of the controls and interfaces before you can hope to become fluent. Facilities included a stereo microphone input (with attenuator, but there's no phantom power output), plus normal search and subcode post-editing. The display is of good quality, and sensibly positioned, and all signal socketry is 3.5mm. The only obvious missing feature is an LP record mode.

Test report

The overall frequency response looks like one produced by a rather average analogue cassette deck, though it is smoother in the bass. Digital filter ripple is quite a prominent feature of the plots. D/A linearity is good down to -90dB, but the digital encode circuitry has a problem in its right hand channel which is non-linear below -60dB, and seri-

ously so below -80dB where there appears to be one or more missing bits. The IM test showed some 1kHz products, but quite low down, at -81dB, and the ultrasonic spectrum is satisfactory.

Sound quality

Musically, the Aiwa performed at least as well as might have been expected. Although below the standards of most domestic DAT decks, it still had the same freedom from clutter and congestion, the same quiet backgrounds, the same tautness and precision in the upper registers and so on. The LF rolloff was probably deliberately introduced to provide some immunity to microphone handling, wind noise and other everyday eventualities of life on the road.

With music the effects were utterly predictable. The Aiwa sounded dry and a little unatmospheric when dubbing particularly reverberant recordings (one of the recordings that produced this comment was *Trinity Sessions* by the Cowboy Junkies), while in another typical example (Villa-Lobos *Bachianas Brasileiras No 1 for Eight Cellos* on Hyperion), cello tone tended to be lean and a little acid in the upper registers.

On the whole though, it was necessary to seek out material to show the Aiwa in a bad light, since in normal day to day use as a surrogate cassette deck it proved quite impressively consistent in its behaviour.

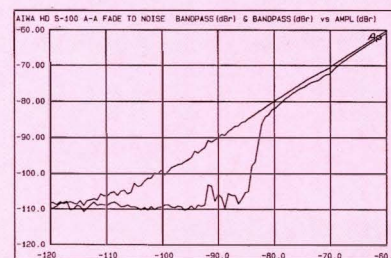
Conclusion

One particularly praiseworthy decision by Aiwa was to specify sealed lead acid batteries rather than NiCads with their traditional memory related fussiness. This underlines the practical nature of a package that is one of the ultimate personal stereos and a powerful portable recording tool, and which at a pinch could even stand in for a domestic DAT recorder. Very much a horses for courses product, a Recommended flag is clearly in order.

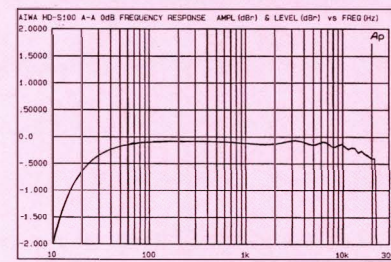
TEST RESULTS

Test resolution	15 bits		
Output level, dB rel 2V, Source (digital in)	1.176V/-4.61dB		
Line input sensitivity/overload	200mV/>13V		
Level meter indication at full level (digital in)	0dB		
Effective dynamic range (-70dB thd + N + dither)	100dB		
	20Hz	1kHz	20kHz
Pure harmonic distortion			
Full level ref 0dB	-82dB		-88dB
20kHz in-band products only			
	0.00794%	0.01%	0.00398%
at -70dB encode + dither	-35dB or 1.77%		
Stereo separation	90dB	80/94dB	60dB
Stereo balance	0.4dB	0.4dB	0.38dB
Frequency response (ref 1k) 20Hz - 20k +/-0.14dB			
Audible HF intermodulation	-81dB or 0.00891%		
Audible electrical noise (CCIR, ARM wtd, 1kHz)	-88dB		
Audible mechanical noise	low		
Ultrasonic noise	-97dB		
Deemphasis	+/-0.17dB at 5kHz		
White noise overload test	OK		
Dimensions (wxhxd)	9.5x4.4x15.5cm		
Typical Retail Price	£450		

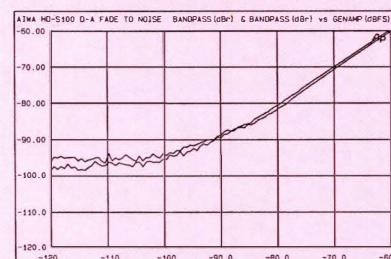
Tested with analogue in/analogue out unless otherwise stated



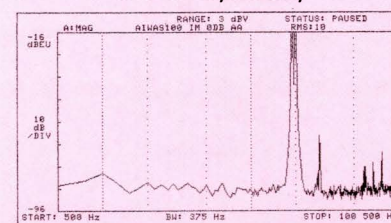
Full encode/decode linearity



Full encode/decode frequency response



Decode only linearity



Intermodulation spectrum



Aiwa XK-9000

Aiwa (UK) Ltd, Unit 5, Heathrow Summit Centre, Skyport Drive, West Drayton, Middlesex, UB7 0LY. Tel: (081) 897 7000



The XK series, with the XK-9000 as its flagship, was the first Japanese range to feature Dolby S. But the XK-9000 is much more than just a showcase for that process

This is a three head model equipped for real time off-tape monitoring, and comes complete with all three noise reduction systems. The display, which boasts a fine 54dB record level meter, can be turned off, as can the Dolby HX Pro circuit. It is even possible to switch off the erase head oscillator when recording on blank tapes, thus eliminating subtle cross modulation problems induced by the large erase currents. Bias, sensitivity and equalisation can be adjusted manually using a needle and pointer scheme.

In addition, the Aiwa includes its own 18-bit eight times oversampling D/A convertor to allow direct connection from a CD player or transport (via TOSLINK or coaxial connectors). To avoid unnecessary degradation when this isn't in use, the digital circuitry can be turned off.

Test report

Real effort has gone into stabilising, damping and isolating the cassette and those parts that touch it, to reduce microphony. Everything about this deck confirms its audiophile credentials, from the wooden base structure to the use of 6N copper in the amorphous record/replay saimesed heads.

The dual capstan transport gives state of the art results, with vanishingly low wow and flutter and a spectrum analysis that looks like the 'before' plot plus noise! Apart from a small LF ramp in the replay only frequency response, the deck measures flat under most conditions (the slight HF kink with Dolby C, however, is audible), but there is a perceptible HF loss with Dolby S.

Sound quality

Dolby C is effectively rendered obsolete by Dolby S (unless it is to replay existing Dolby

C recordings), and in any case didn't sound too hot. The real life choice then is between the least processing consistent with achieving quiet backgrounds (Dolby B, usually) or the sophisticated solution, Dolby S. Remember that Dolby S tapes play quite happily in a Dolby B car player.

Recording without Dolby shows signs of being sharper and clearer, with less internal muddle and loss of transient 'bite', but the inevitable hiss is unwelcome. On the whole, I ended up favouring Dolby S, of which this is a good (if not totally transparent) example. The sound is more focused than the straight feed without Dolby — hiss has the effect of smudging soundstage information and fine detail — and a lot quieter than Dolby B. Even the bass end benefits.

Leaving NR to one side, the Aiwa is first and foremost a machine dedicated to the special qualities of metal tapes, and it was with good metals that it gave its most open and dynamic performance. Relatively simple, percussive material (eg Keith Jarrett's *Bach Goldberg Variations* on CD), reproduced with remarkable poise and integrity, and with very precise instrumental locations. The subtle reverberant sounds from the body of the instrument reproduced intact. With more complex material the sound began to sound a little smeared — but more with Dolby than without.

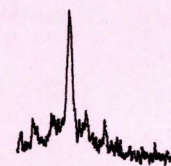
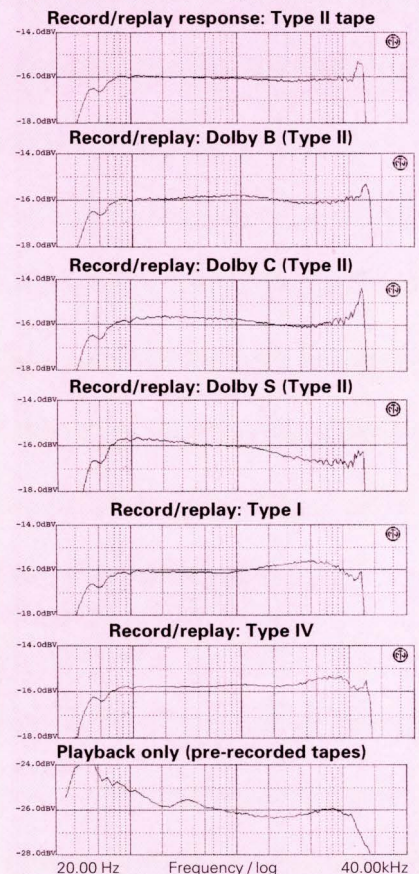
The DAC is of good standard, but easily bettered. It's a utility unlikely to be attractive to the probable target market for so exacting a cassette deck.

Conclusion

My only slight disappointment was to find that Aiwa has ducked the question of replay compatibility by omitting any form of replay azimuth adjustment. This aside, and despite perceptible imperfections in the Dolby circuitry, this is a first rate deck capable of unusual stability, transient attack and refinement. Recommended.

TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	25Hz - 16kHz
IEC Type II	25Hz - 17kHz
IEC Type IV	25Hz - 16kHz
Wow & Flutter - Peak DIN wtd	0.045%
Wow/Flutter - unwtd rec/replay	0.04%/0.09%
Replay only flutter 3kHz	0.001%
Speed	+0.23%
Type I signal/noise CCIR/ARM 400Hz ref 3%THD	60.5dB
VU indication at 3% THD 400Hz/10kHz	+10dB
Type II signal/noise CCIR/ARM 400Hz ref 3% THD	61dB
VU indication at 3% THD 400Hz/10kHz	+7dB
Type IV signal/noise CCIR/ARM 400Hz ref 3% THD	63dB
VU indication at 3% THD 400Hz/10kHz	+10dB
Line input sensitivity/overload	81mV/>13V
Mic input sensitivity/overload	1.64mV/77mV
Line output for 0dB/maximum	807mV/5.70V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.4%
Azimuth check R-L phase at 10kHz	30 degrees
VU indication at IEC 0dB	4dB
Dimensions (wxhxd)	47x15.5x36.5cm
Average wind/rewind time (C90)	1 min 41 sec
Typical Retail Price	£700



Noise modulation spectrum analysis



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Akai DX-57

Akai (UK) Ltd, 12 Haslemere Heathrow Estate, Silver Jubilee Way, Hounslow, Middlesex. Tel: (081) 897 6388



The Akai DX-57 is a direct response to the predatorially priced three head decks introduced last year by kissing cousins Aiwa and Sony. Cheap as it is, the Akai manages to include a dual capstan transport mechanism, hopefully to mitigate the microphony invited by the extremely flimsy loading door, a point that should be addressed in the event of a *MkII* version.

The features list is straightforward and sensible, and even manages to cram in the odd luxury such as an electronic memory counter scaled in elapsed time, a back lit cassette well, and record level meters which offer excellent ballistics and a full 50dB working dynamic range. There is also a peak hold feature and a graphic display of an appropriate maximum input level for each tape group, though the suggested levels were not always very sensibly set — see three per cent THD figures in the panel.

Tape search aids include track search capable of looking up to 30 tracks in either direction. Surprisingly, the Akai even comes with a small stick-like remote control. Basic features include the standard Dolby triumvirate (with switchable MPX filtering) and variable bias.

Test report

Although it was not in any real danger of setting new standards, the DX-57 acquitted itself honourably on the test track. Tape handling is on the noisy side, especially when changing modes or in fast wind, but there's no other real cause for complaint. The deck also ran effectively flat frequency response shapes with Type IV (metal) tapes and in the prerecorded response test run.

The flat Type II Dolby C plot, however, is interestingly disfigured, showing progressive loss of output at higher frequencies, largely due to underbiasing, and this was confirmed in the listening tests (see below). But although rebiasing restores the Type II response to neutrality, it leaves Type II with

Dolby C sounding bright.

The Akai is an electrically quiet deck with adequate headroom in the heads and record amps and a consequent ability to make good use of high energy Type II and even Type IV (metal) tapes.

Sound quality

The good showing in the lab tests was confirmed on audition in a pattern mirrored by comparably priced machines from a number of manufacturers. There has been a general upgrading of standards in the middle sector of the market, of which this Akai is a part.

Prerecorded tapes sounded tonally accurate, with real clarity and warmth, and good presence and freedom (relatively speaking) from hiss at the top end. It proved possible to achieve a practically flat amplitude response with all the IEC standard tapes using a touch less than the standard amount of bias and I made some fine recordings. Metals ultimately gave a sharper presentation with better architecture. They simply sounded more stable, outgoing and dynamic, and there are not many less expensive cassette decks of which the same can be said.

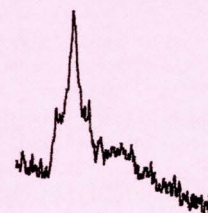
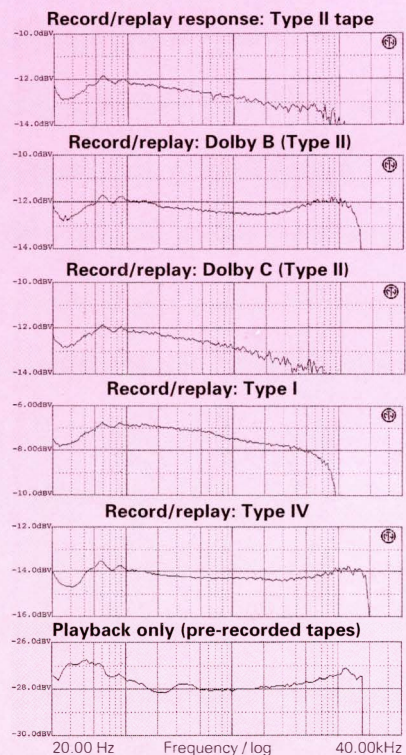
Pitch accuracy was good, but not faultless: the sound being perceptibly less stable than some, though the dual capstan mechanism imposes a discipline on the sound, especially at the frequency extremes through a reduction in flutter and modulation noise. Dolby C was a dead loss. Familiar music sounded shut in and dynamically constrained. Dolby B was fine, but depending on the programme material, it could be well worth trying a quiet Type II without Dolby by all.

Conclusion

Recommended as a strong middle ranking model, with good all round performance in all operational modes except Dolby C. It's well priced and makes good use of the dynamic capabilities of metal tape stock.

TEST RESULTS

Dolby Level reading on deck's meters	n/a
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 10kHz
IEC Type II	<20Hz - 12kHz
IEC Type IV	<20Hz - 20kHz
Wow & Flutter - Peak DIN wtd	0.12%
Wow/Flutter - unwtd rec/replay	0.09%/0.12%
Replay only flutter 3kHz	0.075%
Speed	+0.13%
Type I signal/noise CCIR/ARM 400Hz ref 3%THD	56.0dB
VU indication at 3% THD 400Hz/10kHz	+2dB
Type II signal/noise CCIR/ARM 400Hz ref 3% THD	61.5dB
VU indication at 3% THD 400Hz/10kHz	+3dB
Type IV signal/noise CCIR/ARM 400Hz ref 3% THD	62.5dB
VU indication at 3% THD 400Hz/10kHz	+7dB
Line input sensitivity/overload	100mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	609mV/4.48V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.38%
Azimuth check R-L phase at 10kHz	150 degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	43x13.5x34cm
Average wind/rewind time (C90)	1 min 45 sec
Typical Retail Price	£200



Noise modulation spectrum analysis

Denon DRM-710

Hayden Labs Ltd, Hayden House, Chiltern Hill, Chalfont St Peter, Bucks SL9 9UG. Tel: (0753) 888 447



This model replaces the popular *DRM-700*, and like its predecessor is a three head model. It differs from that model in one major respect, however, as the old single capstan transport has been replaced by a dual capstan transport normally used in more expensive Denons.

The deck is notable for clear disposition of controls and displays, the latter centred on a long, high resolution record level meter with a full 50dB dynamic range. Dolby B, C and HX Pro are all included, along with some useful search options — track search and an elapsed time memory counter among them.

Bias can be fine adjusted in the traditional manner using a control and juggling the before/after tape monitor switch. Output level to the headphones and to the outside world are adjustable using the same pot — the latter a classic error which I have recently seen perpetuated in a state of the art £800 model! The output should always be as direct as possible, best simulated here by leaving the control on maximum.

Test report

Measurement-wise, the *DRM-710* was something of a mixture. Although the replay only response shape is extremely flat, the Type II record/replay response shape showed significant treble loss before bias correction, and the other two tapes showed the inverse characteristic.

While Dolby B had only the expected effect on the response shape (given the starting point), the Dolby C shape was grossly in error. This test was repeated several times with the same effect — a 7dB loss at 20kHz ref 1kHz — but the reason remains a mystery as the effect was symptomless in the subsequent listening tests, bar the usual Dolby C related losses!

The transport was pretty good on paper, though the spectrum analysis was disappointing. The record chain has relatively

limited headroom, making metals only marginally worthwhile, and signal/noise performance was universally disappointing. 56dB for three per cent THD is about 5dB below where it should be.

Sound quality

It didn't take long to confirm the obvious, that Dolby C was inferior to Dolby B, though not to the usual extent. Metal tapes did no harm musically, but they scarcely repaid the additional investment. Of the tapes tried, the deck was at its most cost-effective with TDA SA-X. Prerecorded material was handled kindly.

The listening notes were full of details which are difficult to roll up into a single, coherent overall picture of the Denon's capabilities — and limitations. Superficially at least, the deck sounded open, clean and stable, with quite impressive stability and a lightness of touch that not all cassette decks can emulate. But there was a downside too: a one dimensionality to violin and piano tone, a lack of breathing sounds and articulation with closed miked vocals are typical examples, as was a flattening and foreshortening of stereo perspectives and a loss of stereo projection, for example of centrally placed lead/solo instruments or voices.

Bass was light and agile in tone, though occasionally a little fruity in balance. Put at its simplest, the Denon just lacked subtlety, and although what was clearly audible was well enough reproduced, there was a sense in which the deck seemed to draw a veil over more level passages.

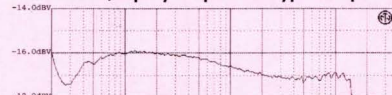
Conclusion

As a basic three head cassette deck, the Denon *DRM-710* has a lot to recommend it, but to an extent it seems the victim of events, which include lower prices and improved standards from at least some of the players this time around. And it still cannot be run from a timer.

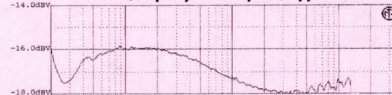
TEST RESULTS

Dolby Level reading on deck's meters	n/a
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 14kHz
IEC Type II	<20Hz - 16kHz
IEC Type IV	<20Hz - 19kHz
Wow & Flutter - Peak DIN wtd	0.09%
Wow/Flutter - unwtd rec/replay	0.07%/0.12%
Replay only flutter 3kHz	0.09%
Speed	-0.6%
Type I signal/noise CCIR/ARM 400Hz ref 3% THD	56.5dB
VU indication at 3% THD 400Hz/10kHz	+7dB
Type II signal/noise CCIR/ARM 400Hz ref 3% THD	58.0dB
VU indication at 3% THD 400Hz/10kHz	+2dB
Type IV signal/noise CCIR/ARM 400Hz ref 3% THD	56.0dB
VU indication at 3% THD 400Hz/10kHz	+3dB
Line input sensitivity/overload	94mV/>7.8V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	730mV/3.12V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	2%
Azimuth check R-L phase at 10kHz	20 degrees
VU indication at IEC 0dB	3dB
Dimensions (wxhxd)	43.5x12.5x27.5cm
Average wind/rewind time (C90)	3 min 4 sec
Typical Retail Price	£230

Record/replay response: Type II tape



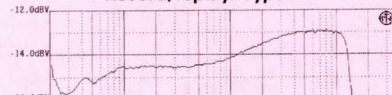
Record/replay: Dolby B (Type II)



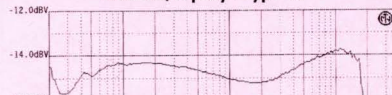
Record/replay: Dolby C (Type II)



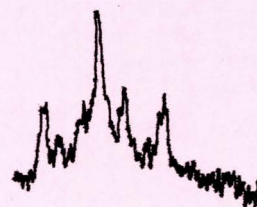
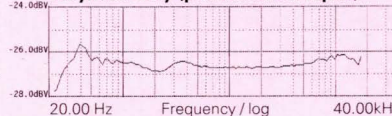
Record/replay: Type I



Record/replay: Type IV



Playback only (pre-recorded tapes)



Noise modulation spectrum analysis

Denon DRS-810

Denon Labs Ltd, Hayden House, Chiltern Hill, Chalfont St Peter, Bucks SL9 9EW. Tel: (0753) 888 447



In retrospect it should have been obvious that someone, somewhere would make a cassette deck that is equipped with a CD style drawer loading mechanism. The maker claims that the horizontal fly-wheel bearings are better than their vertical counterparts, reducing 'intermodulation resonances' whatever they are. Denon might have mentioned improved environmental sealing which reduces microphony, and the opportunity it provides to reduce the player's height, though only marginal advantage has been made of this.

The only obvious downside is that the tape is invisible when loaded, which can make it difficult to get a feel for how the tape is progressing. Denon tackles this with a real time tape counter with a remaining time display (in minutes) available a few seconds after the button is pressed - but it's a clumsy implementation.

This is a three head deck with off tape monitoring. Unusually for Denon, a timer standby facility is included, along with basic tape search features, including record return and track search. Tape tuning is confined to variable bias. Other features include Dolby B, C and HX Pro, a variable headphone outlet, and a good quality function display which includes 50dB peak hold meters. IR remote control is optional, though mostly intended for Denon system users.

Test report

The dual capstan transport is arranged on its side in the drawer, with a cassette shell clamp where the disc centre clamp would normally be. The unusually solid and heavy case is supported on feet with some built-in damping properties. The spectrum analysis of wow and flutter artefacts is unusually clean, with no dominant effects, and the numbers broadly support this analysis.

Although metals can be made to give a flat response, usually with a little added bias, Type IV signal/noise is very poor, and

IM distortion around 0VU is catastrophic due to a lack of headroom. Even at 400Hz, three per cent THD was reached at only +4dB, which is lower than for Type I ferrics! Type IIs are adequately handled, albeit still with a somewhat foreshortened dynamic range, and Dolby C lineup is poor at very high frequencies. At the very least this results in excessive EHF hiss, which is especially noticeable via headphones. The replay only response is accurately set however.

Sound quality

The Denon does not favour metals, which would be understandable in a £150 deck, but is both surprising and on balance unfor- givable in one costing £300.

On audition, the *DRM-810* provided an interesting blend of vices and virtues. The horizontal loading mechanism appears to result in cleaner low level sound, especially with quiet ferrics and chromes (BASF and TDK SA-X, for example) used with Dolby B. The problem was that the electronics were not good enough to press the advantage at the forté end of the dynamic range, and performance with high energy metals suffered from inadequate headroom, making hiss more prominent.

When not being stressed beyond its capabilities this is a fine deck. It was notably good with prerecorded tapes, which tended to sounded lively, open and unsmear- ed.

Conclusion

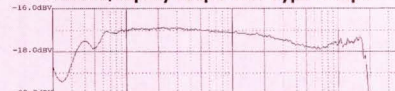
The *DRS-810* has an unusually attractive appearance, in part due to good finish and also because most of the secondary controls and the headphone socket are hidden behind a full width flap.

The sliding mechanism is an undoubted success, because it is quick and quiet and appears to offer improvement in sound, but the time counter design is half baked. Musically, this is a good deck for undemanding material with medium energy tapes.

TEST RESULTS

Dolby Level reading on deck's meters	n/a
Rec/replay response-3dB ref 1kHz	
IEC Type I	20Hz - 18kHz
IEC Type II	20Hz - 19kHz
IEC Type IV	20Hz - 22kHz
Wow & Flutter - Peak DIN wtd	0.12%
Wow/Flutter - unwtd rec/replay	0.09%/0.13%
Replay only flutter 3kHz	0.08%
Speed	+0.20%
Type I signal/noise CCIR/	
ARM 400Hz ref 3% THD	58.0dB
VU indication at 3% THD 400Hz/10kHz	+7dB
Type II signal/noise CCIR/	
ARM 400Hz ref 3% THD	58.0dB
VU indication at 3% THD 400Hz/10kHz	+1.5dB
Type IV signal/noise CCIR/	
ARM 400Hz ref 3% THD	+57.5dB
VU indication at 3% THD 400Hz/10kHz	+4dB
Line input sensitivity/overload	95mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	731mV/2.45V
IM distortion 10kHz/	
11kHz 0dB peak, 1kHz product	106%
Azimuth check R-L phase at 10kHz	30 degrees
VU indication at IEC 0dB	2dB
Dimensions (wxhxd)	43.5x12x32cm
Average wind/rewind time (C90)	2 min 33 sec
Typical Retail Price	£300

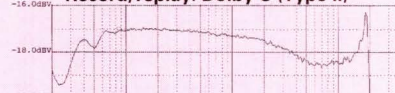
Record/replay response: Type II tape



Record/replay: Dolby B (Type II)



Record/replay: Dolby C (Type II)



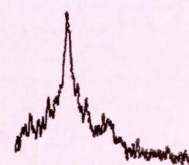
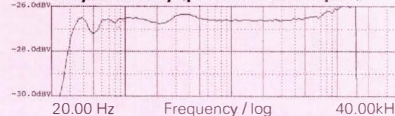
Record/replay: Type I



Record/replay: Type IV



Playback only (pre-recorded tapes)



Noise modulation spectrum analysis

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NO. 9

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Dick Olsher, Stereophile. Vol.14 No.11 November 1991

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Dual CC800RS

Ram Projects, Unit 27, Stretford Motorway Estate, Stretford, Manchester M32 0ZH. Tel: (061) 8668101



Headline features of this new inexpensive deck from the house of Dual include an auto reverse transport, Dolby B and C and Dolby HX Pro. These things apart, the specification sheet is pretty basic. The auto-reverse mechanism runs up against the buffers at end of side: the Dual has no optical end of tape sensor and therefore doesn't change sides rapidly. The record level meter has a narrow 19dB range in six broad steps; there's no MPX filter switch and the headphone socket is driven at a fixed volume level.

On the other hand there is a microphone input — a single 6.3mm stereo socket — and although there is no counter memory, there is a track skip facility which looks for the next or the current track start. In other words, all the basics are there, plus auto-reverse. It is even possible to link the deck, via data sockets on the back to other Dual components for system remote control.

This wasn't the most pleasing deck to operate. It appears to be stuffed full of noisy solenoids, and the mechanical tape counter would occasionally lock, producing a frantic clicking noise in fast wind as well as loosing touch with the tape position. The tape loading arrangement has a Heath Robinson feel, since it relies on the door deforming in a predetermined way. Press the wrong corner and it doesn't open at all.

Test report

Wow and flutter levels varied as the tests took place, and the results can be summed up in one word: erratic but poor overall. OK, four words. The area enclosed under the curve on the spectrum analysis shows graphically just how erratic the levels are.

The frequency responses are all within reasonable limits, but all the record/playback responses have a characteristic dished shape, with a broad, shallow depression in output centred on 2kHz. This would have been of no great consequence except that

there's no bias adjustment to bring the responses back into line. The playback only response shape is good, though tilted slightly upwards in the treble, implying a lively sound.

There's little wrong with the available dynamic range with Type I and II tapes, but as expected given the price, this is not a deck suitable for driving metals to the limit.

Sound quality

Very high line level input settings were required with the test system (based around an Audiolab 8000C preamplifier), raising the possibility that some systems won't drive this deck fully.

Fired up with some Mozart (*Piano Concerto No 21*) and a Type II tape, the Dual proceeded to roughen up the piano and play havoc with the orchestral ensemble, as well as pulling them forward a couple of meters. The piano's intonation took on a decidedly wobbly feel, though the improved figures were matched by a more solid and stable sound when playing side B without first inverting the tape.

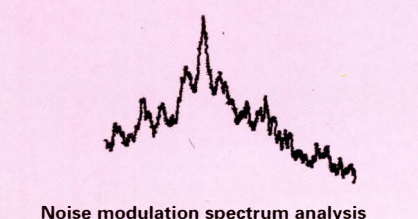
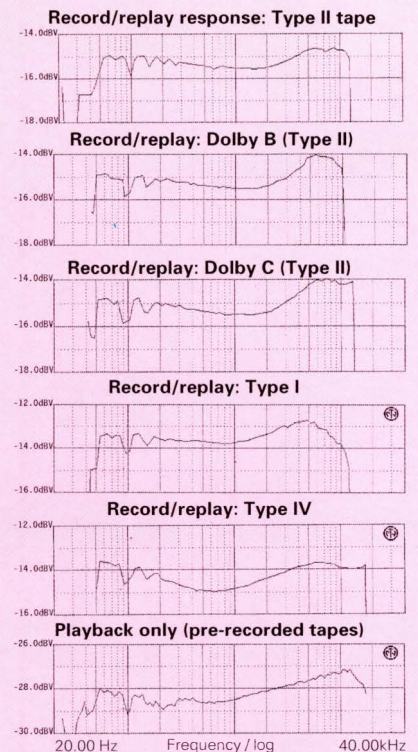
Insofar as the deck is capable of good sound, the Dual worked satisfactorily with Type I and IIs, though the latter tended to sound more consistent dynamically. Type Is sounded OK with rock and other music that trawls a steady 20dB or so maximum dynamic envelope. With more obviously dynamic, open textured material (a number of female vocal recordings qualify here, including every reviewer's favourite, Mary Black), the Dual squashed the sound, muddled fine detail and omitted deep bass, a point that was also noticed with prerecorded tapes.

Conclusion

The combination of low price and auto-reverse has some attraction, but the Dual CC800RS is a relatively crude design with somewhat coarse sound quality and a shortage of fine detail, despite an almost aggressively up-front balance.

TEST RESULTS

Dolby Level reading on deck's meters	n/a
Rec/replay response -3dB ref 1kHz	
IEC Type I	40Hz - 12kHz
IEC Type II	40Hz - 12kHz
IEC Type IV	40Hz - 18kHz
Wow & Flutter - Peak DIN wtd	FWD/REV 0.24%/0.16%
Wow/Flutter - unwt'd rec/replay	FWD 0.10%/0.80%
	REV 0.75%/0.76%
Replay only flutter 3kHz	FWD/REV 0.15%/0.22%
Type I signal/noise CCIR/ARM 400Hz ref 3%THD	57.0dB
VU indication at 3% THD 400Hz/10kHz	+6dB
Type II signal/noise CCIR/ARM 400Hz ref 3% THD	59.0dB
VU indication at 3% THD 400Hz/10kHz	+6dB
Type IV signal/noise CCIR/ARM 400Hz ref 3% THD	57.0dB
VU indication at 3% THD 400Hz/10kHz	+3dB
Line input sensitivity/overload	128mV/>13V
Mic input sensitivity/overload	0.52mV/53mV
Line output for 0dB/maximum	587mV/2.92V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.28%
Azimuth check R-L phase at 10kHz	FWD/REV 60/240 degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	44x12.5x24.5cm
Average wind/rewind time (C90)	2 min 10 sec
Typical Retail Price	£150



JVC TD-R441

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



If god had intended compact cassette to be a hi-fi medium, he'd have made it half-track to run at 15ips. It was always intended as a handy convenience-oriented tool, and it is arguable that machines like this, with their auto-reverse mechanisms giving the system 90 or even 120 minutes unattended record and playback capability, are closer to the spirit of the cassette than more overtly hi-fi machines.

The titanium coloured *TD-R441* borrows a lot from its senior brother, the three head unidirectional *TD-V541*, though it is much more plasticity in construction. The visual identification, however, is nearly complete; the 38dB record level meter is virtually identical and the transport controls are laid out similarly except for the addition of a 'direction' key.

Most of the signal conditioning circuitry from the more costly machine is also present, including Dolby C and HX Pro, adjustable bias, a circuit for finding peak levels as an aid to recording from CD (see *TD-V541* review on the facing page) and two inputs, switchable on the front panel. The elapsed time tape counter is also similar, as is the fixed level headphone circuit.

Test report

As had been anticipated, the performance of the auto reverse transport mechanism is a long way short of achieving the standards of JVC's own unidirectional transports. The broadened peak in the spectrum analysis is an accurate measure of this. The figures show that the transport behaved better in the reverse direction, wow levels especially being improved.

The various signal/noise figures are satisfactory, though machine limited to about the same level for all three tape groups, which means that high energy tapes will not be properly exploited, a comment that is especially true of metals.

Most interesting of all, the metal tape

response run was absolutely flat within its passband, and ferric tapes were also pretty well handled. However, the deck sounded and measured dull with IEC Type II tapes. Rebiasing helped considerably, but Dolby levels were slightly mis-set and some treble loss was apparent, especially with Dolby C. The bass response was also rather lacking in depth with all tape groups.

Sound quality

The bass tended to sound shallow and boomy (Andy Sheppard's *Upstate* from *In-Co-Notion* was one of the most noticeable examples), and although metal tapes sounded OK with much material, they tended to be hissy due to the JVC's inability to push them near their intrinsic limits. In short, the (considerable) additional expense of metal tape simply isn't justified in this case. The deck worked well with Dolby B and a good Type I — TDK *AR-X* worked well — or Type II, but was a little coloured at the top end with Dolby C, which on balance (and as usual) was felt to be marginally inferior to its lowlier stablemate.

The *TD-R441* has a general tendency to sound shut-in and a little slow and lazy, which was especially noticeable when the music was at its busiest and most vivid (about five minutes into the same Andy Sheppard track, for example). There were also signs of pitch imprecision with sustained piano notes and other pitch sensitive material, though this is more a 'seat of the pants' observation: there was nothing that could be pinned down as a definitely meandering pitch.

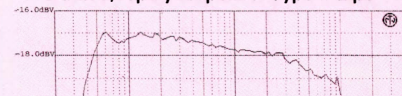
Conclusion

Only so much should be expected of a low end auto-reverse cassette deck, and in reality the *TD-R441* does what it sets out to do. Include it on your shortlist if you need auto-reverse, but it falls short of the criteria for explicit commendation.

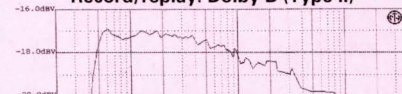
TEST RESULTS

Dolby Level reading on deck's meters	-1dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	40Hz - 14kHz
IEC Type II	35Hz - 12kHz
IEC Type IV	40Hz - 14kHz
Wow & Flutter - Peak DIN wtd	FWD/REV +0.15%/+0.12%
Wow/Flutter - unwtd rec/replay	FWD 0.13%/0.27% REV 0.08%/0.30%
Replay only flutter 3kHz	FWD/REV 0.21%/0.16%
Speed	FWD/REV -0.23/-0.33%
Type I signal/noise CCIR/ ARM 400Hz ref 3% THD	59.0dB
VU indication at 3% THD 400Hz/10kHz	+4dB
Type II signal/noise CCIR/ ARM 400Hz ref 3% THD	58.0dB
VU indication at 3% THD 400Hz/10kHz	0dB
Type IV signal/noise CCIR/ ARM 400Hz ref 3% THD	59.0dB
VU indication at 3% THD 400Hz/10kHz	+2dB
Line input sensitivity/overload	126mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	460mV/3.04V
IM distortion 10kHz/ 11kHz 0dB peak, 1kHz product	1%
Azimuth check R-L phase at 10kHz	60 degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	43.5x13x32cm
Average wind/rewind time (C90)	2 min 36 sec
Typical Retail Price	£170

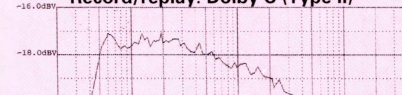
Record/replay response: Type II tape



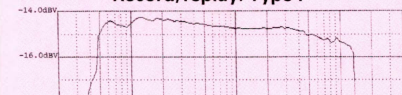
Record/replay: Dolby B (Type II)



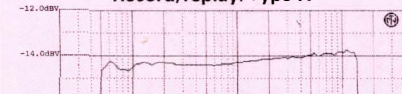
Record/replay: Dolby C (Type II)



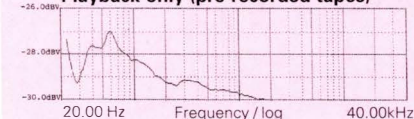
Record/replay: Type I



Record/replay: Type IV



Playback only (pre-recorded tapes)



Noise modulation spectrum analysis

JVC TD-V541

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



The *TD-V541* rejoices in what is billed as a titanium finish — actually aluminium based — which is attractive in a way that highlights the high tech aspects of the design. It is not wholly practical however: the white panel legends are easily lost under adverse lighting conditions.

A quick check of the price confirms that this is a three head deck with off tape monitoring (auto-switching when pausing during record, otherwise manual). The front panel controls are large and clearly signposted, operating a quiet acting transport, powered loading door included, and a high quality 38dB meter display (with an indefinite peak function) which includes an elapsed time electronic memory counter. Best of all, the display can be turned off entirely, though it returns temporarily when the tape is stopped.

Signal processing is provided by the usual Dolby B/C/HX Pro package, with variable bias and two inputs, one a 'direct' circuit designed to accept a feed from a CD player (say) bypassing the system amplifier.

There are some other gadgets too. Something called DDRP absolves the user from setting record levels manually when using a JVC CD player (on balance this on its own should not be considered a strong enough sweetener to buy a JVC CD). A multifunction time/locate switch is also provided, and this can look for the highest recording level when setting up a recording, and display the elapsed and remaining tape timings. Track search and counter memory facilities are also fitted. Headphones can be connected, but at fixed level only.

Test report

In this latest, much improved design, JVC has identified acoustic feedback as a problem worth tackling, and some attempt has been made to deal with this by providing a shell clamp and sealing around the heavy cassette loading door. The finely engineered

transport has a direct drive forward capstan from which a belt drives the trailing capstan. The measured wow and flutter figures are exemplary, as is the spectrum analysis.

Signal/noise figures are also excellent, full advantage being taken of the extra headroom implicit in high bias tapes. 63dB without noise reduction with *MA-X* is a fine result, but some HF intermodulation was beginning to become apparent around 0VU, showing that the record chain is not completely linear at high levels.

Sound quality

Forget Dolby C, stick to Dolby B and some decent metal tapes (eg TDK *MA-X*), turn off the display and have yourself a ball with a cassette deck that really works. Although the JVC is not capable of subtle Nakamichi style euphony, the *TD-V541* comes remarkably close thanks to an unusually integrated sound with a sharp, attacking bass and superbly focused mid/treble. Metals — and the better chrome bias tapes — provided excellent separation and low level resolution, and a lack of the usual cassette style waffle at the frequency extremes. Some tonal colours (woodwind, piano etc) occasionally sounded a little thin and raw, but that was the extent of the criticisms noted during most of the listening tests.

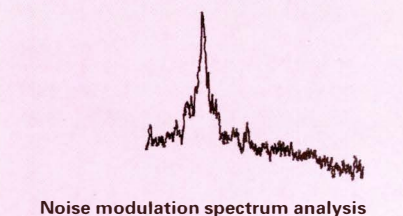
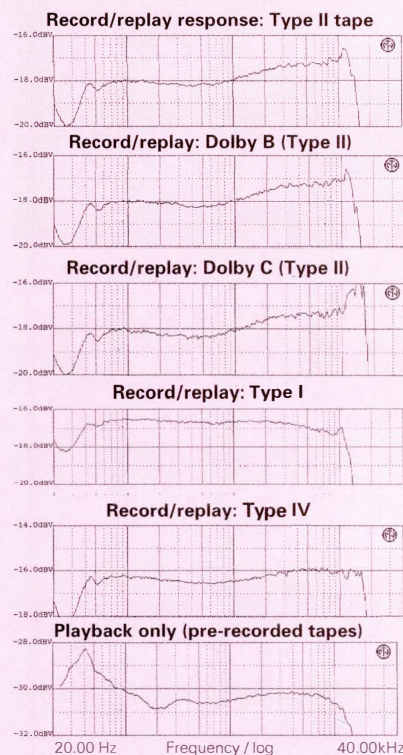
Stereo imagery is very well defined in all planes, and although it tended to be closer than the source, this was hardly a disadvantage. The speed, energy and pizzazz of the sound was more than ample compensation for slight detours from the straight and narrow. A very impressive deck, with good replay performance to match.

Conclusion

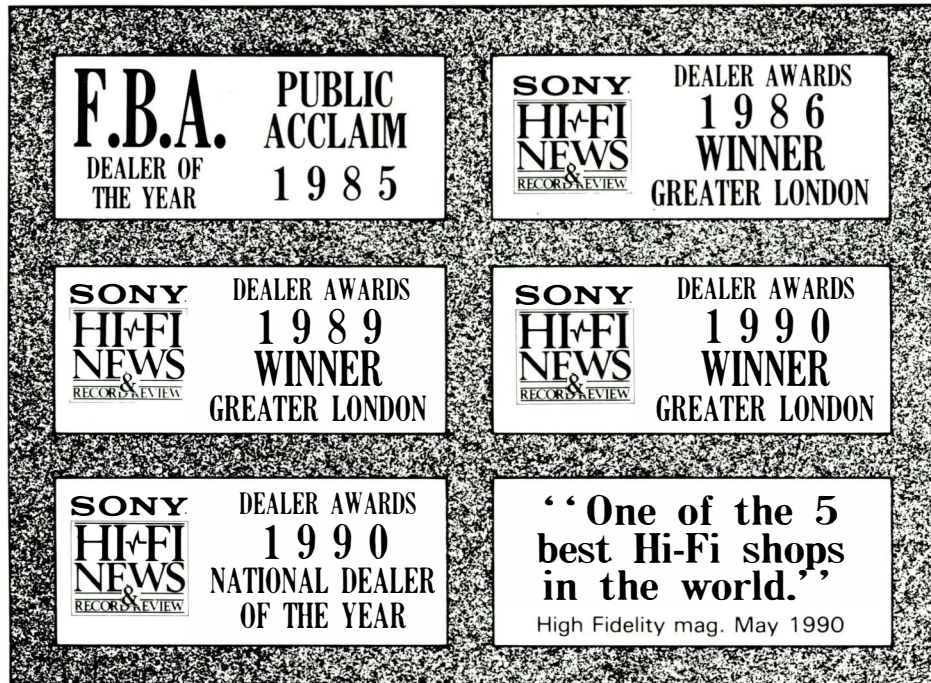
It seems that by sticking to the engineering essentials and toning down the usual surfeit of unnecessary gadgets, JVC has succeeded in producing a really electric sounding design. Best Buy.

TEST RESULTS

Dolby Level reading on deck's meters	-1dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 13kHz
IEC Type II	<20Hz - 16kHz
IEC Type IV	<20Hz - 18kHz
Wow & Flutter - Peak DIN wtd	0.05%
Wow/Flutter - unwtd rec/replay	0.028%/0.09%
Replay only flutter 3kHz	0.09%
Speed	+0.23%
Type I signal/noise CCIR/	
ARM 400Hz ref 3% THD	57.5dB
VU indication at 3% THD 400Hz/10kHz	+4dB
Type II signal/noise CCIR/	
ARM 400Hz ref 3% THD	61.0dB
VU indication at 3% THD 400Hz/10kHz	+2dB
Type IV signal/noise CCIR/ARM 400Hz ref 3%	
THD	63.0dB
VU indication at 3% THD 400Hz/10kHz	+6dB
Line input sensitivity/overload	158mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	567mV/3.17V
IM distortion 10kHz/	
11kHz 0dB peak, 1kHz product	3.2%
Azimuth check R-L phase at 10kHz	30 degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	43.5x13.5x33.5cm
Average wind/rewind time (C90)	2 min 20 sec
Typical Retail Price	£280



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JVC Digifine XD-Z505

JVC (UK) Ltd, Eldonwall Trading Estate, 12 Priestly Way, Staples Corner, London NW2. Tel: (081) 450 3282



This is a relatively low cost unit; a full size player capable of recording in SP (normal 16-bit, 44.1 or 48kHz linear sampling for a two hour maximum recording time) or LP (32kHz, 12-bit non-linear, four hour) modes, and of playing back 16-bit 32kHz recordings. The deck has a very straightforward and understandable set of front panel controls.

Criticisms? There are several minor points to be made, such as the lack of prominence given to the LP/SP switch and the one that switches between analogue, optical and coaxial digital inputs, both of which are miniature slide switches. These are key functions, and should not be hidden away with the timer standby switch. The display is comprehensive and not unattractive, but it cannot be switched off. It's also tilted in its cutout, and the overload margin readout doesn't 'hold' on the highest level, which tends to undermine its usefulness.

The rear panel is home to the usual complement of goodies, namely in and output sockets in all three flavours (analogue, coaxial, TOSLINK), and system control sockets which will be of interest to those who own other JVC components. A supplied remote control handset adds random track search to the basic control set.

Test report

The A/D convertor is a delta-sigma (1-bit) type with fourth order noise shaping, with a PEM (JVC's proprietary Pulse Edge Modulation) convertor in the decode chain which turns out to be extremely linear down to better than -100dB.

The complete AD:DA chain, however, becomes noticeably non-linear below -70dB, most of which (by elimination) is attributable to the A/D convertor. IM distortion is below the noise floor, and the level of noise above 20kHz (IM or otherwise) is also extremely small. The overall frequency response has a just perceptible EHF loss, though probably

not enough to be reliably detectable. Distortions are held to better than -90dB ref full level, and overall CCIR/ARM weighted noise is -85dB, which is worse than would be expected from a CD player, but about right for DAT.

The only other notable point is the low line sensitivity. This input will need to be driven quite hard, which could prove a problem with passive preamplifiers, and, under unlikely but conceivable circumstances, with certain active ones.

Sound quality

Given the plethora of minor problems uncovered with this deck, I was not expecting star quality on audition. In the event, it proved to be very acceptable by DAT standards, though the JVC has neither the control nor the clarity of tape, even with a digital input, to make it seriously interesting. In decode mode (with a digital source) it could easily have been mistaken for a moderately good integrated CD player, a feat equalled by very few DATs, and the degradation imposed by the encode (ADC) side of the chain was no more severe than expected from this strong starting point.

But there were a few degradations: the encode cycle added a suggestion of sibilance, but the main effect noted was the perennial one with DAT; a coarsening and thickening of textures and an erosion of fine detail. Worst affected were percussive instruments with rich, complex sound signatures — plucked acoustic steel strung guitar being a classic case — where the JVC simply homogenised the complexities into something comparatively flat and bland.

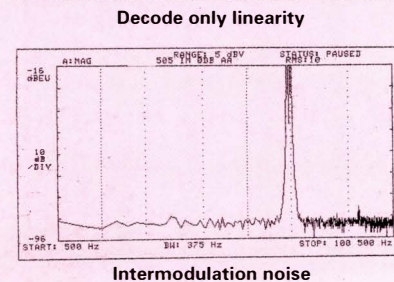
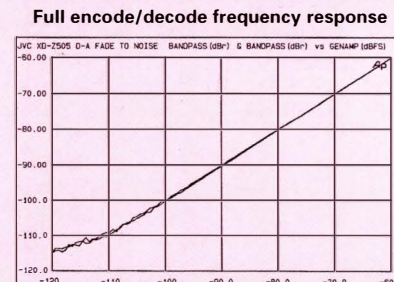
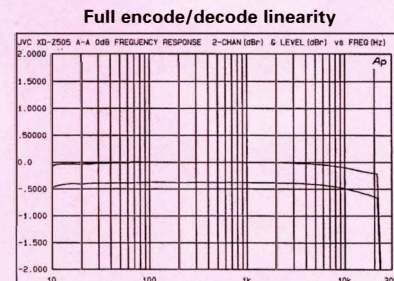
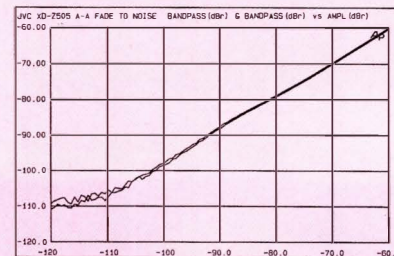
Conclusion.

Recommendable certainly - but in the final analysis it is pipped at the post by the Sony DTC-750, which is both cheaper and tidier as a design, whilst performing at least equally well musically. It's a close run thing though.

TEST RESULTS

Test resolution	15.8 bits
Output level, dB rel 2V, Source (digital in)	2.12V/+0.51dB
Line input sensitivity/overload	520mV/>13V
Level meter indication at full level (digital in)	0dB
Effective dynamic range (-70dB thd + N + dither)	110dB
Pure harmonic distortion	20Hz 1kHz 20kHz
Full level ref 0dB (20kHz in-band products only)	-90dB <-90dB
at-70dB encode + dither	0.00316% 0.002% <0.0-316%
Stereo separation	106dB 87dB 61dB
Stereo balance L/R	0.01dB 0.01dB 0.05dB
Frequency response (ref 1k) 20Hz - 20k +/-0.15dB	
Audible HF intermodulation	-101dB or 0.00089%
Audible electrical noise (CCIR, ARM wtd, 1kHz)	-85dB
Audible mechanical noise	low
Ultrasonic noise	-104dB
Deemphasis	+/-0.05dB at 5kHz
White noise overload test	OK
Dimensions (wxhxd)	43.5x13.5x32.5cm
Typical Retail Price	£620

Tested with analogue in/analogue out unless otherwise stated



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Kenwood KX-5530

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



Auto-reverse cassette decks are more discreet than they used to be. Once they announced their presence with garish displays and controls, now you have to peer at them closely to see if they're auto reverse or not. This change has probably come about because the term 'auto reverse' has come to be synonymous with 'inferior performance.'

True to form, the Kenwood is as discreet as they come with little to give the game away — least of all in the spec sheet which boasts wow and flutter figures on a par with comparably priced unidirectional decks. More of this below.

The KX-5530 has an optically triggered auto-reverse mechanism to minimise the gap between sides, the standard Dolby B, C and HX Pro and a whole raft of minor features such as A-B repeat, intro scan, track or tape (one or two sides) repeat, and dash and play (to skip unrecorded sections of tape). A microprocessor controlled facility is another handy device which, when used with a Kenwood brand CD player, facilitates automatically managed CD dubbing. A confusing list — and somewhat confusing to operate unless your mind just happens to work that way.

There is an additional feature: auto-biasing, which at the press of a button sets optimum bias for the tape inserted, and stores the result in a non-volatile memory. The process takes only a few seconds.

Test report

The various response plots show a relatively flat overall response at the treble end, along with a limited bass output and some strong head contour effects, that are typical of auto reverse decks where the tape path and head contour take second place to other design factors — like cost.

This deck is not well adapted to metal tapes, which produce inferior overload performance and signal/noise figures to lower

bias tapes, a point which was later confirmed on audition. IM distortion is well up at 0VU which is a sure indication that headroom is limited. Note that with ferric tapes, the meters have been set so that peaks can be recorded up to +10dB, which is the highest level they can display. It would have been better if 0VU had been set higher up the tape saturation curve.

Finally, wow and flutter was a little erratic on test, the figures and spectrum analysis being typical. The latter shows some strong fluttersidebands indicative, perhaps, of loose capstan bearings or maybe some roughness and/or eccentricity in the rotating parts.

Sound quality

One unquestioned advantage of this deck over most others at the price is its ready ability to produce a neutral, accurate sounding tonal balance off tape - any tape. Having instrumental simulacra that sound like the original instruments is clearly a good place to start. Pitch integrity was also quite reasonable, especially for an auto reverse deck which will invariably perform poorer than a comparably priced unidirectional deck.

The Kenwood is letdown in subtler ways. The fact that metal tapes offer no advantage over a decent quiet Type II superferric like TDK SA-X was no surprise. A more relevant criticism is the amount of HF compression evident with lower bias tapes when recording HF rich material - almost as though Dolby HX Pro wasn't fitted at all.

Equally relevant is the coloured, hollow bass and scratchy treble tone when extended. Prerecorded material was handled satisfactorily given the context explained above.

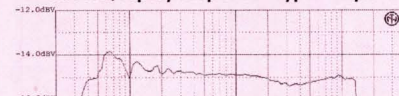
Conclusion

Although a lot less shabby sounding than some auto-reverse decks, this one scarcely transcends the stereotypes. Adequate if needs must.

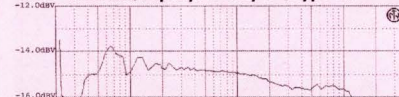
TEST RESULTS

Dolby Level reading on deck's meters	n/a
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 12kHz
IEC Type II	<20Hz - 14kHz
IEC Type IV	<20Hz - 15kHz
Wow & Flutter - Peak DIN wtd	FWD/REV 0.09%/0.13%
Wow/Flutter - unwt'd rec/replay	FWD 0.09%/0.21% REV 0.09%/0.27%
Replay only flutter 3kHz	FWD/REV 0.14%/0.18%
Speed	FWD/REV -0.4%/-0.2%
Type I signal/noise CCIR/	
ARM 400Hz ref 3% THD	57.5dB
VU indication at 3% THD 400Hz/10kHz	+10dB
Type II signal/noise CCIR/	
ARM 400Hz ref 3% THD	59.0dB
VU indication at 3% THD 400Hz/10kHz	+7dB
Type IV signal/noise CCIR/	
ARM 400Hz ref 3% THD	56.5dB
VU indication at 3% THD 400Hz/10kHz	+6dB
Line input sensitivity/overload	107mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	794mV/4.0V
IM distortion 10kHz/	
11kHz 0dB peak, 1kHz product	4%
Azimuth check R-L phase at 10kHz	FWD/REV 40/60degrees
VU indication at IEC 0dB	+3dB
Dimensions (wxhxd)	44x13x27.5cm
Average wind/rewind time (C90)	2 min 9 sec
Typical Retail Price	£190

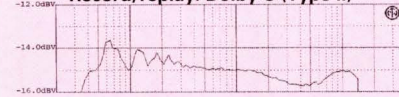
Record/replay response: Type II tape



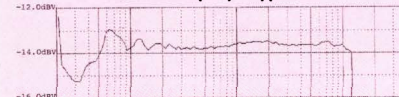
Record/replay: Dolby B (Type II)



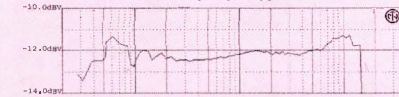
Record/replay: Dolby C (Type II)



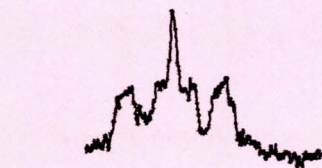
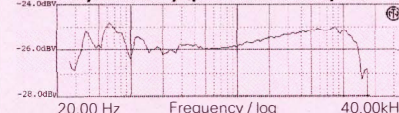
Record/replay: Type I



Record/replay: Type IV



Playback only (pre-recorded tapes)



Noise modulation spectrum analysis

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Nakamichi Cassette Deck 1.5

Nakamichi B&W (UK) Ltd, Marlborough Road, Churchill Industrial Estate, Lancing, West Sussex. Tel: (0903) 750750



The nomenclature arises because Nakamichi already has a *Cassette Deck 1* and *2*. This deck sits neatly between them, with the three head layout of the dearer model, but not the azimuth adjustment that ensures playback compatibility of previously recorded tapes.

The *1.5* has all the expected Nakamichi-style idiosyncrasies, most notably manual tape type switching (there are three buttons, labelled Type I, II and IV, but you'll have to open a flap on the fascia to find them) and the absence of Dolby HX Pro (I have never been able to make Nakamichi explain why). There are precious few other facilities, but you do get Dolby B and C, a fine bias adjust control, auto or manual tape/source selection and a simple electronic tape counter with a counter search (ie return to zero) facility. The Nakamichi can be plumbed into an all Nakamichi system for remote control purposes, and headphones can be connected at fixed level only. As expected, the record level meters are of fine quality, resolution and range (50dB), but the input level control is squirreled away under the flap and hard to use. This single ergonomic shortcoming is offset by an uncommonly smooth acting set of logic transport controls, which operate one of the sweetest and quietest transports you can buy.

Test report

No attempt appears to have been made to hold output up at HF, and LF behaviour is odd, the intrinsic rolloff being disguised by apparently rather heavy handed equalisation, while the midband responses at the normal bias setting are a little wavy. On the whole, though, these responses are correctable, and output uniformity at HF is unusually good, as the smoothness of the plots in this region indicates.

The transport is an example of Nakamichi's asymmetric diffused resonance dual capstan design and provides exem-

plary wow and flutter results and a textbook spectrum analysis. The heads are truly independent and not siamesed to avoid cross-modulation. Completing a clean bill of (audio) health, the deck is electrically quiet with all tape types, Type IV in particular, with three per cent THD appearing at a sensible place on the meters in each case.

Sound quality

Nakamichi has always made cassette decks that audition better than others of comparable price; now it seems to have entered a new phase where the decks continue to do so, but without any obvious reason why. Other decks are more exactly engineered inside and out, and many others give superior technical performance in most areas, yet the *1.5*, with its idiosyncrasies that no other company would allow on their decks, has an immediately striking realism that lives and breathes music in a way that simply eludes others.

However, there are signs this time round that the deck has been made to sound better than it really is: the bass is surely just a little *too* full, the treble *too* sweet and rounded, and the soundstage just a little *too* spread out and deep. Some of these effects are quite likely to be related to sympathetic colorations caused by the way the Nakamichi drives tapes with a characteristic midband suckout irrespective of the tape used or the bias setting employed. What saves it, I think, is the supremely stable transport, and the excellence of the head and matching record/play electronics.

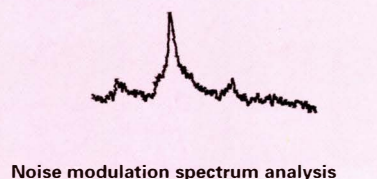
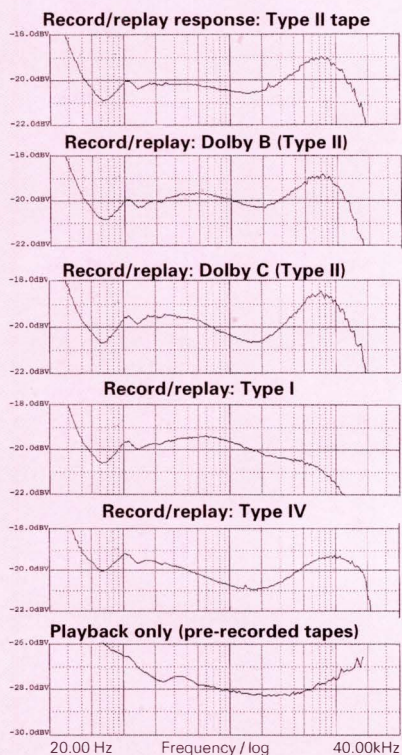
Conclusion

Highly Recommended, partly because whatever its failings, they're largely benign, and partly for all the intangibles: the long term serviceability to the original spec that is probably unique to this marque.

All the same, there are worrying signs here of resting on laurels.

TEST RESULTS

Dolby Level reading on deck's meters	n/a
Rec/replay response-3dB ref 1kHz	
IEC Type I	<20Hz - 11kHz
IEC Type II	<20Hz - 19kHz
IEC Type IV	<20Hz - 21kHz
Wow & Flutter - Peak DIN wtd	0.08%
Wow/Flutter- unwtd rec/replay	0.07%/0.08%
Replay only flutter 3kHz	0.046%
Speed	+0.43%
Type I signal/noise CCIR/ARM 400Hz ref 3% THD	57.5dB
VU indication at 3% THD 400Hz/10kHz	+5dB
Type II signal/noise CCIR/ARM 400Hz ref 3% THD	61dB
VU indication at 3% THD 400Hz/10kHz	+3dB
Type IV signal/noise CCIR/ARM 400Hz ref 3% THD	62.5dB
VU indication at 3% THD 400Hz/10kHz	+8dB
Line input sensitivity/overload	71mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	669mV/5.45V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	1.4%
Azimuth check R-L phase at 10kHz	40degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	43x10x32cm
Average wind/rewind time (C90)	2 min 22 sec
Typical Retail Price	£500



Noise modulation spectrum analysis

Pioneer CT-339

Pioneer High Fidelity (GB) Ltd, Field Way, Greenford, Middlesex UB6 8UZ. Tel: (081) 575 5757



Although this slip of a cassette deck is priced at a bargain basement £150, it has a unique selling proposition, previously only equalled at rather higher prices: a fully functional proprietary 'Auto BLE' circuit, which adjusts record bias, equalisation and sensitivity to optimise frequency response and distortion for almost any tape type, and to eliminate Dolby mistracking errors due to the varying sensitivity levels of different tape types.

It is notable that all three parameters have been included, not just bias, or bias and sensitivity, as is the case with almost all other automatic setup routines. The whole process, which involves winding the tape past the leader, performing the tests and rewinding to the start point, takes just one button press and 34 seconds.

Apart from Auto BLE, and the awful function display that accompanies it, this is a relatively straightforward deck. It is equipped with Dolby B, C, the usual HX Pro headroom extension circuitry, a simple non-memory elapsed time counter, an even simpler 28dB record level meter and 'CD synchro' which handles all the housekeeping connected with dubbing from CD to tape if your CD player is a Pioneer. Although somewhat clanky, the deck operates sweetly enough, and feels well built.

Test report

The frequency responses were run after setting up with Auto BLE, and the results give a good indication of the behaviour of this circuit, which is slightly erratic to judge by the Type I response. The metal tape response run is a textbook example, but the picture here was rather spoilt by the high 0VU IM distortion figure and the limited signal/noise figure with this tape type.

This deck is not designed for metal tapes, no matter what the manufacturer claims. But fairly good lab test results were available from Type II chrome bias tapes and

Type I ferrics, albeit with a still disappointing signal/noise figure.

Pitch integrity was also suspect, the main contributory factor being the capstan related sidebands which have knocked the flutter figure as high as 0.46 per cent.

For reasons that remain obscure, the new equipment used for this series of tests chose this occasion to refuse to perform a playback only response except from a high starting frequency. The plot shown is all that could be run.

Sound quality

Although basically well engineered and aligned, sound quality was a considerable way short of matching the source. Most of the problems were concentrated at the frequency extremes. Although there was plenty of treble in the sinewave plots, complex material sounded cluttered and a little dull in this region, making it difficult to resolve individual players during loud passages. The lack of a truly analytical edge to the sound was mirrored by a bass region that sounded even, but which lacked energy and momentum. Pre-recorded material was equally flaky.

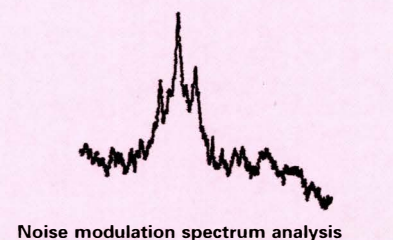
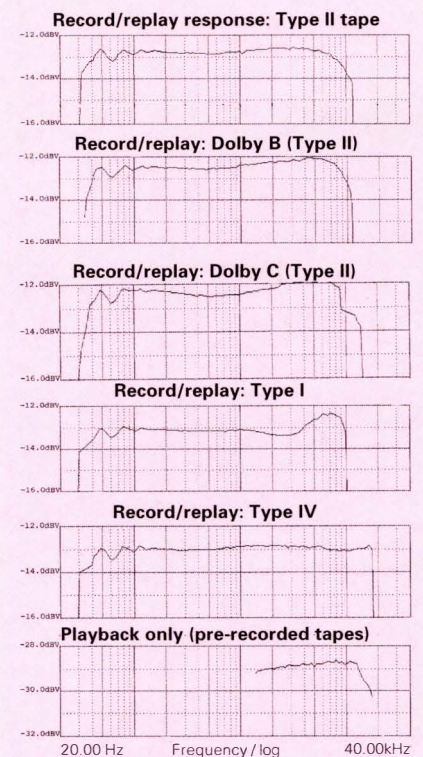
Although measured wow and flutter levels were low, there were problems when using certain pre-recorded tapes, which reproduced with significant levels of programme wow. Poor quality cassette housings appear to be responsible for this finding, which was intermittent and which never happened with high grade (blank) tapes. Better transports on other decks are generally more adept at imposing control over their charges.

Conclusion

This is not a bad starter deck, and although its scarcely has star status, it just about earns a formal Recommended flag. The automatic tape alignment feature is a welcome extra, but worries about pitch stability with less than perfect tape stock remain.

TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	30Hz - 10kHz
IEC Type II	30Hz - 11kHz
IEC Type IV	30Hz - 19kHz
Wow & Flutter - Peak/DIN wtd	0.12%
Wow/Flutter - unwtd rec/replay	0.075%/0.46%
Replay only flutter 3kHz	0.17%
Speed	+0.1%
Type I signal/noise CCIR/	
ARM 400Hz ref 3% THD	57.5dB
VU indication at 3% THD 400Hz/10kHz	+9dB
Type II signal/noise CCIR/	
ARM 400Hz ref 3% THD	57.5dB
VU indication at 3% THD 400Hz/10kHz	+7.5dB
Type IV signal/noise CCIR/	
ARM 400Hz ref 3% THD	54.5dB
VU indication at 3% THD 400Hz/10kHz	+5dB
Line input sensitivity/overload	104mV/>3.95V
Mic input sensitivity/overload	1.12V/22.5mV
Line output for 0dB/maximum	520mV/2.1V
IM distortion 10kHz/	
11kHz 0dB peak, 1kHz product	1.78%
Azimuth check R-L phase at 10kHz	20 degrees
VU indication at IEC 0dB	+3dB
Dimensions (wxhxd)	42x12.5x27.5cm
Average wind/rewind time (C90)	2 min 6 sec
Typical Retail Price	£150



Pioneer CT-W650R

Pioneer High Fidelity (GB) Ltd, Field Way, Greenford, Middlesex UB6 8UZ. Tel: (081) 575 5757



The Pioneer CT-W650R costs a little more than most twin cassette decks and will appeal to those who want the benefits of a twin transport deck without sacrificing the slick controls and musical performance of a standard single transport deck.

The fascia is awash with buttons, controls and displays. Both transports are fully auto-reverse capable, though neither has optical end of tape recognition and so there is always a ten seconds plus down time while the leader is played — twice.

Features tacked on to this basic recipe start with Auto BLE which adjusts record bias, sensitivity and equalisation at the press of a button (see Pioneer CT-339 review on the facing page) and takes in Dolby B and C noise reduction and Dolby HX Pro. Tapes can be dubbed at normal or double speed and two tapes can be played consecutively. Dubbing from Pioneer brand CD players is also possible with a number of automatic editing features available.

The record level meters are of good quality if limited (28dB) range, and each transport has its own electronic time counter. Headphones and microphones can be connected, and the deck will operate at the behest of a timer, with a 90 minute maximum continuous recording duration based on C90 stock.

Test report

Measured performance is a mixed bag. Flutter levels are fairly high, though the spectrum analysis shows relatively clean behaviour without any obvious dominating sidebands to attract the ear. Most of the frequency responses are good, the exception being the Type II plot which was all over the place, despite the best efforts of the tape alignment circuit. The Dolby plots merely reflect the intrinsic response errors seen through the respective electronic magnifying glasses provided by the action of the

Dolby processors. Metal tapes, though nominally compatible, are not a sensible choice for this deck as the poor noise and overload figures demonstrate, but the other two tape groups are handled satisfactorily, and yield an adequate dynamic range

Sound quality

Although generally quiet and smooth operating, there was some annoying mechanical heterodyning when dubbing at high speed. At other times, the deck operated quietly.

Musically, the CT-W650R was capable of performing to a standard that transcended its price and specification. You'll still get better results from a dedicated unidirectional deck with a single transport, but the Pioneer is unlikely to be disgraced. Although not especially detailed, and despite a rather unnatural bass sound, there is an overall evenness with this deck that allowed music to 'speak through' with greater force than might have been expected.

The predominantly good impression was spoiled by the erratic behaviour of the Auto BLE circuit, which gave results varying from excessively brightly lit tonal colours to a loss of treble with severe Dolby 'pumping'. Type II tapes were the worst affected. If the Auto BLE was left alone the deck worked well with IEC tapes from all three tape groups, but it is probable that the review sample was faulty in some way, since previous Auto BLE equipped players have demonstrated no such variability.

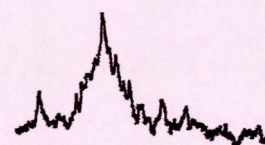
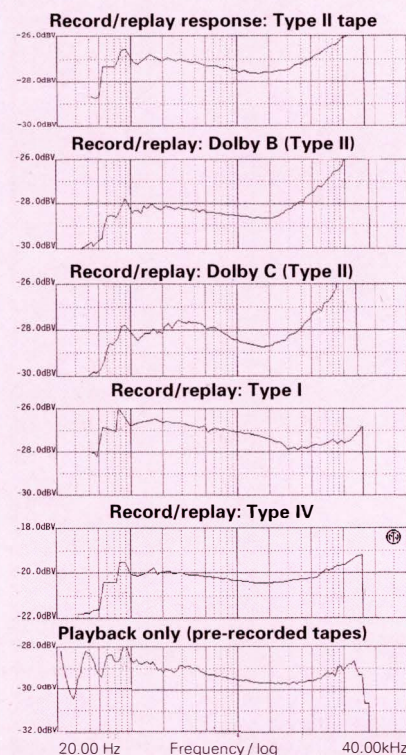
High speed dubbing was performed with losses that were more innocuous than with many twins, and prerecorded tapes were handled surprisingly cleanly.

Conclusion

On the assumption that the problems with the Auto BLE circuit were not typical, which seems probable, this model can be Recommended — but only if a tape dubbing capability is a prerequisite.

TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	30Hz - 15kHz
IEC Type II	30Hz - 17kHz
IEC Type IV	30Hz - 17kHz
Wow & Flutter - Peak DIN wtd	FWD/REV 0.11%/0.13%
Wow/Flutter - unwtd rec/replay	FWD 0.06%/0.23% REV 0.06%/0.34%
Replay only flutter 3kHz	FWD/REV 0.15%/0.16%
Speed	Deck II FWD/REV +0.16%/+0.10% Deck I 0.2%/0.1%
Type I signal/noise CCIR/ARM 400Hz ref 3% THD	57.0dB
VU indication at 3% THD 400Hz/10kHz	+8dB
Type II signal/noise CCIR/ARM 400Hz ref 3% THD	57dB
VU indication at 3% THD 400Hz/10kHz	+6dB
Type IV signal/noise CCIR/ARM 400Hz ref 3% THD	54dB
VU indication at 3% THD 400Hz/10kHz	+5dB
Line input sensitivity/overload	116mV/>3.92V
Mic input sensitivity/overload	0.71mV/23.2mV
Line output for 0dB/maximum	570mV/2.1V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	1%
Azimuth check R-L phase at 10kHz	FWD/REV Deck I - 0/120 degrees Deck II - 40/50 degrees
VU indication at IEC 0dB	5dB
Dimensions (wxhxd)	42x13x27cm
Average wind/rewind time (C90)	2 min 16sec
Typical Retail Price	£200



Noise modulation spectrum analysis

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Pioneer D-500

Pioneer High Fidelity (GB) Ltd, Field Way, Greenford, Middlesex UB6 8UZ. Tel: (081) 575 5757



Slightly smaller than a traditional full size unit, this is Pioneer's main-stream domestic DAT. It allows recording in both LP and SP mode, with 32, 44.1 and 48kHz sampling for a two or four hour maximum recording duration. The deck itself has a full set of controls, with major features repeated on an almost palm-size remote control.

If anything, the Pioneer is over-endowed with features designed to help locate specified recordings on tape quickly and easily. The list includes a special TOC (table of contents) track which is recorded at the start of track one.

Making this TOC is a one key operation, which requires that the deck make a physical search of the complete tape, re-marking track starts appropriately. With a TOC listing read into the memory, very rapid track searches are possible. Comprehensive auto and manual subcode editing can be performed, including Skip IDs, which, for example, allow you to mark advertising breaks on a recording off air, in order that they should be skipped automatically on playback (a service to humanity if ever there was one!).

A whole range of cueing speeds, including one in which the tape is inched along at half normal speed for SP recordings are available, though most turned out to be unusable on the grounds of unintelligibility.

Test report

Both the A/D convertor and the DAC in this deck are 1-bit designs. On test, the Pioneer has a degree of EHF treble loss which arises because of an error in the A/D convertor transfer characteristic, plus some ringing caused by the digital output filter. Linearity of the complete code/decode chain is quite good, but subject to a considerable amount of noise at low levels.

Both A/D convertor and DAC otherwise behave well, and overall resolution is 15.9 bits. Downband IM products are low, but

there are some ultrasonic spurious which in a dynamic musical environment could cause spurious to be reflected down into the audio band. The result here is worse than usual for DAT, but in absolute terms doesn't amount to much at -73dB overall.

Sound quality

Although it comes on like a train from the visual and features point of view, the sonics are somewhat disappointing, not just by CD standards (which in many ways seems an appropriate yardstick to measure DAT by) but also by the standards of other DAT decks, including the JVC XD-ZX505 and the Sony DTC-750.

The full encode/decode cycle via tape had murky, almost creamy textures. Piano tended to sound flat dynamically though a little smeared, even bloated in the lower registers, and with a quality in the higher registers which sounded as though the gaps between the notes were being filled in by something opaque just below the threshold of hearing.

This is not an uncommon finding with DAT and some low-end CD players (the flatness specially) and on an analogue cassette deck could be likened to modulation noise, though the same mechanism isn't responsible here.

Stereo perspectives tended to be foreshortened, and smeared so that individual instruments sometimes took on an amorphous quality, and the individuality and clarity of lines was reduced in consequence.

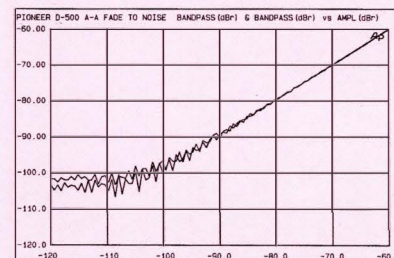
As expected, decode only - when fed with a digital source - was clearer and sharper, but we're talking matters of degree here, not of kind.

Conclusion

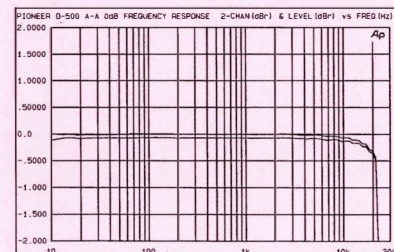
Slick and accomplished from the operational viewpoint, the Pioneer's subtly messy musical presentation precludes a formal Recommendation.

TEST RESULTS

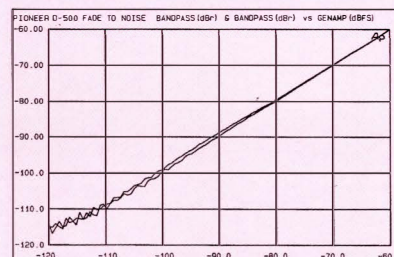
Test resolution	15.9 bits		
Output level, dB rel 2V, Source [digital in]	2.25V/+1.03dB		
Line input sensitivity/overload	345mV/>13V		
Level meter indication at full level (digital in)	0dB		
Effective dynamic range (-70dB thd + N + dither)	107dB		
	20Hz	1kHz	20kHz
Pure harmonic distortion			
Full level ref 0dB (20kHz in-band products only)	-85dB	88dB	<-90dB
	0.00562%	0.00398%	0.00316%
at-70dB encode + dither	-34dB or 1.99%		
Stereo separation	103dB	97dB	69dB
Stereo balance L/R	0.05dB	0.06dB	0dB
Frequency response (ref 1kHz) 20Hz - 20kHz	+/-0.16dB		
Audible HF intermodulation	-90dB or 0.00316%		
Audible electrical noise (CCIR, ARM wtd, 1kHz)	-83dB		
Audible mechanical noise	low		
Ultrasonic noise	-73dB		
Deemphasis	+/-0.02dB at 5kHz		
White noise overload test	OK		
Dimensions (wxhxd)	42x13.4x33cm		
Typical Retail Price	£595		
Tested with analogue in/analogue out unless otherwise stated			



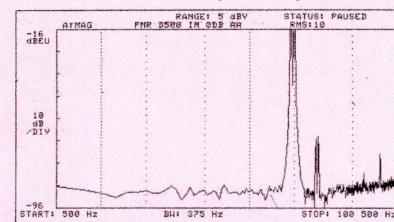
Full encode/decode linearity



Full encode/decode frequency response



Decode only linearity



Intermodulation spectrum

Revox H11

Revox UK Ltd, 1 Berkshire Business Centre, Berkshire Drive, Thatcham, Berkshire RG13 4EW. Tel: (0635) 876 969



Revox's cassette deck for the pros has very basic equipment levels. The efficient transport control system is not especially quiet, and is matched to a utilitarian though effective display which includes medium resolution meters scaled from -35 to +12dB. This is a three head deck, but there is no tape/source monitor switchover accessible to the user, so it cannot be used to assess recording quality directly (though source/tape switching is normally possible at the system amplifier).

Noise reduction is by Dolby B and C with Dolby HX Pro background processing to suit. Record bias and level controls are also fitted, but are adjusted manually, bias by ear and sensitivity using the meters. There is a headphone socket (fixed level) and MPX switching, but the tape counter, which is scaled in minutes and seconds, has no memory stop facility. No track search options are provided either, but as I say, the H11 only costs £938. Try saying it quickly.

Presentation is neat. The front panel is businesslike though decidedly un-beautiful with all but the major transport controls hidden behind a full width flap. Deep gloss wood side cheeks relieve the austerity, and a remote control socket at the rear helps with H-Line system plumbing.

Test report

H-Line system remote control options include a two way communicating handset with a full readout of cassette deck operating status, and makes the deck a rather more elegant operating proposition than it appears in its normal stand alone form.

The 'loudness' like frequency response curves (and 'curves' is the operative word, though most are held to within a 2dB envelope overall) give a clue to the personality of the H11. The electronics are clean and have plenty of headroom, but the record head appears to be a limiting factor in preventing metal tapes from giving much more than

can be had from ordinary ferrics and chromes. Wow and flutter is also a little disappointing for a deck in this price range.

Sound quality

The H11 has been specifically designed for the Revox multi-room H-Line system, for which a convincingly 'simple' cassette deck has not so far been available. Given this, why hasn't Revox developed a decent automatic tape alignment system, instead of the manual one fitted which is guaranteed to cause heebie jeebies to many of Revox's target market?

On audition the Revox is a mixture of the excellent and the mediocre. There is little to connect the sound of this deck to top ranking audiophile designs (many of which cost about the same). There is little of the finesse and subtlety of expression that graces the Teac V-8000S or even the Nakamichi *Cassette Deck 1.5*, to give just two examples. The Revox does sound stable, and its sound has strength and ruggedness with orchestral and rock music alike, but it lacked the repose to make a convincing blast at well recorded chamber forces, or solo instrumental/vocal material.

Curiously, there was little to be had by changing tapes. It was easier to align Type IIs for a subjectively flat response than Type IVs, which seemed to want to retain their distinctive colorations.

Conclusion

I understand a professional version of this deck will appear, and I'm sure its simplicity, ruggedness and sheer workmanlike sound will make it many friends in that application. As a domestic deck, it can only be recommended by default, as the deck you need to make the Revox H-Line system work. In other systems it looks underqualified and overpriced, though for very intensive use, it might repay the expenditure due to its good build and serviceability.

TEST RESULTS

Dolby Level reading on deck's meters	0dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 13kHz
IEC Type II	<20Hz - 16kHz
IEC Type IV	<20Hz - 20kHz
Wow & Flutter - Peak/DIN wtd	0.20%
Wow/Flutter - unwtd rec/replay	0.15%/0.15%
Replay only flutter 3kHz	0.10%
Speed	-0.4%
Type I signal/noise CCIR/ARM 400Hz ref 3% THD	59.5dB
VU indication at 3% THD 400Hz/10kHz	+5dB
Type II signal/noise CCIR/ARM 400Hz ref 3% THD	60dB
VU indication at 3% THD 400Hz/10kHz	+5dB
Type IV signal/noise CCIR/ARM 400Hz ref 3% THD	59.5dB
VU indication at 3% THD 400Hz/10kHz	+7dB
Line input sensitivity/overload	76mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	630mV/3.8V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.63%
Azimuth check R-L phase at 10kHz	5 degrees
VU indication at IEC 0dB	2dB
Dimensions (wxhxd)	47x14.5x37cm
Average wind/rewind time (C90)	2min 13sec
Typical Retail Price	£938

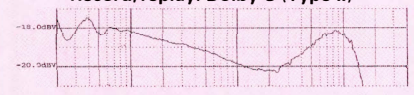
Record/replay response: Type II tape



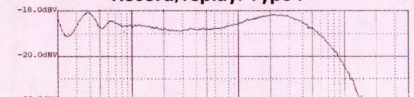
Record/replay: Dolby B (Type II)



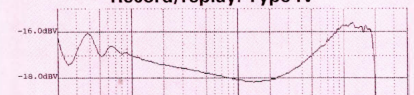
Record/replay: Dolby C (Type II)



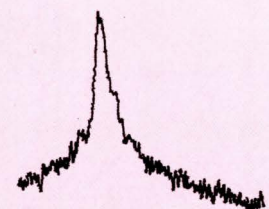
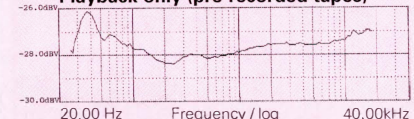
Record/replay: Type I



Record/replay: Type IV



Playback only (pre-recorded tapes)



Noise modulation spectrum analysis

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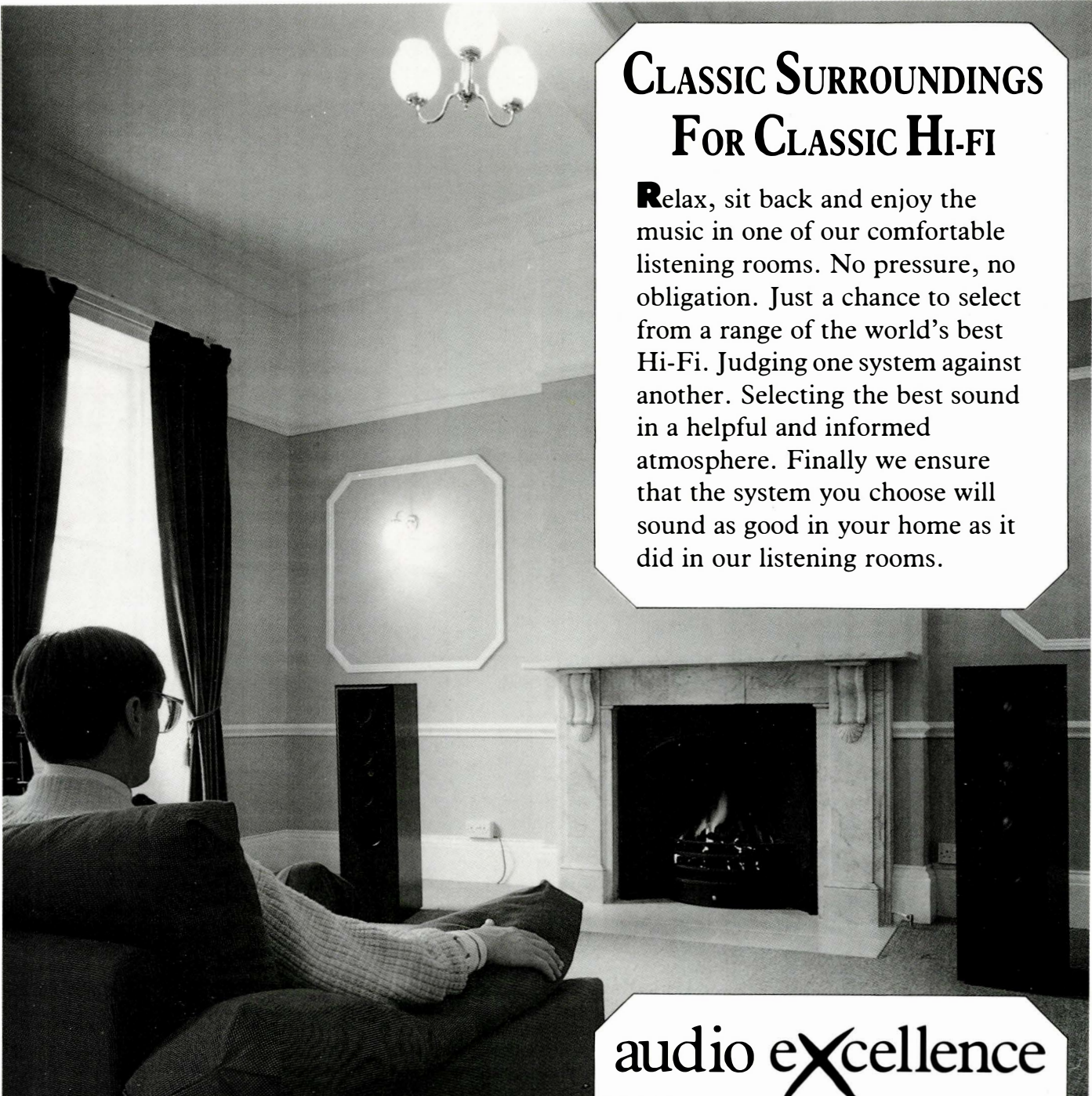
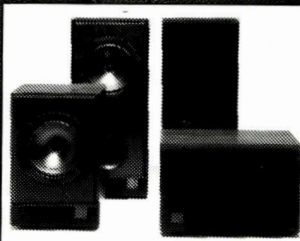
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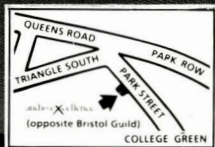
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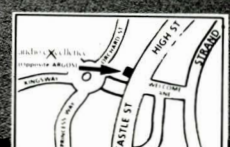
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Sansui D-X111EX

Sansui UK Ltd, 93/95 Gloucester Place, London W1H 3PG. Tel: (071) 487 4844



Sansui, recently divorced from Mission Electronics and from Polly Peck, is heavily involved with mainstream equipment of which this low-end cassette deck is typical. The *D-X111* is an entirely conventional unidirectional cassette design with Dolby B, C and HX Pro. The transport, which is controlled by a well spread out set of keys, makes interestingly loud clackety-clack noises when changing transport modes. Dolby switching and timer standby switching are controlled by utilitarian miniature slide switches. Fine control of the record bias signal is also available to flatten the frequency responses of most tapes.

There is very little of what might be called value added extras. The tape counter is crude and mechanical with no associated memory stop feature, and the record level meters cover only a very narrow dynamic range (16dB) with coarse resolution. A number of simple functional indicators are provided, but the various legends are poorly labelled and not easy to read. Headphones can be connected, but at fixed level only.

Test report

Ferric tapes can be recorded to a peak level 3dB higher than the meters are capable of displaying, which makes a nonsense of the design. In the case of the other two tape groups, the three per cent THD point was reached at +6VU, at the far limit of the meter's range, which is still inadequate. Signal/noise figures are poor, and IM distortion high, underlining the fact that this deck isn't capable of exploiting the extra dynamic range and high frequency potential of high energy/high bias tape formulations.

Wow and flutter is another weakness. The peak weighted figure is about 50 per cent higher than the kind of level normally thought necessary to guarantee inaudibility: in fact low rate variations (wow) are fairly low, it is flutter which is high. The spectrum analysis shows a great deal of flutter en-

ergy, much concentrated into individual bands probably associated with various rotating components of the drive system.

In contrast to the above, the various frequency responses are all accurately set, with good Dolby tracking, and a 17kHz -3dB point in the case of metals. Prerecorded tapes are also accurately handled. In each case, however, the effective bass limit is limited to around 50Hz, with quite strong bass woodles centred on this frequency.

Sound quality

There is no easy way of putting this. Sound quality was a mess. The three tape groups can be used almost interchangeably: there is no perceptible dynamic advantage in using metals, and the deck doesn't have the inherent resolution to demonstrate any other advantage with tapes from this group. Even premium Type IIs seem a waste. In other words, you're better off with cheaper tapes, which in practice you'll find work as well as metals, or very nearly so.

Even so, the dynamic range envelope was narrow, and background noise was poorly suppressed. Hum harmonics were also prominent with this deck, which is very poorly shielded from external hum fields, and which is never entirely free of self induced hum. Treble was dull and splashy, and perceptibly metallic in tone, and wow and flutter artefacts were writ large all over the music. The solo violin in the BIS recording of the Sibelius violin concerto warbled its way through the piece, which was an uncomfortable listening experience.

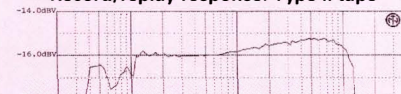
Conclusion

This deck meets no sensible definition of high quality music making on any count. Despite a set of measurements that in isolation don't look too disastrous, this is exactly how the deck sounded when tested with music. There are other cheapies that work better.

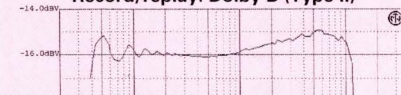
TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	35Hz - 11kHz
IEC Type II	35Hz - 12kHz
IEC Type IV	35Hz - 17kHz
Wow & Flutter - Peak DIN wtd	0.14%
Wow/Flutter - unwt'd rec/replay	0.09%/0.38%
Replay only flutter 3kHz	0.18%
Speed	+0.43%
Type I signal/noise CCIR/ARM 400Hz ref 3% THD	59.5dB
VU indication at 3% THD 400Hz/10kHz	+9dB
Type II signal/noise CCIR/ARM 400Hz ref 3% THD	60.0dB
VU indication at 3% THD 400Hz/10kHz	+6dB
Type IV signal/noise CCIR/ARM 400Hz ref 3% THD	58.0dB
VU indication at 3% THD 400Hz/10kHz	+6dB
Line input sensitivity/overload	107mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	568mV/2.95V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	3.5%
Azimuth check R-L phase at 10kHz	50 degrees
VU indication at IEC 0dB	4.3dB
Dimensions (wxhxd)	43.5x12.5x27cm
Average wind/rewind time (C90)	2 min 10 sec
Typical Retail Price	£120

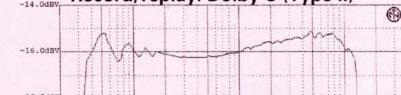
Record/replay response: Type II tape



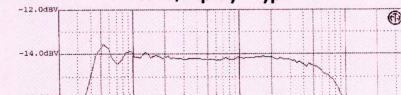
Record/replay: Dolby B (Type II)



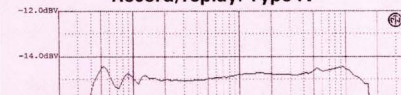
Record/replay: Dolby C (Type II)



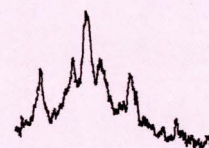
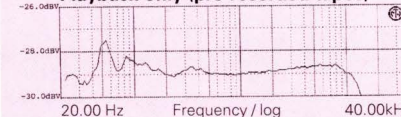
Record/replay: Type I



Record/replay: Type IV



Playback only (pre-recorded tapes)



Noise modulation spectrum analysis

Sony DTC-77ES

Sony UK Ltd, Sony House, South Street, Staines, Middlesex TW18 4PF. Tel: (0784) 467000



The *DTC-77ES* is a tour de force of technological innovation. For the first time you can have real time off tape monitoring from a domestic DAT deck. The monitoring system does exactly what a three head cassette does when 'tape' is selected from record. To achieve this, the two monitor heads are positioned between the existing heads around the periphery of the head drum.

The Sony is fully equipped with coaxial and optical digital in/outputs and a set of analogue sockets and system control data sockets for linked operations, which are also supported with dedicated keys on the remote control. It has just about every search and display option you can imagine, even a real time clock, which imprints time data on tapes so that the time the recording was made is always known. LP and SP record modes are covered. I found a number of alternate display modes (including 'dim' but not 'off') accessed by pressing 'mode' and a numeric key together. Digital fades and full subcode editing are included, and so are a wide range of search modes, including music (intro) scan.

Test report

1-bit pulse convertors are used in the before and after chains, but the implementation is better than most, at least on the test bench where the deck yielded near textbook results. The measured A-D:D-A frequency response is absolutely flat within the limits of measurements, with little evidence of rolloff or filter ripples at either extreme. The fade to noise tests show that the DAC and the AD:DA composite are absolutely linear down to -100dB, and the (tiny) difference between the two is the measure of the loss of linearity of the A/D convertor. Intermodulation products are deeply buried in noise.

The analogue circuits are linear down to -100dB, and little out below that, and much the same is true of the A-D and D-A transfer

characteristics. Distortion products are incredibly low, and overall resolution is assessed at 15.9 bits. It ought to sound good!

Sound quality

Some fancy digital housekeeping is required to simultaneously record and playback off tape, but Sony is adamant in saying that the monitor and playback chain are identical sonically. It seemed to me that there was a difference favouring subsequent playback, but the difference was small — smaller certainly than the equivalent differences in typical three head analogue cassette decks.

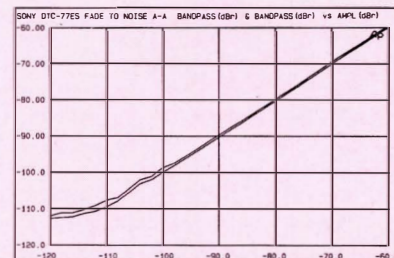
More to the point is that the *DTC-77* was disappointing on audition. Its performance was broadly comparable to the very much cheaper *DTC-750*, and in certain respects it was worse. The full en/decode cycle produced a welter of observations with different recordings, the lowest common denominator of which was that timing was subtly slowed and transients dulled. The net effect was as though a significantly inferior CD player had been bought into the room. The overt smudging of detail heard with one or two of the low cost DATs was not a feature of this deck, but this in a way only served to highlight the lack of pace and dulling of transients.

Conclusion

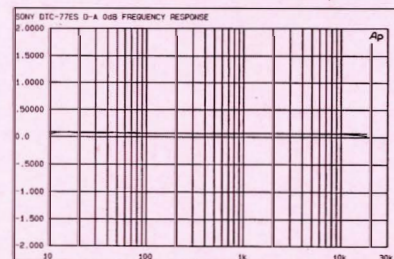
The original concept of DAT was that it should be an intuitive medium that is as easy to use as compact cassette. Unfortunately, this deck is far removed from that concept. Even the display is bewilderingly complex, but there is no questioning its engineering quality or its flexibility, which are second to none. The off-tape monitoring facility works exactly as intended, but at the end of the day there is little here to engage the audiophile. DAT copies of known CD source material (made in the digital domain) sound considerably worse than CD-R copies auditioned in parallel.

TEST RESULTS

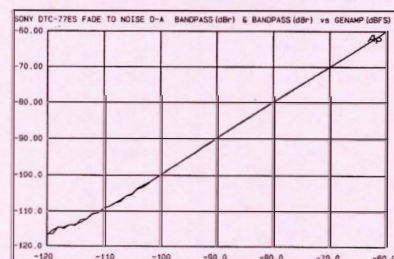
Test resolution	15.9 bits		
Output level, dB rel 2V, Source [digital in]	2.32/+1.29dB		
Line input sensitivity/overload	313mV/>13V		
Level meter indication at full level (digital in)	0dB		
Effective dynamic range (-70dB thd + N + dither)	116dB		
	20Hz	1kHz	20kHz
Pure harmonic distortion			
Full level ref 0dB	-90dB	90dB	<-90dB
(20kHz in-band products only)			
at-70dB encode + dither	0.00316%	0.00316%	0.00316%
Stereo separation 125/100dB	100dB	-41dB or 0.89%	73dB
Stereo balance L/R	0dB	0dB	0.08dB
Frequency res. (ref 1kHz) 20Hz - 20kHz	+/-0.12dB		
Audible HF intermodulation	-96dB or 0.00158%		
Audible electrical noise (CCIR, ARM wtd, 1kHz)	-85dB		
Audible mechanical noise	low		
Ultrasonic noise	-102dB		
Deemphasis	+/-0.07dB at 5kHz		
White noise overload test	OK		
Dimensions (wxhxd)	43x13.5x33.5cm		
Typical Retail Price	£990		
Tested with analogue in/analogue out unless otherwise stated			



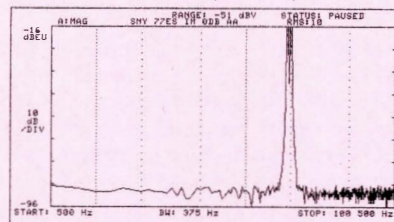
Full encode/decode linearity



Full encode/decode frequency response



Decode only linearity



Intermodulation spectrum



Sony DTC-750

Sony UK Ltd, Sony House, South Street, Staines, Middlesex TW18 4PF. Tel: (0784) 467000



There is an even cheaper Sony unit, a low end mini component called the *DTD-P7* which costs £50 less, but this is the cheapest full size, fully featured model available.

The Sony will record at normal or half speeds (48kHz SP and 32kHz LP) from analogue sources, or at 44.1kHz SP mode via coaxial or TOSLINK optical digital inputs. Outputs are analogue and optically flavoured digital: there is no electrical equivalent, the only noteworthy omission given the traditional superiority of the coaxial input over the flawed TOSLINK standard.

The control system is undeniably impressive, though some may find the minor features daunting and presentation a tad messy. In addition to the usual ID subcodes, the Sony allows Start IDs to be repositioned in 0.3sec increments, and even stores and displays the date when the recording was made (useful with live recordings, as Sony points out). The display area includes a margin display (the level margin below overload that is) and various display dim/off modes. Various special play modes (intro-scan etc) are available, and in the absence of a tape, the machine reverts to a back to back A/D - D/A — a kind of electronic bragging mode. Basic CD player function commands can be accessed from the remote control, which also controls synchronised recording from CD - if your CD player happens to be a Sony. This deck can also be run from a timer.

Test report

The deck is built around Sony's slant loading mechanism that operates rather like a analogue cassette loading door, but which flips the tape down on insertion so that the cassette hubs can be viewed. This gives the control system an intuitive quality that is missing in decks not comparably equipped. The mechanism has direct drive capstan and head drum motors, with a separate reel motor and automatic head cleaning, no less.

The A/D convertor is a High Density Linear 1-bit device with 64 times oversampling and a simple low order low pass filter on its output. The matching DAC chain includes an eight times oversampling digital filter with noise shaping feeding a 64 times oversampling differential mode D/A processor.

Both encode and decode linearity are good down to -100dB, a fine result, although there is a little divergence between the two convertors below -100dB. Resolution is around 15.7 bits. The frequency responses are extremely accurate with only a hint of roll-off prior to 20kHz, and the IM plot is clean, most distortion products (checked on separate instrumentation) being well below the noise floor. IM checks out at -94dB, and ultrasonic noise is about average at -76dB. All distortion and noise results are low (good), and the deck consequently receives a clean bill of health.

Sound quality

This is plainly an exceptional product at the price, and although it probably isn't quite the equal of the late, lamented *DTC-55ES*, the *750* is significantly cheaper than the model it displaces.

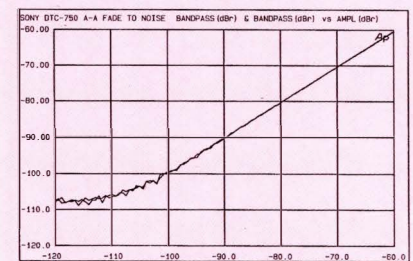
Sound quality was equal to the best in the group, and in certain respects it had no equals. Compared to the prestigious *DTC-77*, the *750* is a little less polished, yet the weight of the *77*'s sophistication didn't bear as heavily on this very affordable model's shoulders. The *750* sounded penetratingly clear with piano and vocal material, and less messy than usual through the denser and more complex passages. All in all, a good, strong, consistent performer . . .

Conclusion

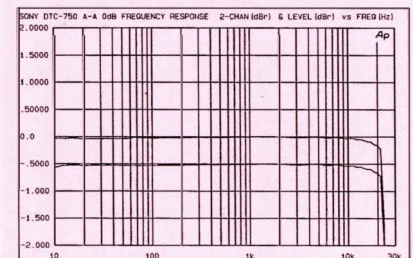
. . .and at a bargain price. This is a powerfully equipped and effective model and Best Buy seems appropriate for a DAT deck which after all offers the best for the least at the present state of the art.

TEST RESULTS

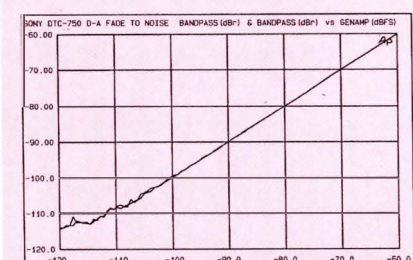
Test resolution	15.7 bits	
Output level, dB rel 2V, Source [digital in]	2.25V1.02dB	
Line input sensitivity/overload	300mV/>13V	
Level meter indication at full level (digital in)	0dB	
Effective dynamic range (-70dB thd + N + dither)	104dB	
	20Hz	1kHz
Pure harmonic distortion	20kHz	
Full level ref 0dB	-82dB	-86dB
(20kHz in-band products only)	-<-90dB	
at-70dB encode + dither	0.0079%	0.0005%
Stereo separation	91dB	88dB
Stereobalance L/R	0.01dB	0.01dB
Frequency resp. (ref 1k) 20Hz-20kHz +/-0.13dB		
Audible HF intermodulation	-94dB or 0.002%	
Audible electrical noise (CCIR, ARM wtd, 1kHz)	-83dB	
Audible mechanical noise	low	
Ultrasonic noise	-76dB	
Deemphasis	+/-0.08dB at 5kHz	
White noise overload test	OK	
Dimensions (wxhxd)	43x12.2x35cm	
Typical Retail Price	£449	
Tested with analogue in/analogue out unless otherwise stated		



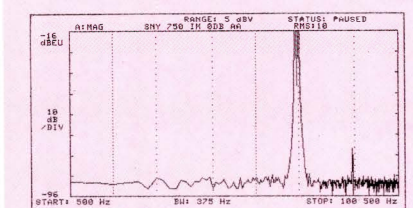
Full encode/decode linearity



Full encode/decode frequency response



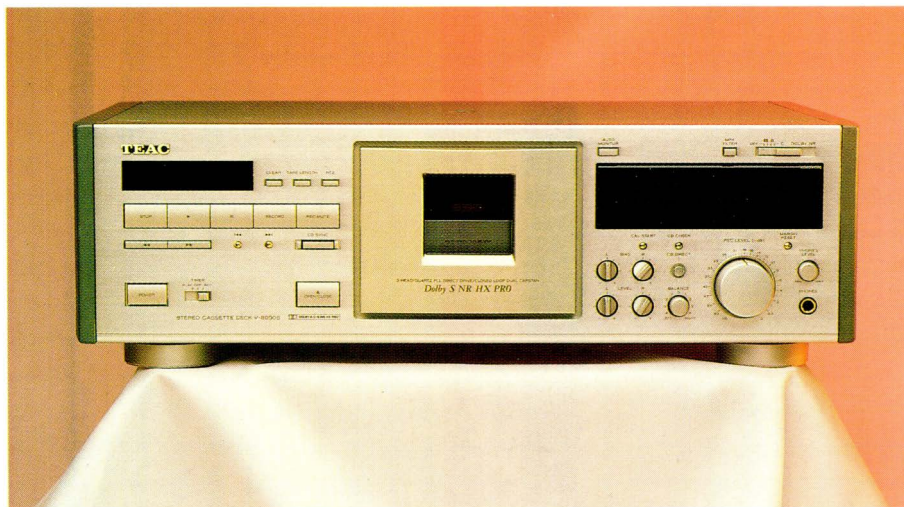
Decode only linearity



Intermodulation spectrum

Teac V-8000S

Teac (UK) Ltd, 5 Marlin House, The Croxley Centre, Watford, Herts WD1 8YA Tel: (0923) 225 235



Teac supplied two cassette decks for this issue, both bulky, imposing designs with a certain sophistication — and available for a certain price. The V-8000S is a unidirectional design, complete with powered transport and fully logic driven loading door mounted amidships. This is flanked by the transport controls on one side and the input level control, meters and record calibration controls on the other. The Teac is equipped with separate potentiometers for each channel (a theoretical requirement, but open to the charge of taking extremism a bit far) to adjust record bias and sensitivity, and uses a dedicated display mode for the purpose. The ergonomics of this task haven't been fully followed through however since you must first engage record (left hand side of fascia), then calibration start (right) and finish off by cancelling record mode (left). Greater integration of the controls involved (a simple software task) would solve this.

Key features of this elaborately engineered deck include a quartz lock, direct drive motor for the dual capstan transport, independent record and playback heads for off tape monitoring in real time and Dolby S. These are backed by a raft of features to help set record levels and edit CDs onto tape when the CD player is one of a specified range of Teac models. A remote control handset is the icing on the cake.

Test report

All record/replay responses are extremely accurate after calibration with Teac's lineup circuit, and both Dolby circuits are correctly aligned. However, there is some rounding off of the low frequency region with Dolby S, and to a lesser extent, Dolby C, and in all cases the responses show a slight downwards tilt. The playback response run is less even, almost as though there is a built in loudness contour. Noise levels are low with all tape groups, and the deck is fully capable of driving high energy tapes, especially

metals, to their intrinsic headroom limits. Headroom in the record amps is not a limiting factor in this case.

The wow and flutter figures are extremely low, among the best measured, which is backed up by a textbook spectrum analysis with almost no sideband energy to be seen.

Sound quality

That this is a first rank cassette deck was obvious from the start. There was a finesse to the sound of known prerecorded material, a quality approaching understatement that highlighted the coarseness of lesser machinery. The excellence of the transport is undoubtedly a factor too, including the (unquantified) freedom from modulation noise of the dual capstan transport, inferred from the unmuddled textures. Sharp, attacking piano transients were slightly fudged at times, however. Dropping the recording levels a couple of dB from the theoretically correct point seemed to help here, and with Dolby B, background hiss was more than adequately suppressed for most purposes.

Metal tapes were well suited to this deck in practice as well as on paper. TDK MA-X and MA-XG made recordings of tremendous freshness, range and vitality outside the compass of lesser formulations.

Only Dolby S was slightly disappointing, measured in this case against the Dolby S installations of Pioneer (and incidentally the new Arcam model). On this deck Dolby S bled the sound of colour and expression and made tempi oddly sluggish. This was a far from transparent example of what is proving to be a difficult system to implement satisfactorily.

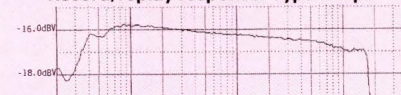
Conclusion

A Recommendation is mandatory because of the Teac's overall stability, lack of muddle — and just sheer excellence. The Dolby S circuit, however, proved to be surprisingly opaque when additioned critically.

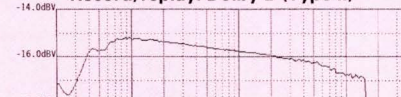
TEST RESULTS

Dolby Level reading on deck's meters	-1dB
Rec/replay response-3dB ref 1kHz	
IEC Type I	20Hz - 18kHz
IEC Type II	20Hz - 18kHz
IEC Type IV	20Hz - 20kHz
Wow & Flutter - Peak DIN wtd	0.05%
Wow/Flutter - unwtd rec/replay	0.025%/0.15%
Replay only flutter 3kHz	0.075%
Speed	no error
Type I signal/noise CCIR/	
ARM 400Hz ref 3% THD	60.0dB
VU indication at 3% THD 400Hz/10kHz	+10dB
Type II signal/noise CCIR/	
ARM 400Hz ref 3% THD	61.5dB
VU indication at 3% THD 400Hz/10kHz	+6dB
Type IV signal/noise CCIR/	
ARM 400Hz ref 3% THD	62.0dB
VU indication at 3% THD 400Hz/10kHz	+8dB
Line input sensitivity/overload	110mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	738mV/2.65V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.25%
Azimuth check R-L phase at 10kHz	50 degrees
VU indication at IEC 0dB	2dB
Dimensions (wxhxd)	47.5x15x35.5cm
Average wind/rewind time (C90)	2 min 5 sec
Typical Retail Price	£699

Record/replay response: Type II tape



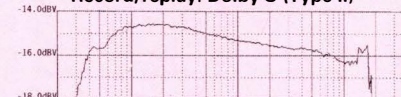
Record/replay: Dolby B (Type II)



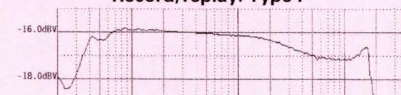
Record/replay: Dolby C (Type II)



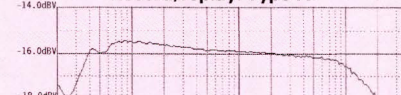
Record/replay: Dolby S (Type II)



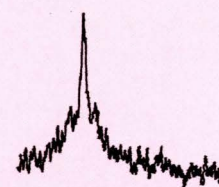
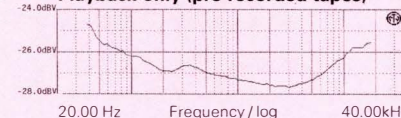
Record/replay: Type I



Record/replay: Type IV



Playback only (pre-recorded tapes)



Noise modulation spectrum analysis

Teac R-9000

Teac (UK) Ltd, 5 Marlin House, The Croxley Centre, Watford, Herts WD1 8YA. Tel: (0923) 225 235



The auto-reverse capable *R-9000* is one of the more button bound decks in this survey, and because the organisation of controls is so poor, a number of lesser used controls are fitted behind a full width flap. It is worth learning to drive though; its capabilities are enormously wide.

The brief version is that this is a three head deck with full off tape monitoring, Dolby B and C (yes, and HX Pro), an elegantly designed, assisted tape calibration system, and more minor features than can be counted while standing on one leg.

Highlights: a real time tape counter - no, I mean *real*/time: you programme the length, but can insert the tape at any arbitrary point and within a few seconds it tells you how much time remains with an accuracy of better than a minute by my reckoning. Blank skip, a second line input and excellent record level meters also feature. Naturally, the auto-reverse mechanism has an optical end of tape sensor to ensure a quick turnaround. A remote control handset is included in this package.

Test report

With the tape calibration system employed to line up each of the test tapes before running the plots, the Teac can be seen to be extremely consistent, but a noticeable tendency to push output a little high lies outside the range of the system's correction ability. Head contour effects are well optimised but HF bandwidth is a little narrower than for Teac's sister model, the *V-8000S*. Signal/noise figures are fair-to-middling, but the IM distortion figure is very high, and there is some shortage of HF headroom which affects metal tapes especially.

Although pitch stability would be marginal for a unidirectional cassette deck costing much more than, say, £150 or so, it is almost miraculously good for an auto-reverse design, and incidentally extremely consistent between sides.

Sound quality

At the start of this review, I entertained a hope that the *R-9000* would repeat, or come close to repeating, the excellent showing of the *V-8000S*. It was not to be. This auto reverse model sounds clean, accurate and stable — more stable than any auto-reverse deck I have encountered recently — but it doesn't have rock solid certainty of the *8000*, a fact that can be felt more than it can be heard. The texture of the music is different as well: it is a little less fine grained, while instrumental textures are less distinctive and more homogenised.

Given the selling price, the performance shortfall from the *V-8000S* came as no surprise, and what was left was no disappointment. The key weaknesses of auto-reverse decks, namely tonal inconsistency due to azimuth variations when changing sides and a lack of pitch integrity, are both convincingly handled, and the sound was generally sharp and clear, but with a flatness of expression and some opacity when auditioned through the Dolby C circuit.

Conclusion

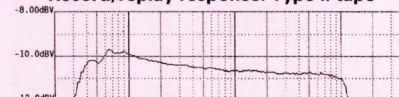
This model enlivens a severely underpopulated area of the market for high grade cassette decks with auto-reverse. Most manufacturers implicitly invite you to go for features such as auto-reverse or for good sound quality, with the implication that the two are mutually exclusive. Nakamichi has proved that this needn't be the case, and here is another that goes a long way towards proving that you can have both high quality and a greater than usual measure of the special benefits that cassette tape can provide, of which the ability to make long uninterrupted recordings of long radio programmes must be paramount for many readers, in a single box.

It's not exactly cheap though, and sound quality is barely commensurate with the £450 price tag.

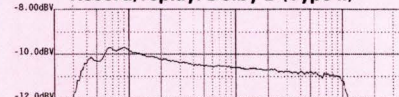
TEST RESULTS

Dolby Level reading on deck's meters	-1dB
Rc/replay response -3dB ref 1kHz	
IEC Type I	20Hz - 15kHz
IEC Type II	20Hz - 14kHz
IEC Type IV	20Hz - 16kHz
Wow & Flutter - Peak DIN wtd	FWD/REV 0.13%/0.10%
Wow/Flutter - unwtd rec/replay	FWD 0.13%/0.21% REV 0.13%/0.21%
Replay only flutter 3kHz	FWD/REV 0.10dB/0.10dB
Speed	FWD/REV +0.3%/+0.5%
Type I signal/noise CCIR/ ARM 400Hz ref 3%THD	57.5dB
VU indication at 3% THD 400Hz/10kHz	+6dB
Type II signal/noise CCIR/ ARM 400Hz ref 3% THD	59dB
VU indication at 3% THD 400Hz/10kHz	+4dB
Type IV signal/noise CCIR/ ARM 400Hz ref 3% THD	61.5dB
VU indication at 3% THD 400Hz/10kHz	+6dB
Line input sensitivity/overload	108mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	813mV/5.02V
IM distortion 10kHz/ 11kHz 0dB peak, 1kHz product	31%
Azimuth check R-L phase at 10kHz	FWD/REV 30/ 10 degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	47.5x15x35.5cm
Average wind/rewind time (C90)	1min 45sec
Typical Retail Price	£449

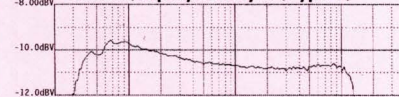
Record/replay response: Type II tape



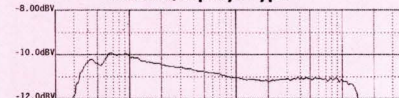
Record/replay: Dolby B (Type II)



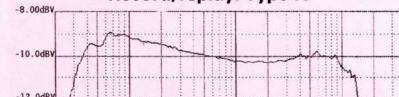
Record/replay: Dolby C (Type II)



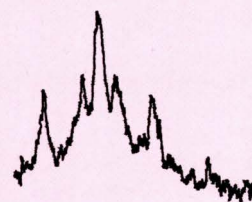
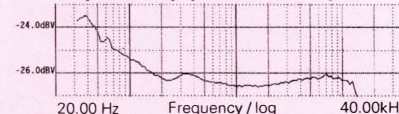
Record/replay: Type I



Record/replay: Type IV



Playback only (pre-recorded tapes)



Noise modulation spectrum analysis

Technics RS-BX606

Panasonic UK Ltd, Panasonic House, Willoughby Road, Bracknell, Berks RG12 4FP. Tel: (0344) 862444



Aiwa started something last year when it introduced a £200 three header. Like a red rag to a bull, this has become a new price point for others to aspire to, and as we have seen, a number have taken up the challenge. As I recall, Aiwa said it could meet the price without too many engineering compromises, by gearing up to sell extremely large numbers. The (rhetorical) question this raises is how many low cost, three head decks can the market support?

Technics' entry level three header costs just £180. Although only a single capstan transport, the capstan motor is directly driven, eliminating a number of gears and belts, which theoretically at least, can be expected to produce a more tightly defined mechanical performance. The capstan motor is quartz referenced and is said to be a high torque design.

As with most Technics cassette decks, few creature comforts have been omitted. The list includes track search, a real time memory counter, dual record level meter range (from -30 to +12dB or, redundantly, -7 to +7dB), bias adjust and a control to vary headphone monitoring level, in addition, of course, to the traditional Dolby B, C, HX Pro and MPX switching. The only minor disappointments — big deal — were the manual tape/source monitor switching and noisy transport mode engagement. The good news is that the deck at least looks and feels like a quality item, despite the evidence of the price.

Test report

The record/play frequency responses were all extremely well adjusted for the normal IEC tape groups, with well controlled head contour effects (the variations in output near the LF rolloff point), accurate Dolby tracking and a well extended HF response except in the case of ferric (Type I) tape which suffered some premature roll-off due to

overbiasing with the IEC standard tape employed. The playback response shape is also very close to a straight line. What is noticeable, however, is the roughness of the HF output, presumably due to poor tension control over the head block.

Wow and flutter, though adequate, do not approach the standards set by the use of similar quartz locked DD motors elsewhere. Signal/noise results are good all round, but IM distortion is extremely high at 0VU, underlining the lack of headroom to fully exploit the benefits of metal tape, despite the good behaviour with this tape in other tests, and the good saturation performance of the heads — + three per cent THD at +11dB!

Sound quality

Notwithstanding the comment concerning IM distortion, the deck could be driven successfully with metal tapes. The deck has surprisingly good timing, and was at its most effective with vibrant, lively stuff like Andy Sheppard's *In-Co-Motion*, one of the discs chosen for this test. It was relatively less successful with mainstream classical material, such as the recent BIS Sibelius *Violin Concerto* recording, where a hint of steeliness made an impression on the finely recorded soloist, and where the deck tended to homogenise the orchestral strings in their upper reaches. Both noise reduction processes were successful here.

On the whole, though, the good outweighed the bad, and the *RS-B606* had the capability of outshining most of its contemporaries below £200 for its clarity, vitality and good timing, but not for its audio manners, which were decidedly lacking.

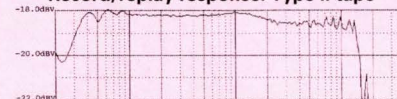
Conclusion

Maybe what this deck really needs a dual capstan transport. I'm split between awarding it Best Buy — it's cheap for what's on offer — or not recommending it at all. OK then, Recommended.

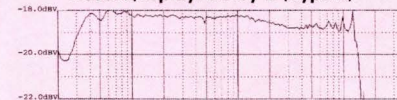
TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 11kHz
IEC Type II	<20Hz - 15kHz
IEC Type IV	<20Hz - 19kHz
Wow & Flutter - Peak DIN wtd	+0.17%
Wow/Flutter - unwtd rec/replay	0.06%/0.32%
Replay only flutter 3kHz	0.17%
Speed	+0.20%
Type I signal/noise CCIR/ARM 400Hz ref 3%THD	48.0dB
VU indication at 3% THD 400Hz/10kHz	+11dB
Type II signal/noise CCIR/ARM 400Hz ref 3% THD	60.0dB
VU indication at 3% THD 400Hz/10kHz	+8dB
Type IV signal/noise CCIR/ARM 400Hz ref 3% THD	62.0dB
VU indication at 3% THD 400Hz/10kHz	+11dB
Line input sensitivity/overload	134mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	645mV/3.7V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	40%
Azimuth check R-L phase at 10kHz	60 degrees
VU indication at IEC 0dB	+3dB
Dimensions (wxhxd)	43x12.5x30cm
Average wind/rewind time (C90)	2 min 9 sec
Typical Retail Price	£180

Record/replay response: Type II tape



Record/replay: Dolby B (Type II)



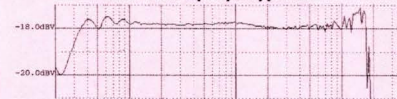
Record/replay: Dolby C (Type II)



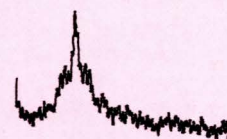
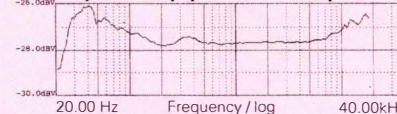
Record/replay: Type I



Record/replay: Type IV



Playback only (pre-recorded tapes)



Noise modulation spectrum analysis

Technics RS-BX707

Panasonic UK Ltd, Panasonic House, Willoughby Road, Bracknell, Berks RG12 4FP. Tel: (0344) 862444



The RS-BX707 transport boasts a single quartz-referenced direct drive capstan, which is generally as good news for a cassette deck as it was bad news for turntables years ago. The fact that this isn't a dual capstan deck is the only obvious omission from a full spec list.

The bias and sensitivity set-up routine requires that two adjustments be made using the record level meter in a special mode. To help with record level adjustment, the deck can look at the input signal for as long as required, the stored peak level being adjusted using the input level controls to the appropriate point on the record level meters.

The record level meter itself is almost a yard long and consequently easy to read, but despite having switchable ranges, neither is sufficient to cover the top end of the signal dynamic range (see later). The deck also includes a multi-function memory counter, track search and the usual Dolby B, C and HX Pro amenities. Tape/source monitoring is manual, a Technics quirk.

Test report

The transport is a good one with excellent pitch integrity, though the quartz lock reference doesn't stop the tape running slightly fast! The tape calibration circuits had more serious problems, in that some tapes which were outside its range were aligned correctly (eg TDK SA-X, which gave a perfectly flat response), and vice versa, TDK SA, for example, being apparently correctly aligned yet producing a sharp treble loss amounting to over 3dB at 10kHz ref 1kHz. Dolby C alignment was also poor, producing a curve with a distinctive S-shaped response when the starting (non-Dolby) plot was flat. Some unevenness in output was noticeable with all tapes at high frequencies, and poor tape/head contact is indicated.

This deck has a surprisingly low 80kHz bias frequency, which perhaps explains the

rather messy backgrounds sometimes noticeable on replay. These may be a result of downband products caused by intermodulation between the music signal and sub-harmonics of the bias signal. 0VU IM distortion is extremely high, and oddest of all, the 3dB peak levels are as high as +16VU with metal tapes, which, as suggested above, can't even be approached by the meters. On the other hand, signal/noise figures are excellent all round.

Sound quality

There were times on audition when the sound began to come together, but on the whole the Technics turned out to be a mess. A hard, almost metallic edge to the sound detracted from acoustic instruments and voices, and was particularly objectionable with simple material such as Mary Black's *Schooldays Over* recorded on metal tape. Listening notes contained adjectives such as 'shrill' which is precisely what she sounded like when reproduced with inadequate resolution and control.

There was a marked difference between the two noise reduction processes, as usual favouring the less manipulative Dolby B, but both imposed colorations on the sound, and a well matched Type II driven hard without noise reduction is clearly the best way to use this deck — when the source material is dense enough to drown out tape hiss, which often won't be the case. Prerecorded tapes sounded as rolled off in the bass and treble as the frequency response suggests.

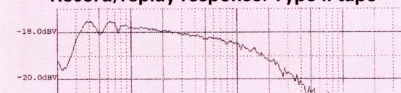
Conclusion

There's a good cassette deck here struggling to get out. Right now it is hamstrung by a number of poor design decisions and even poorer factory alignment. The unevenness of HF output in particular should be checked out and cured, and as for tapes that can be peaked to a (non-existent) meter reading of +16VU... well!

TEST RESULTS

Dolby Level reading on deck's meters	n/a
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 15kHz
IEC Type II	<20Hz - 17kHz
IEC Type IV	<20Hz - 19kHz
Wow & Flutter - Peak DIN wtd	0.055%
Wow/Flutter - unwtd rec/replay	0.023%/0.12%
Replay only flutter 3kHz	0.09%
Speed	+0.26%
Type I signal/noise CCIR/ARM 400Hz ref 3%THD	58.5dB
VU indication at 3% THD 400Hz/10kHz	+12dB
Type II signal/noise CCIR/ARM 400Hz ref 3% THD	60.5dB
VU indication at 3% THD 400Hz/10kHz	+9dB
Type IV signal/noise CCIR/ARM 400Hz ref 3% THD	62.5dB
VU indication at 3% THD 400Hz/10kHz	+16dB
Line input sensitivity/overload	132mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	657mV/3.62V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	40%
Azimuth check R-L phase at 10kHz	50 degrees
VU indication at IEC 0dB	+4dB
Dimensions (wxhxd)	43x13.5x30cm
Average wind/rewind time (C90)	2 min 15 sec
Typical Retail Price	£220

Record/replay response: Type II tape



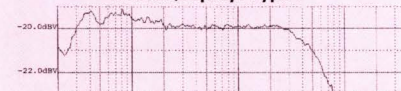
Record/replay: Dolby B (Type II)



Record/replay: Dolby C (Type II)



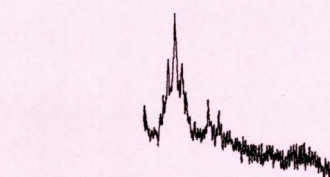
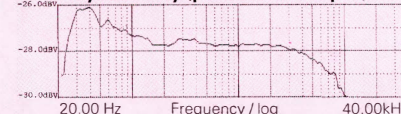
Record/replay: Type I



Record/replay: Type IV



Playback only (pre-recorded tapes)



Noise modulation spectrum analysis

The Reference Review

WHAT'S NEW

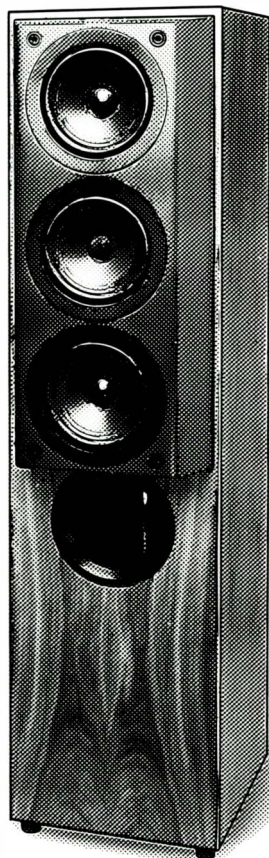
Audiolab 8000DAC is now available for demonstration. Based on Philips own Bitstream but with Audiolabs own application, this particular DAC must be heard to be fully appreciated. Automatic sensing of all normal digital outputs with two phase lock loops for the master clock, phase inversion and two analogue outputs.

Quad at last have released the new and long awaited Quad FM 6 Tuner. This unit is part of the 600 system and offer remote operation via Quad's own 66 remote.

Exposure As a newly appointed Exposure agent, we are happy to announce that the Exposure range is now available for demonstration. Prices start from around £500 for the Exposure 20 integrated amplifier.

GREAT DANES

DynAudio have a simple design philosophy – it has always been better to avoid faults at source than to try to rectify them afterwards. The Danish company have now launched their own range of speakers to a expectant UK market. Typical design of DynAudio speakers takes years not months, with emphasis on low cabinet colouration. Drivers are capable of huge dynamics, in some cases 2000 watt transients soft dome tweeters deliver superior high frequency performance. Leaving nothing to chance they even design and manufacture their own speaker cable. This is no ordinary cable and the only one we know to give flat characteristic impedance across the full frequency of the speaker.



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We will be one of the first few to receive DCC in the country. This unique digital tape system holds the promise of "Perfect Sound Forever" from tape. To be launched in April with a mass of advertising, you wont escape knowing of its existence. Come and hear for yourself how DCC stacks up against, other less perfect formats. Book a demo today.

BLACK & GOLD

Have you noticed an alarming decline in vinyl available in the High Street? At the Reference Rooms you will find a growing stock of high quality pressings from Sheffield Labs, Wilson, Opus 3, and Chesky. Also available are Audiophile quality CD's. Available from those already mentioned together, are Narada and 24 Carat Gold Mobile Fidelity, Gold Diggers this way please.

TRANSPORT

The Silver Disc or CD has recently undergone a tune up with some heavy modifications. Teac have produced special dia cast components and a revolutionary new clamp system called VRDS which improves stability and laser tracking allowing for higher resolution. A more emotional musical event are the results of TEAC's latest innovation.

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Tech Talk

At the outset let me acknowledge the help I received from Chris Bryant, who did the sensitivity, overload, azimuth, intermodulation and VU indication at IEC 0dB measurements on the analogue machines and all DAT tests. The remaining machine tests and tape tests were done using the author's own facilities.

Every review includes a table of laboratory test results. Alvin Gold explains how the tests were carried out and how to interpret the results.

Lab testing

Rec/replay response - 3dB ref 1kHz. The two figures given are simply the frequency extremes that define the bandwidth (referred to the arbitrary 0dB 1kHz level, and recorded at -10dB ref IEC). These are shown separately for all three tape types.

Wow and flutter- Peak DIN wtd/unweighted. Central to the task of writing to and reading from tape is that the consequence of any lack of absolute speed stability will superimpose itself on the signal, and you will hear the effect of that. In an analogue system like compact cassette, the inevitable variations in speed of the tape passing over the heads appear as momentary (and sometimes longer term) pitch variations. This class of variation is known under the blanket term wow and flutter, and is shown in unweighted and weighted form.

Speed error is measured in percentage deviation from the nominal standard (4.75cm/s).

Signal/noise ratios are quoted with CCIR/arm weighting. The test frequency is 400Hz for three per cent THD for each of the three tape types.

Line input sensitivity/ overload. Will it match your amplifier tape feed?

Mic input sensitivity/ overload. What sort of microphones (if any) can be used?

Line output for 0dB/ maximum. Will it drive your amplifier properly? (Probably.)

IM distortion 10kHz 11kHz 0dB peak, 11kHz product. This test gives a useful measure of how well or badly the various machines respond when asked to record two high frequency signals at 0VU level simultaneously. Real life musical signals are much more complex still, of course, and an inability to deal with this test cleanly suggests an inability to cope with upfront percussion or other high energy material without sounding hard or just plain distorted.

Azimuth check R-L phase at 10kHz. Expressed in three degrees (of treble phase shift), this is a measure of azimuth misalignment. The higher the error, the greater the HF loss when playing commercially recorded cassettes.

VU indication at IEC 0dB. A flux level corresponding to IEC 0dB (= 250nW/m) will usually produce a record level metre reading in the range +/-3VU.

In addition, a number of plots and graphs are included with each review. The frequency response plots were run with the highest resolution available, which means that dropouts tend to show up in all their glory, and frequency response errors are not 'sanitised' as is often the case. The plots were made with the greatest vertical resolution. This exaggerates response aberrations by a factor of 2.5 times compared to previous cassette deck tests but brings them into line with CD players, cartridges and amplifiers. The record/replay sweeps were also continued right up to 40kHz.

All response plots were run at -10dB, which stresses the machines rather more than if they were run at the traditional -20dB.

Also included are similar comparable plots showing the effects of the noise reduction systems in the frequency domain.

The playback only plots were run in exactly the same way giving an indication of the frequency response available with prerecorded material. For these tests, thanks to Pioneer, we were able to run with the official IEC 120µS replay sweep test tape from ABEX.

We also performed spectrum analysis tests to investigate the mechanical behaviour of each of the decks, though space prevented the publication of more than one of these. The noise modulation spectrogram graphically illustrates the mauling endured by a 3150Hz sinewave when recorded and replayed by the deck under test - there are close parallels with a similar analysis carried out in last year's edition. The central peak should be as fine and as thin as possible, any problem here being heard as a lack of pitch stability. Response runs were also made using the high speed dub option, but have not been reproduced for space reasons. With auto-reverse decks, all data refers to Side One, but the reverse side was checked in the same way, and again discrepancies were reported as they arose. In the case of decks with automatic tape alignment, the alignment procedure was followed, and where a bias adjustment facility was fitted, the setting recommended for TDK AD, SA and MA-X was used if available. Otherwise, the central setting was adopted.

Listening tests

The listening was divided into two sections, the first of which involved using each deck in turn in a system which included a Meridian 200 CD transport, Audio Alchemy DAC, Audiolab pre/power amplification, various loudspeakers including Musical Fidelity MC6 and a pair of Sennheiser HD560 Ovation headphones. Much routine listening was done with this system, along with all the functional work - which button does what and so on.

Finally, each deck was auditioned in a high grade loudspeaker based system. Equipment used included Roksan and Michaelson Audio amplification and Martin-Logan Quest loudspeakers, with various digital (CD and CD-R) and analogue sources of commensurate quality.

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THORENS ★ MISSION and more

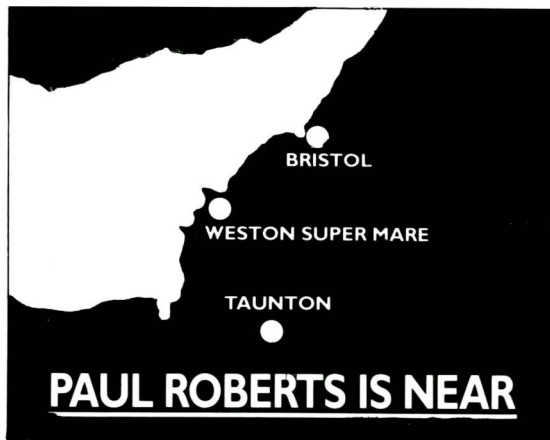
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Conclusions, Best Buys & Recommendations

Trends noticeable since the last survey (October 1991) continue to be governed by the parlous state of the British economy. Value for money remains the prime driving force behind most manufacturer's thinking — and marketing plans.

Manufacturers are busy widening the base of low end decks with three heads (for real time off tape monitoring) and such refinements as direct drive capstan motors and dual capstan transport mechanisms. We have already learned that dual capstans mean greater immunity from cassette shell problems, lower modulation noise, even lower wow and flutter, and that direct drive capstan motors, which apply the force where the action is, rather than at a distance

Which cassette and DAT players came out best in this month's survey? Hit the decks with Alvin Gold.

through belts and idler wheels, can give dramatically lower wow and flutter and a more accurate absolute running speed. Intriguingly, however, many of the low cost decks with these features are little better than their forebears which didn't have them. Well, what do you know?

The one surprise this time round was the number of DAT decks submitted - five out of a total of 22 models, though it would have been six had one hopeful professional model now being offered to the public not gone wrong. Only one portable is counted in this number, included for good measure and to help illustrate generic differences between domestic DAT and the pocketable variety.

The general observation is that DAT recordings, even those made in the digital domain where the digital code on tape can be presumed to be a direct bit copy of the original and which therefore should sound identical to be source, barely attains even low-end CD standards.

Typically DAT sounds sluggish, and tends to lack much of the subtlety, expressiveness, stereo focus and the individuality of instruments now available from Compact Disc. It is anyone's guess whether the DAT medium will ever match Compact Disc, given the improvements that we have seen in that medium in recent years.

Perhaps it's no accident that the best of the DATs is also the cheapest grown up model on the market — the Sony *DTC-750*, which replaces the well liked *DTC-55ES*. Certainly the Sony *DTC-77ES*, which costs around twice as much, appears to add little to the musical repertoire of the cheaper model, though it is certainly engineered to a more exacting standard, and it has some important extra features, of which the real time off-tape monitoring system is the most

impressive. The cheaper Sony *DTC-750* is so accomplished in relation to price that Best Buy seems the only possible rating, but the miniature Aiwa *HD-S100* is a natural Recommendation as a practical pocketable which gets the job done with some panache.

Vying head on with the DAT models were a couple of impressive top end cassette machines, the Teac *V-8000S* and Aiwa *XK-9000* (which has an on-board DAC) which on purely musical criteria are easily the equals of the current generation of DATs. The Aiwa especially sounds a little less stable, and although not as tidy as a good DAT in many ways, the personality and expressive range of the music tended to be better conveyed. Even the Nakamichi *Cassette Deck 1.5* had a similarly capable underlying character, though the untidiness of the medium is more apparent with this model than with either of the previously mentioned models. All three achieve recommendation, the Aiwa and Teac near the epicentre of DAT territory at £700, and the Nakamichi well under DAT prices at £349.

The other Best Buy and Recommended decks all cost considerably less than the models already described, and do not inhabit quite the same rarefied performance bracket. But there are some goodies here too. The JVC *TD-V541*, for example, is a cracker. It costs £280, for which you get an ostensibly rather ordinary set of whistles and widgets, though the list does include dual capstans, a direct drive power plant and three heads. In this case these high tech accoutrements actually work, and this is one of the strongest models we've seen from JVC for some time. It receives the only other Best Buy in this report — and mercy of mercies, it's not black.

For £80 less, there is a fairly similiar concept (but finished in black this time) in the shape of the Akai *DX-57* (Recommended), which again is a thoroughly workmanlike design which performed well in most modes, metal tape included, though Dolby C was weak compared to the more transparent sounding Dolby B circuit.

Our final two Recommendations cost less than £200. The dearer model is the Technics *RS-B606*, which is Technics' low end (£180) three head deck, this time with a single capstan motor and direct drive. This deck is a mixed bag on audition, but proved surprisingly accomplished with metal tapes, though it could sound rough around the edges. Last there is the Pioneer *CT-339*, a competent two head deck costing just £150. There were questions on test about pitch integrity, and like other decks in this price area, the Pioneer was not a great success with metal tapes. On the whole though it worked very well, with tonal accuracy and Dolby replay tracking improved by the powerful (and completely automatic) BLE (Bias, Level, Equalisation) tape alignment circuitry Pioneer has seen fit to include. An impressive party trick.

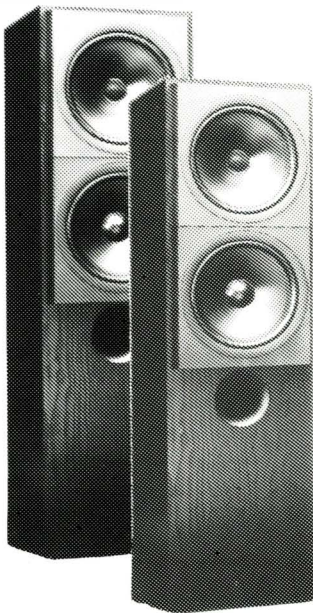


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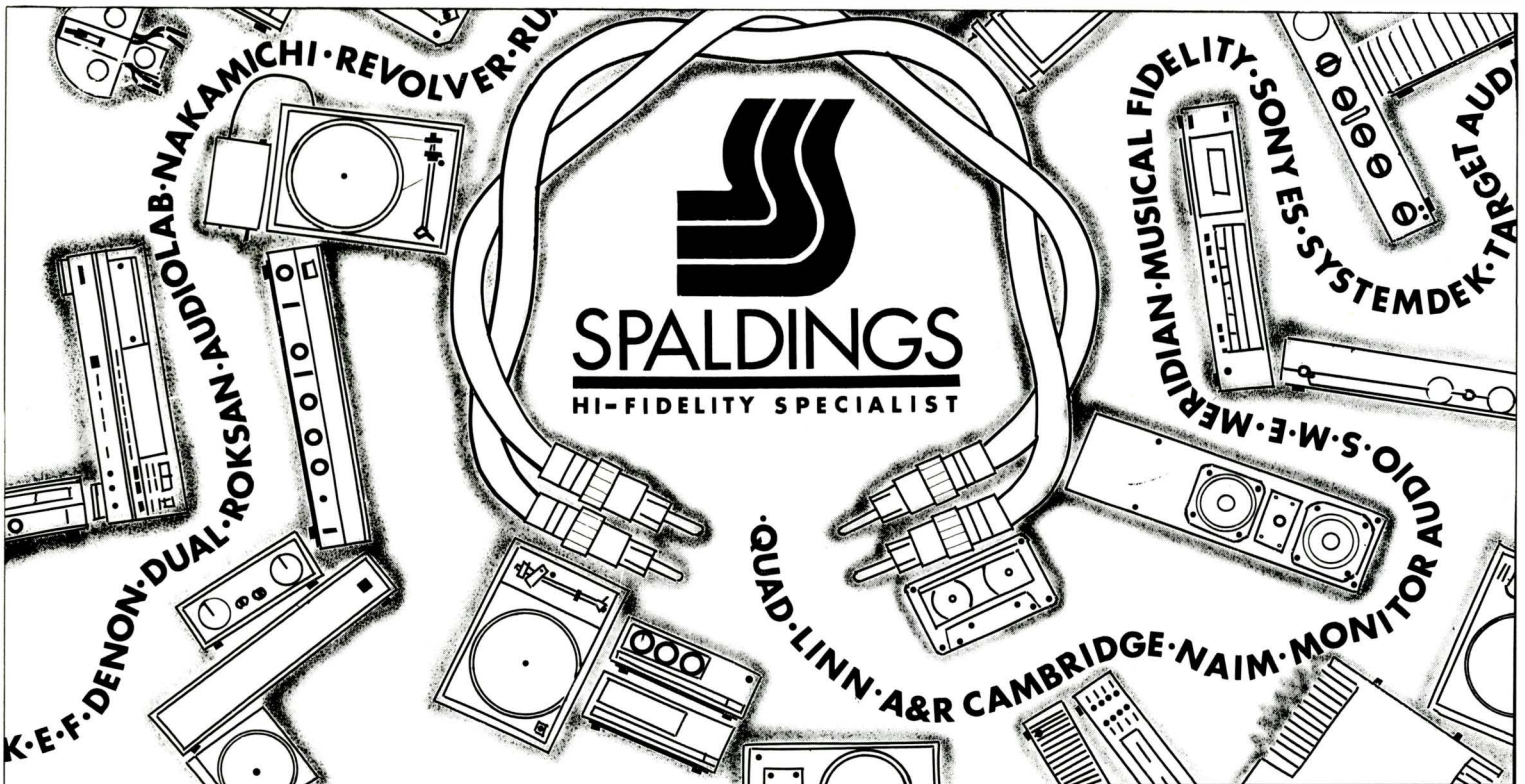
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Choosing and Using . . . Receivers

As hi-fi continues to sub-divide into ever more separate separates, pre and power amps, CD transports, outboard DACs and the like, it's something of a contrast to contemplate the humble receiver.

Not so long ago a receiver was a simple combination of AM/FM tuner and stereo amplifier, complete with additional inputs for your CD player, tape deck and record player. If this still sounds like your cup of tea, for reasons of space or whatever, then you'll be delighted to learn that such ergonomic packages remain in existence, even if they're on the wane.

These days more and more receivers also offer comprehensive audio visual facilities such as Dolby 3, Dolby Surround and Dolby Pro-Logic. In fact it's difficult to tell whether these are simply very versatile receivers or widget-strewn A/V amplifiers that just happen to have an AM/FM tuner thrown in for good measure.

Combining your tuner and amplifier in the same box can save a lot of space, as well as opening up some interesting control possibilities. Join Paul Miller as he explores the airwaves with that much maligned breed, the receiver.

But then receivers have never enjoyed equal status with separate amplifiers and tuners, so the A/V invasion could well be a ruse to invigorate the market. In the US big receivers have always taken the lion's share of sales and these latest A/V systems look like being the next popular fad. It's difficult to imagine them ever obtaining more than a toenail-hold in the conservative UK market, but time will tell. Back to business.

In an ideal world manufacturers could squeeze a top-notch tuner in beside an equally impressive amplifier, saving plenty of cash on casework and packaging, making the whole thing more convenient while losing nothing in quality.

Reality used to be a friend of mine

Back in the real world, though, there is invariably some interaction between the siamesed amp and tuner, either through a shared power supply or through radiated interference. Their sheer proximity eats away at their ultimate sound quality.

As a result, and despite manufacturers' best efforts, a quality tuner/amp combination will inevitably out-perform the very best receiver. It's the price you pay for convenience. Once you've accepted this, then the 'rules' for buying a receiver are broadly in

line with those for amps and tuners. For a start don't be bamboozled by claims for abundant power and infinitesimally low distortion. It's important to realise that the higher-powered receiver with vanishingly low levels of distortion will not necessarily sound any better than a weaker model with crate loads of unwanted harmonics in tow. Neither should you worry over-much about 'matching' the nominal output of the receiver to the suggested power rating of your speakers.

A slap on the back

Just because your favourite pair of boxes have a 50W sticker slapped on the back does not prohibit the use of a 25W or 100W receiver. If it sounds right then it is right, after all you're the one who has to live with the decision, not your local dealer. In fact it's easier to damage your speakers by pushing an under-powered A/V centre too hard than blasting out the occasional clean peak from a mega-watt receiver. This is especially true when driving several sets of speakers to achieve that 'surround sound' effect. The more speakers are hooked up, the more your A/V receiver will be struggling.

This assumes you've taken the A/V route, of course. Certainly, these models look darn impressive with their fancy graphic equaliser systems, flickering bar graphs (I haven't the cheek to call them spectrum analyzers), variable delay, rear and centre-level controls. If you are confident that such a beast will find a place alongside your hi-fi VCR and you're prepared to litter your lounge with the extra sets of speakers they require, then, by all means, go ahead. A/V systems are tremendous fun and bring a whole new dimension to favourite films.

Aerial boundaries

If you are more interested in tapping into the FM airwaves than knocking ornaments off the shelf with a copy of *Star Wars* then don't forget to invest in a decent outdoor aerial. This needn't cost an arm or leg unless, of course, you happen to fall off the roof while installing it. Just £30 or so will buy you a four or five-element FM aerial, the first and only line of defence for your new tuner. Even a basic aerial like this will afford some protection from unwanted multi-path interference while making the most of weak broadcasts that meet it head-on.

The length of T-wire supplied with your receiver is completely useless in this regard and really has no place in a decent hi-fi set-up. Do remember to use a 75ohm shielded downlead between the aerial and receiver, by the way, unless you want to be plagued by ticks, pops and other sorts of interference. All this might seem a hassle but a little time and effort spent at the outset will reward you with hash-free reception for years to come.

Harman Kardon HK3400

Harman Audio, Unit 1B, Mill Street, Slough, Berks SL2 5DD.
Tel: (0753) 576 911



Back in Issue 93 Harman's sleek *TU9400* tuner scored a direct hit with its quiet but proud and dynamic sound. Indeed, many of our listeners likened its fresh and clean delivery to that of a CD player. So hopes were high when HK's matching receiver, the *HK3400*, arrived for testing.

Visually it bears comparison with Harman's other separates, especially with its contoured preset and display area. However the internal design is quite specific, HK opting for logic-controlled switching of the tape, VCR, phono and CD inputs so that more operations can be moved over to remote control. Even the volume knob is motorised though features like tone, balance and speaker selection still use mechanical switches.

Under the bonnet you'll find a fully discrete phono board mounted at right angles to the logic and tuner circuits. Even the power amp is partially shielded by a huge alloy heatsink that lies midway across the amplifier.

Lab report

HK's filtering of pilot (19kHz) and subcarrier (38kHz) tones is very poor, resulting in the bold tracks (just -20dB down in the case of the pilot) visible on the 3D plot.

Fortunately, HK's partnering amp keeps any subsequent intermodulation products at bay (0.0037 per cent) even if the relatively tight IF bandwidth of the tuner itself pushes IM distortion to 1.2 per cent at source. On the positive side this does confer an excellent 74dB selectivity, implying that the *HK3400* will work wonders in very 'busy' FM airwaves.

Meanwhile an unexpected pilot product at 14kHz compromises the tuner's best S/N ratio — free of this tone, quieting would improve from -64dB to -69.2dB. Nevertheless, the 'clean' 3D plot shows the tuner is mercifully free of rubbish through the treble.

Anyway, the amp exceeds its 35W rating with a healthy 66W into 4ohms even if HK's claim for vast quantities of current is not wholly supported by the 10.9A measured on this occasion.

Sound quality

Lacks the clarity and sense of perspective recovered by the NAD, our panel suggested, though none of them were aware of the names of either product. By way of comparison they thought the HK offered a fuller, rounder but marginally defocused sound. Yet it was still subjectively powerful, a very big and bold sound with a gratifyingly solid bass; something of a welcome contrast to its lacklustre competition.

Our pop selection actually sounded slower paced, a measured beat attributed to the new-found octaves of bass rather than any sluggishness on the part of the amp. Lisa Stansfield's voice was slightly synthetic, though, lacking the rounded, natural hue that so distinguished the NAD. It has body, plenty of body, but its resolution is not up to scratch, concluded the panel.

Switching over to the tuner brought a sense of 'something in the way', an intrusive vagueness that disguised the positioning of different instruments as well as their relative scale within a performance. It could easily become quite untidy and abrasive, not bright as such, but still rather pointed or fierce.

Conclusion

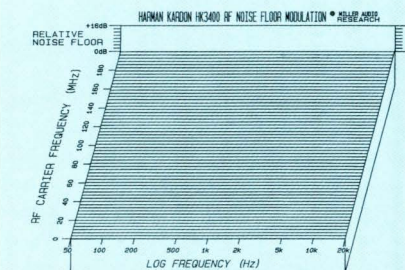
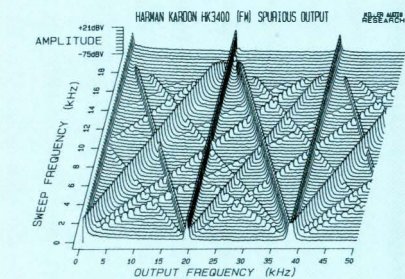
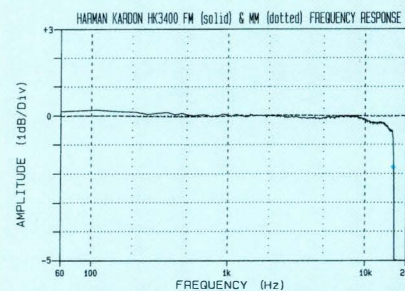
One thing's for sure. You'll need the services of a good MPX filter before recording from this radio unless, of course, your Dolby NR circuit has a death wish. These pilot tones might also prompt a degree of inconsistency between the sound of the *HK3400* with different speakers.

In our case we simply ended up with music that was big and confident but slightly messy with it.

TEST RESULTS

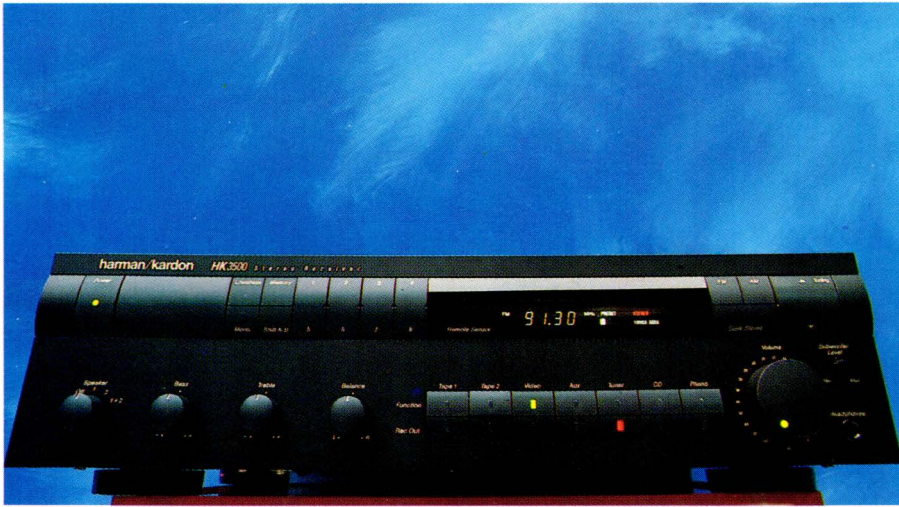
Tuner Section	
Muting Threshold	16µV
Sensitivity, 50dB S/N (mono)	13µV
Sensitivity, 50dB S/N (stereo)	58µV
Sensitivity, 65dB S/N (stereo)	285µV
Ultimate S/N ratio, mono	76.7dB
Ultimate S/N ratio, stereo	64.1dB*
Stereo Separation, 1kHz	32.7dB
Stereo Separation, 15kHz	25.9dB
Alternate channel selectivity	74dB
Second channel rejection ratio	105dB
Pilot Suppression, 19kHz	19.9dB
Pilot Suppression, 38kHz	38.6dB
FM Stereo Distortion, THD	-49.4dB
FM Stereo Distortion, IMD	-32.2dB
AM Rejection Ratio	60.6dB

Amplifier Section		20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms		41.3W	43.2W	41.8W
4ohms		61.4W	65.8W	62.2W
Dynamic Headroom (IHF)		+1.03dB (54.7W)		
Peak Current (5msec, 1% THD)		10.9A		
Output Impedance		0.128ohm		
Damping Factor		62.4		
		CD	MM	
Stereo Separation (1kHz)		77.9dB	76.2dB	
Stereo Separation (20kHz)		51.2dB	49.8dB	
Channel Balance (1kHz, -60dB)		0.59dB	0.56dB	
Distortion, THD (2/3 power)		-74.3dB	-70.4dB	
IMD (2/3 power)		-82.5dB	-69.4dB	
Noise (A-wtd, 0dBW)		-81.2dB	-78.4dB	
(A-wtd, 2/3 power)		-91.6dB	-81.0dB	
Input Sensitivity (for 0dBW)		22.8mV	372µV	
(for full output)		151.1mV	2.42mV	
Typical Retail Price				£350



Harman Kardon HK3500

Harman Audio Unit 1B, Mill Street, Slough, Berks SL2 5DD.
Tel: (0753) 576 911



Sweeping price cuts across the entire range of HK's separates have brought the cost of both *HK3400* and *HK3500* receivers down by £50. Not to be sniffed at, even though £450 is hardly bargain-basement pricing for this 50W receiver. A receiver, I might add, that's rather less conservatively rated than the cheaper *HK3400*. Superficially the *HK3500* looks pretty similar with its curved controls for AM/FM band selection, auto tuning, loudness and mono facilities in addition to programming for the 16 random presets.

Any of the three line, two tape and MM phono inputs are selected beneath the display, using an arrangement of logic switches similar to that used on the *HK3400*. However, in this case each input is supplemented with an independent rec-out switch for tape recording. There's a variable subwoofer output too, connected to a pair of phono's round the back.

Circuit-wise the *HK3500* uses basically the same tuner and phono stage as the *HK3400* but with extra logic provided on the line/tape PCB to accommodate the new rec-out facility. Once again, the power amp is separated from the pollution of logic and tuner boards by its heatsinking, while a chunkier power supply beefs up the output. Oh yes, the extra £100 also buys you proper speaker binding posts instead of nasty little spring-clip terminals.

Lab report

Once again HK's tuner boasts a very sharp and effective mute (22.9dB/μV RF) with its 'seek' mode engaged. It's a little more sensitive too though, more importantly, its freedom from in-band IM products gives it a wider 69.3dB S/N ratio.

Harmonic distortion is also proportionally lower (0.15 instead of 0.34 per cent) even though image rejection, selectivity and the poor pilot rejection (-20dB) remain unchanged. Just look at that 'clean' 3D plot —

utterly free of top-end hash.

Nothing obviously wrong with the amp with its modest 53/84W output supported by a generous 14A current capacity. The RF IMD plot seems free of distortion but this is due to HK's input RF filters and is not a true indication of the amp's inherent immunity to RF noise.

Sound quality

After an initially positive reaction to the weighty, ambient character of this amp our listeners became steadily disillusioned by its mid-forward balance, a hardness that made Lisa Stansfield's voice sound less feminine and rather more mechanical. Percussion, strings and vocals alike were uncomfortable hard. Not bright, our panellists stressed, but cold and abrupt.

The acoustic of the busy Brahms' *Violin Concerto* was lost, almost as if the orchestra was playing in a room with carpeted walls, suggested one imaginative panellist. Any natural reverberation was lost under the tangle of strings, strings that themselves lacked the richness, smoothness and timbral detail we had expected.

This roughness was certainly mollified by the tuner but at the further expense of perspective and stereo definition. This was a shame because our listeners could sense the underlying quality of the tuner trying to break through, qualities of dynamics and freshness that were thoroughly ruined by the partnering amplifier.

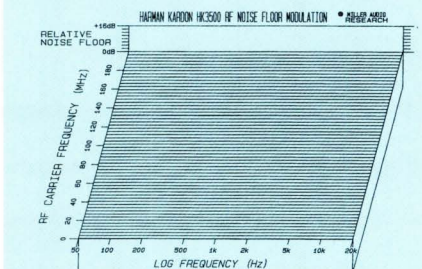
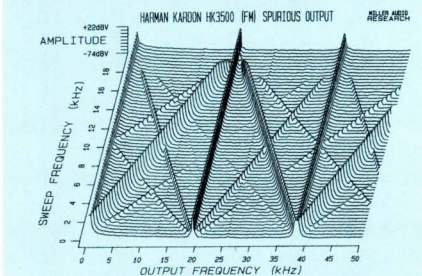
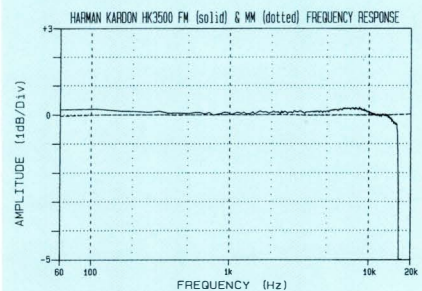
Conclusion

Well built, beautifully finished and never less than confident in operation. Nevertheless the *HK3500* was dismissed as 'painful' by our crew of listeners who were less and less enamoured of its performance the longer it was left playing. Not entirely representative of HK's tuners or amps, I hasten to add, but as a combination it certainly isn't deserving of any commendation.

TEST RESULTS

Tuner Section	
Muting Threshold	14μV
Sensitivity, 50dB S/N (mono)	8.5μV
Sensitivity, 50dB S/N (stereo)	48μV
Sensitivity, 65dB S/N (stereo)	215μV
Ultimate S/N ratio, mono	77.4dB
Ultimate S/N ratio, stereo	69.3dB
Stereo Separation, 1kHz	39.3dB
Stereo Separation, 15kHz	28.4dB
Alternate channel selectivity	76dB
Second channel rejection ratio	105dB
Pilot Suppression, 19kHz	20.3dB
Pilot Suppression, 38kHz	41.1dB
FM Stereo Distortion, THD	-56.7dB
FM Stereo Distortion, IMD	-44.2dB
AM Rejection Ratio	58.2dB

Amplifier Section			
	20Hz	1kHz	20kHz
Maximum Continuous Power Output			
8ohms	52.3W	52.8W	44.1W
4ohms	79.3W	83.8W	68.2W
Dynamic Headroom (IHF)	+0.96dB (65.9W)		
Peak Current (5msec, 1% THD)	14.1A		
Output Impedance	0.119ohm		
Damping Factor	67.3		
	CD	MM	
Stereo Separation (1kHz)	84.9dB	86.0dB	
(20kHz)	82.5dB	78.9dB	
Channel Balance (1kHz, -60dB)	0.42dB	0.33dB	
Distortion			
THD (2/3 power)	-69.3dB	-70.7dB	
IMD (2/3 power)	-66.7dB	-70.0dB	
Noise			
(A-wtd, 0dBW)	-79.6dB	-78.2dB	
(A-wtd, 2/3 power)	-91.8dB	-81.0dB	
Input Sensitivity (for 0dBW)	19.3mV	318μV	
(for full output)	141.7mV	2.29mV	
Typical Retail Price	£450		



JVC RX-505VL

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



Welcome aboard the *RX-505VL*. Every function is governed by logic-control for your comfort and convenience. Whether you want to adjust the volume, balance, select a new input or programme one of five personalised equalisation settings, just press a button and we'll do the rest. Get the picture?

Somewhere behind this busy looking fascia, positively glistening with widgets, is an amp and tuner. You simply have to make your way past the Compu-Link Source-Related Presetting (CSR), Dolby Surround with its adjustable digital delay, Hall and Stadium reverb options and SEA graphic in order to find them. When you do stumble across the tuner you'll be delighted to learn that JVC has provided a generous 40 station preset memory, including a four character title option for at least 20 stations.

Auto-tuning is provided, naturally, with a realistic muting threshold that discards noisy whiffs of RF. Meanwhile everything you ever wanted to know about the three external line, MM phono and two tape inputs is provided on a broad orange display which also gives a running count of the tuned frequency, preset number, volume, balance and surround mode.

Lab Report

First the good news. JVC's FM tuner is really quite promising, based around a Mitsumi front-end and Sanyo ICs. It's sensitive too, requiring just 95mV (+39.6dB/μV RF) to achieve a 65dB S/N ratio but stretching this to a magnificent, if academic, 73.7dB under optimal conditions.

Add to this its 53/79dB pilot/subcarrier rejection and superbly low 0.08 per cent distortion and all seems well. Yet, perhaps due to its relatively narrow IF bandwidth, there is an increase in IM distortion through the treble. Compare the 'fuzz' in the top right-hand corner of the 3D plot with the equivalent plot for the Proton receiver.

Unfortunately, JVC's amp runs out of breath very quickly, falling from 101W to just 68W into 4ohm, hamstrung, no doubt, by the rather low 4.5A current rating. A pint-sized version of this power amp is provided to drive the 'rear-channel' surround outputs, by the way. Meanwhile the amp's S/N ratio is compromised by at least 9dB due to a spray of mains harmonics that succeed in penetrating the A-weighted curve. Then there's the wobbly phono response. . .

Sound Quality

Auditioned directly after the Proton receiver, the JVC was praised for its improved sense of stereo depth and general spaciousness. Yet there was still a fundamental lack of subtlety and grace in its portrayal of the violins. So our orchestral CDs seemed coherent enough but were still slightly brash and thin; big, quiet but insubstantial.

Lisa Stansfield's CD certainly lacked any clout in the bass department, so though the jangle of percussion was not too forward or offensive her voice remained oddly indistinct, even phasey. 'That's a saxophone...I think!' exclaimed one listener, causing the others to suggest that for all its smoothness the amp still managed to rip the heart from the music. Inoffensive but deadly dull, they concluded.

Once again it was left to the tuner to inject a little drama into our lives. Via FM, the Brahms' concerto was richer, a little muddy through the busiest sequences but at least there was some emotion, some feeling behind the playing of the soloist.

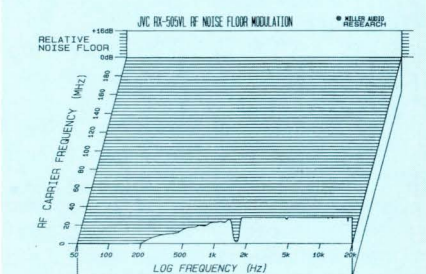
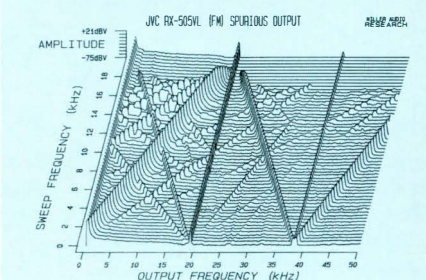
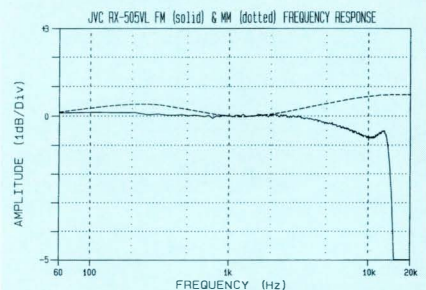
Conclusion

In this instance the over-stretched resources of the amp tend to smother the potential of JVC's tuner, but play safe and it'll reward you with a pleasant if not startling sound. Nevertheless, the lack of power and genuine Pro-Logic decoding do little to promote its cause.

TEST RESULTS

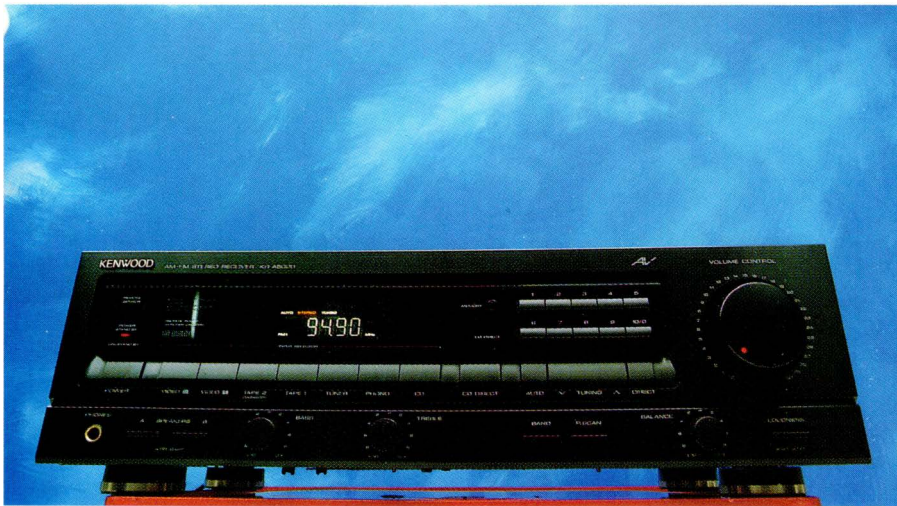
Tuner Section	
Muting Threshold	8μV
Sensitivity, 50dB S/N (mono)	3.8μV
Sensitivity, 50dB S/N (stereo)	24μV
Sensitivity, 65dB S/N (stereo)	95μV
Ultimate S/N ratio, mono	78.4dB
Ultimate S/N ratio, stereo	73.7dB
Stereo Separation, 1kHz	37.6dB
Stereo Separation, 15kHz	23.3dB
Alternate channel selectivity	61dB
Second channel rejection ratio	102dB
Pilot Suppression, 19kHz	53.0dB
Pilot Suppression, 38kHz	79.1dB
FM Stereo Distortion, THD	-61.9dB
FM Stereo Distortion, IMD	-38.8dB
AM Rejection Ratio	71.3dB

Amplifier Section		20Hz	1kHz	20kHz
Maximum Continuous Power Output,				
8ohms	99.9W	101.3W	95.7W	95.7W
4ohms	69.0W	68.2W	69.5W	69.5W
Dynamic Headroom (IHF)				
Peak Current (5msec, 1% THD)	4.5A			1.15dB (132.1W)
Output Impedance				
Damping Factor		0.421ohm		19.0
Stereo Separation (1kHz)				
		47.8dB	47.8dB	47.8dB
Stereo Separation (20kHz)				
		47.1dB	47.1dB	47.1dB
Channel Balance (1kHz, -60dB)				
		0.40dB	0.42dB	0.42dB
Distortion,				
THD (2/3 power)		-75.0dB	-68.7dB	-68.7dB
IMD (2/3 power)		-67.8dB	-74.9dB	-74.9dB
Noise				
(A-wtd, 0dBW)		-77.4dB*	-75.5dB*	-75.5dB*
(A-wtd, 2/3 power)		-91.5dB*	-79.9dB	-79.9dB
Input Sensitivity				
(for 0dBW)		23.8mV	295μV	295μV
(for full output)		242mV	2.95mV	2.95mV
Typical Retail Price				
				£300



Kenwood KR-A5020

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



Looking for an affordable, up-beat receiver but don't want to forego the flexibility of remote control? Then Kenwood's baby *KR-A5020* could be the answer, a receiver with concessions to both sound quality and convenience.

CMOS-logic switches are used to handle the twin video, tape, CD and MM phono inputs for example. But the volume control uses a motorised potentiometer instead of a digital attenuator, a preferable if costlier route that still retains the option of remote control.

Extra logic is provided for CD direct as well as the automated tuning facilities which include an 'intro scan' of the ten AM and 20 FM station presets.

It's even possible to directly punch in the desired station frequency using the ten preset keys. The result, along with preset number, tuning mode and waveband, is then flashed up on an adjacent fluorescent display.

Gripes? Well the accompanying *RC-6020* remote handset includes buttons for Dolby Surround and various equalisation options that are inoperative on the *KR-A5020*. Don't be fooled into thinking that this box has pukka A/V facilities. It doesn't.

Lab report

Kenwood's amp isn't strictly related to any of its high-flying budget integrated models, but it's a passable 50W imitation. Distortion is a moderate 0.025 per cent and noise very low at -94dB (A-wtd, two-thirds output via CD) but the 0.2ohm output impedance is exacerbated by long lengths of internal cabling.

The maximum current delivery is stopped short at 8.4A courtesy of protection relays, by the way. If anything it's the FM tuner that has real problems. The Mitsumi front-end pack confers a fair 35µV (31dB/µV RF) sensitivity for a 50dB stereo S/N ratio but full quieting is limited to -57dB by strong inter-

modulation tones originating with the 19kHz pilot. Filtering these reveals a potential S/N ratio of 68.6dB but, as you can see from the *KR-A5020*'s 3D plot, in practice its spectrum is littered with various IM and harmonic distortions. Nasty.

Sound quality

Auditioned directly after the *HK3500*, the extra bounce, freedom and openness of the Kenwood came as welcome relief. Lisa Stansfield's vocals were returned 'to the mix' rather than being pulled stage front but the lively, quick and nimble character was still appreciated.

This bright and breezy sound was judged closer to the Marantz than, say, the NAD receiver. Either way, it was far from offensive. In fact it set about our orchestral pieces with real enthusiasm, tempered only by a sense of naivety.

One listener said that it was 'almost as if it were starting out with grand and well-meaning intentions without fully appreciating the task it had set itself.'

With no knowledge of the lab results, our listeners declared the on-board FM tuner less impressive than the basic CD input, losing its well-intentioned bravado and becoming a little thin or confused at times. Nevertheless its treble was still nicely sharp, avoiding the 'sting' suggested by its FM response while also avoiding the tendency to sound thick or fuzzy like many of its competitors. They obviously enjoy listening to distortion.

Conclusion

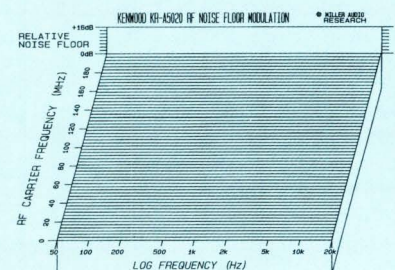
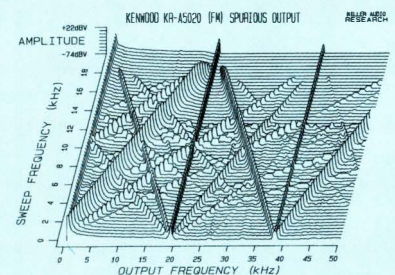
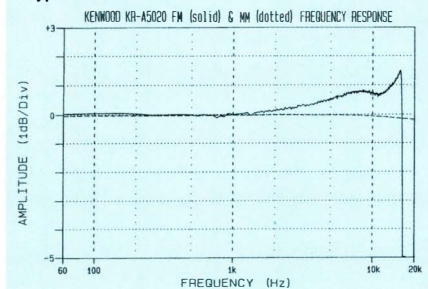
A real trier, concluded our panel who went on to place this receiver about third or fourth in the overall scheme of things.

The FM tuner could do with tidying up as far as noise, distortion and frequency response are concerned but, subjectively at least, it's an attractive enough package for the price.

TEST RESULTS

Tuner Section	
Muting Threshold	<1µV
Sensitivity, 50dB S/N (mono)	5.2µV
Sensitivity, 50dB S/N (stereo)	35µV
Sensitivity, 65dB S/N (stereo)	155µV*
Ultimate S/N ratio, mono	76.0dB
Ultimate S/N ratio, stereo	57.1dB*
Stereo Separation, 1kHz	37.0dB
Stereo Separation, 15kHz	26.1dB
Alternate channel selectivity	66dB
Second channel rejection ratio	>110dB
Pilot Suppression, 19kHz	44.2dB
Pilot Suppression, 38kHz	70.6dB
FM Stereo Distortion, THD	-49.5dB
FM Stereo Distortion, IMD	-34.5dB
AM Rejection Ratio	63.5dB

Amplifier Section		20Hz	1kHz	20kHz
Maximum Continuous Power Output,				
8ohms	51.8W	52.8W	52.8W	52.8W
4ohms	72.0W	80.2W	74.9W	74.9W
Dynamic Headroom (IHF)	+1.28dB (70.8W)			
Peak Current (5msec, 1% THD)	8.4A*			
Output Impedance	0.200ohm			
Damping Factor	40.0			
		CD	MM	
Stereo Separation (1kHz)	75.8dB	73.5dB	73.5dB	
Stereo Separation (20kHz)	51.9dB	47.8dB	47.8dB	
Channel Balance (1kHz, -60dB)	0.04dB	0.03dB	0.03dB	
Distortion,				
THD (2/3 power)	-72.0dB	-72.6dB	-72.6dB	
IMD (2/3 power)	-67.2dB	-67.8dB	-67.8dB	
Noise				
(A-wtd, 0dBW)	-79.9dB	-74.8dB	-74.8dB	
(A-wtd, 2/3 power)	-94.1dB	-76.2dB	-76.2dB	
Input Sensitivity				
(for 0dBW)	19.5mV	305µV	305µV	
(for full output)	142.5mV	2.19mV	2.19mV	
Typical Retail Price	£200			





Kenwood KR-V7030

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



One rung up from the *KR-A5020*. (see left) we find the *KR-V7030*. This is a rather different beast from its cheaper sibling, being aimed more at the crossover area between the audio and video markets. It's the sort of thing currently going down a storm in the States even if it is no more than a light drizzle yet in the UK.

Still it's probably the most powerful and comprehensively equipped unit of its price, offering Dolby 3 Stereo 'surround sound' with extra adjustment over the spread and volume of the central channel. Genuine Pro-Logic decoding is available too, along with independent control over the centre and rear channels and a 16-30msec delay facility.

Up to four surround menus can be stored and recalled by remote control which also offers command of all volume and delay settings. In addition it will select any of the six external inputs and provides access to the AM/FM tuner with direct frequency programming and preset scanning. Extra facilities like the alphanumeric titling of preset stations are included on the receiver itself. Even speaker selection is performed using local relays — another luxury touch.

Lab report

Once again, strong intermodulation distortions radiating out from the 19kHz pilot compromise this tuner's maximum S/N ratio, even if filtering does reveal a potential stereo quieting of 69.2dB. However, it's clear from the 3D plot that the bulk of its spectrum is free of noise and distortion than the cheaper *KR-A5020*, even if the FM response shows a similar treble 'kick'. Kenwood's amp is fairly powerful but its limited current output militates against difficult or multiple speaker systems.

In surround mode the three-channel output drops from 94W to around 60-65W with some 15W available for the rear channel. The RF IMD plot exposes a potential

weakspot, for the *7030* is sensitive to spurious RF in the same band as the tuner's Intermediate Frequency (10.7MHz).

Sound quality

Compared to Kenwood's *KA-5020* (product x to our listeners) this chunkier amp was heard to offer a more precise but slightly less exciting sound. Its big strength is 'structural integrity', described by our panel as the way it set up a very stable and reliable sense of rhythm. This lent an almost mesmeric quality to the Lisa Stansfield track as accompanying instruments bustled past in strict formation.

There's little hardness to complain of but this ultra-steady 'metronomic' quality did end up sounding very synthetic after a time. Our orchestral selection was also reproduced in this big, substantial fashion but also with a stop-start staccato rhythm that destroyed the easy flow, the natural progression of the music as a whole. Almost as if it's following the music 'parrot fashion', suggested one listener.

Just as before, Kenwood's on-board tuner tended to dilute the dynamic confidence of the amplifier but still avoided the brightness suggested by its FM frequency response. Anyway, though its impact was softened, so too was its odd stop-start character. Music now flowed in an altogether smoother fashion. Easy-listening, they mused, but the loss of solidity still robbed the music of its natural, bold stature.

Conclusion

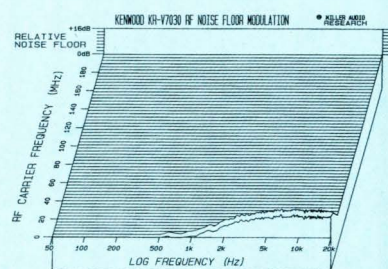
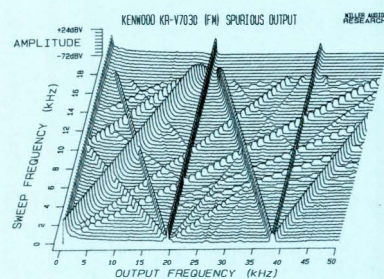
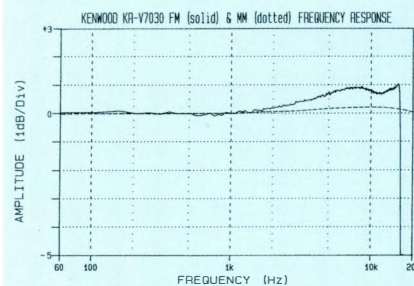
OK, so the amplifier tends to frog-march rather insensitively over the natural ebb and flow of intricate pieces of music. But then the *KR-V7030* was not designed to knock the likes of Pioneer's *A-400* off its perch.

Instead, this is an appealing, exceedingly flexible and generously-priced audio-visual package with plenty to recommend it to the video buff.

TEST RESULTS

Tuner Section	
Muting Threshold	<1µV
Sensitivity, 50dB S/N (mono)	7.0µV
Sensitivity, 50dB S/N (stereo)	48µV
Sensitivity, 65dB S/N (stereo)	220µV*
Ultimate S/N ratio, mono	76.3dB
Ultimate S/N ratio, stereo	61.2dB*
Stereo Separation, 1kHz	32.3dB
Stereo Separation, 15kHz	24.6dB
Alternate channel selectivity	68dB
Second channel rejection ratio	101dB
Pilot Suppression, 19kHz	43.1dB
Pilot Suppression, 38kHz	59.2dB
FM Stereo Distortion, THD	-47.9dB
FM Stereo Distortion, IMD	-37.6dB
AM Rejection Ratio	59.4dB

Amplifier Section			
	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	90.3W	93.7W	91.0W
4ohms	128.7W	139.0W	132.1W
Dynamic Headroom (IHF)	+1.15dB (122.0W)		
Peak Current (5msec, 1% THD)	9.1A*		
Output Impedance	0.171ohm		
Damping Factor	46.9		
	CD	MM	
Stereo Separation (1kHz)	57.2dB	57.1dB	
Stereo Separation (20kHz)	40.5dB	40.2dB	
Channel Balance (1kHz, -60dB)	0.25dB	0.34dB	
Distortion,			
THD (2/3 power)	-72.0dB	-65.2dB	
IMD (2/3 power)	-73.4dB	-79.1dB	
Noise			
(A-wtd, 0dBW)	-79.9dB	-76.8dB	
(A-wtd, 2/3 power)	-95.9dB	-80.8dB	
Input Sensitivity (for 0dBW)	16.2mV	174µV	
(for full output)	157.8mV	1.65mV	
Typical Retail Price	£300		



Marantz SR-50L

Marantz Hi-Fi (UK) Ltd, Kingsbridge House, Padbury Oaks, 581 Bath Road, Longford, Middlesex UB7 0EH. Tel: (0753) 680 868



No Special Edition tweaks in this receiver, but then Marantz has tried valiantly to counterbalance the need for flexibility with the desire for a half-decent sound. To this end it's transplanted an ST-40L tuner (see issue 93 supplement) into a new IC-based integrated amplifier. Once again all the external inputs are logic-switched and so come under the command of Marantz's system remote which also holds sway over the motorised volume control and AM/FM tuner.

An attractive blue display tells you which of the inputs is engaged or, alternatively, gives you a running count of the tuned frequency, tuning mode (auto or manual) and preset number. Unfortunately, tuning is not especially slick while the very low muting threshold lacks the confidence, say, of HK's receivers. Marantz has also added a 'Wake Up' timer facility which can be programmed for once or twice daily operation. Other than this and the thirty station preset scan feature, the SR-50L is a pretty conventional piece of kit.

Lab report

With a power output of some 72W into 8ohms and 86W (+0.8dB) into 4ohms all supported by some 11.8A of unprotected current, it's clear the SR-50L has no obvious partner in Marantz's range of integrated amplifiers. Distortion picks up from 0.01 to 0.03 per cent via MM disc just as the 4.7mV input sensitivity is a little low, but otherwise all seems fine. Oh yes, the blip visible on the RF IMD plot originates with the FM tuner which momentarily locks onto stray RF within the casework as the sweep surges past 101MHz.

The tuner itself shares the same MOS-FET RF front-end as the ST-40L with a newer combined AM/FM receiver IC from Sanyo. Anyway its sensitivity is identical, requiring 175µV (44.9dB/µV RF) for 65dB quieting and offering a potential 71.8dB under idealised

(if unrealistic) conditions. Marantz has succeeded in improving image rejection from the ST-40L's relatively poor 49dB to a respectable 80.5dB, though its selectivity does suffer slightly and the suppression of pilot and subcarrier tones remains appalling. The 3D plots and FM responses here and in issue 93 are almost indistinguishable, by the way.

Sound quality

Right from the outset the extra expressiveness, the realistic ebb and flow of Marantz's amp was abundantly clear. Where others had treated Brahms's *Violin Concerto* with a rude carelessness, now it was possible to appreciate the differentiation of the string tone, the spirit that lay behind the solo violin. 'It's clear this guy's not on a nine-to-five job,' commented one listener in response to the thrill of these strings.

In a technical sense its imaging was not quite as pin-point as it should have been, yet the various instruments at both the front and back of the orchestra were incredibly solid. A little fuzzy about the edges, perhaps, but tactile nonetheless.

So what of the FM tuner? In this instance the receiver sounded a little less dynamic than it had via CD, a little squashed perhaps but still retaining that string tone, that coherence and the ability to withstand difficult sequences we had heard before. Now the amp itself revealed a slight thickening, a further loss of focus and detail. Mild effects that you'd expect from a tuner of this ilk, suggested the panel, without realising just how similar their remarks were to that of the ST-40L tuner, reviewed exactly a year ago.

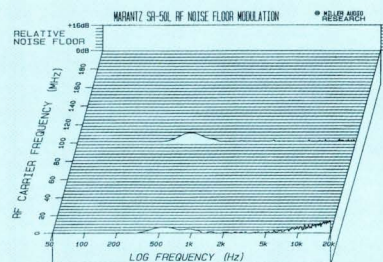
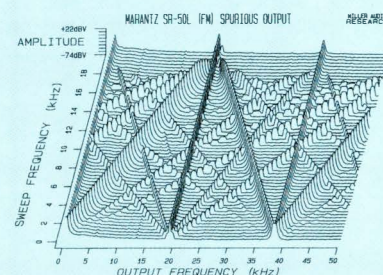
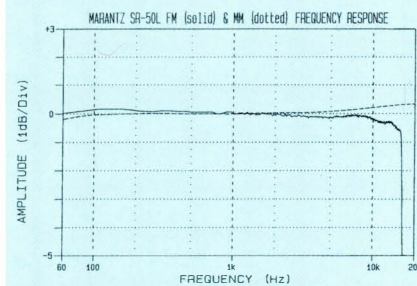
Conclusion

Not as impressive as Marantz's budget amps and tuners in isolation, then, but the SR-50L still represents an attractive compromise. Second only to the NAD in terms of sound quality but a darn sight more flexible.

TEST RESULTS

Tuner Section	
Muting Threshold	1µV
Sensitivity, 50dB S/N (mono)	8µV
Sensitivity, 50dB S/N (stereo)	40µV
Sensitivity, 65dB S/N (stereo)	175µV
Ultimate S/N ratio, mono	77.2dB
Ultimate S/N ratio, stereo	71.8dB
Stereo Separation, 1kHz	34.0dB
Stereo Separation, 15kHz	38.8dB
Alternate channel selectivity	63dB
Second channel rejection ratio	80.5dB
Pilot Suppression, 19kHz	30.5dB
Pilot Suppression, 38kHz	53.0dB
FM Stereo Distortion, THD	-49.6dB
FM Stereo Distortion, IMD	-45.3dB
AM Rejection Ratio	67.0dB

Amplifier Section			
	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	66.9W	72.1W	68.0W
4ohms	83.8W	85.6W	83.8W
Dynamic Headroom (IHF)	+1.66dB (105.6W)		
Peak Current (5msec, 1% THD)	11.8A		
Output Impedance	0.185ohm		
Damping Factor	43.3		
	CD		MM
Stereo Separation (1kHz)	68.3dB	68.5dB	
Stereo Separation (20kHz)	44.8dB	43.3dB	
Channel Balance (1kHz, -60dB)	0.02dB	0.09dB	
Distortion,			
THD (2/3 power)	-78.0dB	-70.1dB	
IMD (2/3 power)	-80.0dB	-74.1dB	
Noise			
(A-wtd, 0dBW)	-85.6dB	-76.5dB	
(A-wtd, 2/3 power)	-97.7dB	-77.1dB	
Input Sensitivity (for 0dBW)	32.1mV	550µV	
(for full output)	273.5mV	4.71mV	
Typical Retail Price	£240		



NAD 7225PE

NAD Marketing Ltd, Adastra House, 401 - 405 Nether Street, London N3 1QG. Tel: (081) 349 4034



Here's a receiver that hails from the good old days when the excesses of A/V paraphernalia were but a glint in some crazed designer's eye. That's not to suggest the 7225PE is archaic. It is, however, one of the few traditional receivers left in our test, a straightforward combination of NAD's 3225PE amplifier and 4225 tuner.

For a start this is the only receiver in our survey that lacks a remote control. Selecting one of the four external inputs (CD, video, tape and MM), or altering the tone, balance, volume, mono and loudness facilities must be accomplished without the aid of logic circuits. But what you lose in flexibility you win back in sound quality.

A red frequency display illuminates the slate-grey fascia with presets for five AM and five FM stations provided alongside. Auto-tuning is very swift, although NAD's muting circuit is not terribly effective. Still, I'm more concerned about the spring-clip FM input which, though it's coupled via a 75ohm balun, is incorrectly earthed. For the FM tuner to offer the highest sensitivity and lowest noise it's worth connecting the shield on your FM downlead to the phono ground tag instead.

Lab report

Having effected this modification, the tuner turns in a panoramic S/N of 73.7dB, tying for first place with JVC. It's sensitive too, requiring just 115µV (41dB/µV RF) for 65dB quieting. Compared with NAD's 4225 tuner, the 7225PE has one less IF stage (three rather than four) with a wide IF bandwidth that trades selectivity (59dB) and image rejection (71.5dB) for very low levels of intermodulation and a wide 36dB stereo separation at 15kHz.

The 3D plot is free of the commonly-encountered IM distortions, promising clean, vibrant sound quality so long as your favourite station is clear of adjacent channels. NAD's amp is impressive too, offering a

healthy 58W output that increases to 89W under dynamic conditions, even if it switches to lower rails when run at full pelt for any length of time.

Furthermore, under normal conditions the Soft Clipping option actually reduces dynamic output by 2.7dB (ie to 47.2W) even though there's no change in the maximum current delivery of 10.9A. The blip at 101MHz on the RF plot is caused by the FM tuner, which remains active even if other inputs are selected.

Sound quality

A very promising start, with good stereo depth and dynamics. This very 'believable' acoustic allowed us to pick out individual instruments, separating strings and woodwinds from a very busy classical mix. The strings were mildly shrill during the loudest passages but the general clarity and drive behind the orchestra gave us the feeling of real purpose and conviction.

This receiver sounds genuinely powerful; 'force with passion,' suggested one panelist, in response to Lisa Stansfield's voice, which had a natural warmth and feminine softness that was utterly lost on the majority of NAD's competitors in our test.

This receiver then proceeded to demonstrate that an FM tuner needn't lose the sparkle, fizz or excitement of the original recording. Our 'broadcast' Stansfield was insignificantly softer, her voice nearly as bold, as full and engaging as it was via CD. Similarly, percussion still boasted that crystalline focus and sense of intricate detail that was routinely smothered by much of the A/V-oriented competition.

Conclusion

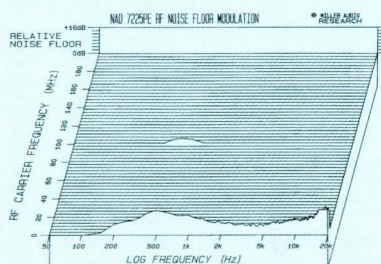
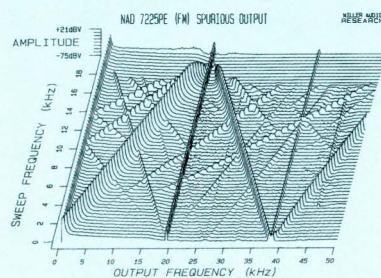
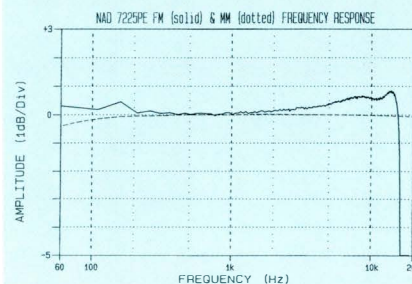
Marvellous stuff. A marriage between a popular amp and a proven tuner that suffers little compromise. This is the enthusiast's choice, the very best of our test and the only unit to come within half a mile of a Best Buy



TEST RESULTS

Tuner Section	
Muting Threshold	<1µV
Sensitivity, 50dB S/N (mono)	4.5µV
Sensitivity, 50dB S/N (stereo)	26µV
Sensitivity, 65dB S/N (stereo)	115µV
Ultimate S/N ratio, mono	77.3dB
Ultimate S/N ratio, stereo	73.7dB
Stereo Separation, 1kHz	38.1dB
Stereo Separation, 15kHz	35.6dB
Alternate channel selectivity	59dB
Second channel rejection ratio	71.5dB
Pilot Suppression, 19kHz	59.5dB
Pilot Suppression, 38kHz	87.8dB
FM Stereo Distortion, THD	-55.5dB
FM Stereo Distortion, IMD	-59.5dB
AM Rejection Ratio	65.1dB

Amplifier Section:			
	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	54.4W	57.5W	54.4W
4ohms	69.0W	75.8W	74.1W
Dynamic Headroom (IHF)	+1.87dB (88.5W)		
Peak Current (5msec, 1% THD)	10.9A		
Output Impedance	0.157ohm		
Damping Factor	CD	MM	51.0
Stereo Separation (1kHz)	86.3dB	77.1dB	
(20kHz)	59.2dB	49.5dB	
Channel Balance (1kHz, -60dB)	1.83dB	1.71dB	
Distortion,			
THD (2/3 power)	-88.9dB	-88.3dB	
IMD (2/3 power)	-88.9dB	-88.4dB	
Noise			
(A-wtd, 0dBW)	-84.6dB	-78.7dB	
(A-wtd, 2/3 power)	-94.3dB	-81.3dB	
Input Sensitivity			
(for 0dBW)	35.5mV	532µV	
(for full output)	271.2mV	4.03mV	
Typical Retail Price	£250		



Nakamichi Receiver 2

Nakamichi B&W (UK) Ltd, Marlborough Road, Lancing, West Sussex BN15 8TR. Tel: (0903) 750 750



If style is paramount then you'll probably find Nakamichi's *Receiver 2* quite irresistible. Yet, even with its system remote in tow, there are flexible A/V receivers available at half the price. Nevertheless the *Receiver 2* remains a class act, offering one of the slickest auto-tune facilities (only HK's is better) and a genuinely sensible mute circuit that holds off until a good 15µV of RF is detected.

This is the only tuner to offer you an indication of signal strength, with five beacons that light at $1\mu\text{V}$, 3µV, 13µV, 43µV and 475µV respectively. Before the last indicator flickers into life you'll be enjoying the cleanest sound the BBC can offer. The features do not end here, of course. Open the fascia and extra controls like remote speaker, independent rec-out selection, tone and variable loudness pop into view.

Lab report

Compared with the *Receiver 3*, (see right) this bigger unit offers a combination of lower distortion (typically 0.0047 per cent) and higher power (141W into 4ohms) even if its current delivery is still limited by protection relays. A better potentiometer means a better channel balance while the amp's sensitivity to RF noise is curtailed just prior to the crucial 10MHz band on this occasion.

The tuner also features various improvements, though not without a hiccup or two. Despite using a MOSFET RF front-end, for instance, its FM sensitivity has fallen to 283µV for a 65dB S/N. Then there's the ultimate S/N which would actually clock in at a record 74dB if it were not for the ingress of pilot IM products at 13kHz and 15kHz.

The 3D plot is free of synthesiser noise and shows off the effective pilot/subcarrier filtering, yet intermodulation in the treble octaves (top left of plot) is demonstrably worse. A pity, because the tuner's 400kHz selectivity (just 56dB) has been traded for extremely low levels of THD (0.07 per cent)

and IMD through the bass and midrange frequencies.

Sound quality

Difficult to ignore, ventured one listener in response to the intensity of the *Receiver 2*'s sound and its larger-than-life forceful presentation. Not aggressive, added the panel, even though it appeared to concentrate on fierce detail rather than the warmth and body of the music.

On this occasion some instruments played at the expense of others, especially during the loudest passages. Brahms's *Concerto* was fragmented, so though it was possible to discern a barrage of different instruments they were simply too intense. Lisa Stansfield's CD was bunched-up in comparison, but the taut focus of the percussion and the sharp articulation of her voice all implied that this was a more sophisticated machine than the feature-strewn boxes that had preceded it.

Switching to stereo FM elicited an altogether more favourable reaction as the panel applauded the sense of space and depth. The fierceness of the amplifier was clearly mollified by the reticence of the tuner, the combination proving to be very well-balanced indeed. There was some criticism over a loss of sharp, leading-edge detail and a similar loss in subtlety, but the sense of coherence, of 'working together', remained a joy to hear.

Conclusion

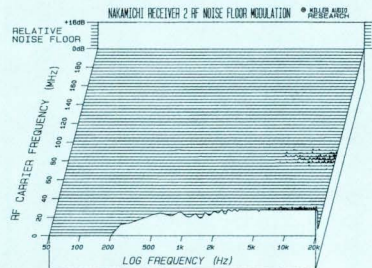
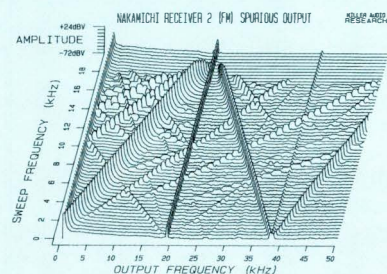
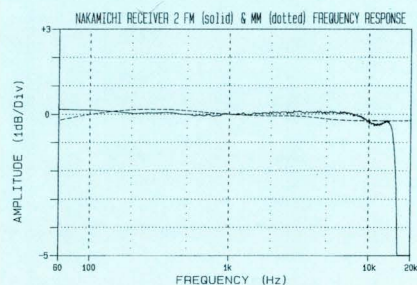
To some extent you are paying for the exclusivity of the Nakamichi brandname, a seal of quality that would seem to guarantee a reliable and luxurious product.

The FM tuner is certainly something special but the amp, for all its boldness, is not always satisfying. Sophisticated but still rather fierce was how our listeners described it. The overall verdict? Slick, but dreadfully expensive.

TEST RESULTS

Tuner Section	
Muting Threshold	15µV
Sensitivity, 50dB S/N (mono)	9.8µV
Sensitivity, 50dB S/N (stereo)	58µV
Sensitivity, 65dB S/N (stereo)	283µV
Ultimate S/N ratio, mono	79.4dB
Ultimate S/N ratio, stereo	69.1dB*
Stereo Separation, 1kHz	36.1dB
Stereo Separation, 15kHz	33.8dB
Alternate channel selectivity	56dB
Second channel rejection ratio	69.1dB
Pilot Suppression, 19kHz	60.1dB
Pilot Suppression, 38kHz	91.6dB
FM Stereo Distortion, THD	-62.7dB
FM Stereo Distortion, IMD	-52.7dB
AM Rejection Ratio	69.5dB

Amplifier Section:			
	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	94.4W	96.1W	86.4W
4ohms	130.9W	141.4W	128.7W
Dynamic Headroom (IHF)	+1.43dB (133.5W)		
Peak Current (5msec, 1% THD)	16.1A*		
Output Impedance	0.137ohm		
Damping Factor	58.6		
	CD	MM	
Stereo Separation (1kHz)	70.1dB	69.7dB	
(20kHz)	55.2dB	52.0dB	
Channel Balance (1kHz, -60dB)	0.21dB	0.28dB	
Distortion, THD (2/3 power)	-86.2dB	-86.9dB	
IMD (2/3 power)	-81.6dB	-83.5dB	
Noise (A-wtd, 0dBW)	-86.9dB	-81.7dB	
(A-wtd, 2/3 power)	-98.2dB	-84.1dB	
Input Sensitivity (for 0dBW)	21.2mV		
(for full output)	209.9mV		
Typical Retail Price	£600		



Nakamichi Receiver 3

Nakamichi B&W (UK) Ltd, Marlborough Road, Lancing, West Sussex BN15 8TR. Tel: (0903) 750 750



Nakamichi describes this unit as "an affordable receiver," but it obviously has a rather dated concept of what people can afford these days. Spending £370 on this remotely-controlled receiver or £200 on an amp and £170 on a tuner is hardly shoestring stuff.

Still they've put a lot of effort into the build, appearance and overall 'feel' of the *Receiver 3* which offers a sort of luxury that's altogether missing with cheaper rivals. Rocker switches flank the broad green display, enabling you to select any of the phono, line or tape inputs in preference to the internal tuner. Then there's the remote handset which can command a variety of other Nakamichi separates via the receiver.

If you do decide to listen to the radio then ten AM/FM station presets and slick auto tuning are up for grabs. Nakamichi has also taken the trouble to ensure its muting circuit works properly so you won't be bothered by noisy, grot-ridden broadcasts.

The tuner's RF front-end and quality IF stage (with no less than four ceramic filters) looks promising enough but their single-board construction offers little shielding from cross-circuit interference.

Lab report

Nothing particularly special about the amp in this instance, just a solid 67/92W 8/4ohm power rating with some 8.8A of current on tap until its protection circuit pulls the plug. Distortion hovers around 0.02 per cent via CD or MM but the biggest worry is its obvious sensitivity to spurious RF noise in the 0-20MHz region (see RF IMD plot). With a 10.7MHz IF signal humming away inside the same case this would seem to be asking for trouble.

The tuner itself is more interesting with its 0.6dB mid-treble boost, moderate sensitivity (44.8dB/μV RF for 65dB quieting) and appalling 29dB pilot-tone rejection. However, look at the 3D plot and you'll see that

the *Receiver 3* is rather less afflicted with high-order IM distortions than the *Receiver 2*—a very much 'cleaner' plot that serves to expose some digital synthesiser noise at around 13kHz.

Sound quality

We auditioned this unit immediately after the larger *Receiver 2* and the contrast could hardly have been greater. Gone was the penetrating fierceness and dynamic resolution to be replaced by a smoother, less forward but generally less interesting presentation. Our listeners found it difficult to concentrate, their minds wandering until abruptly brought back by the odd bar or phrase that seemed somehow new or different from before.

Tricky to describe what was wrong, yet it nonetheless failed to fire the panel's enthusiasm. On the face of it everything was well-ordered, the soundstage populated with interesting snippets of detail. But the presentation was oddly subdued, almost as if the performers 'couldn't wait to get home'.

Nakamichi's tuner was voted ahead of the amp, breathing more life and fire into its performance. Strings possessed a greater vibrancy, a grip and tenacity that was missing with the amp alone. Nevertheless its outlook was hampered by a lack of stage depth, placing one instrument atop another once the going got tough. Though the soloist from Brahms's concerto was still isolated forward of the orchestra, there was a lack of 'flow' about the music. Vibrant but mechanical, they suggested.

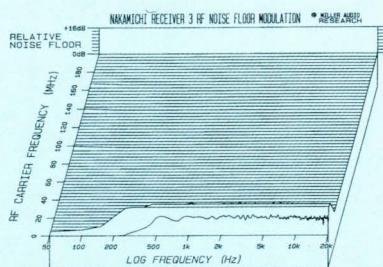
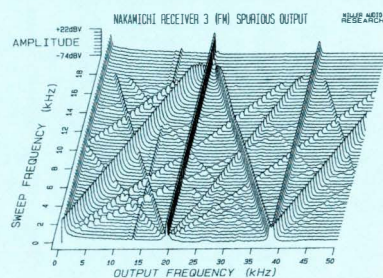
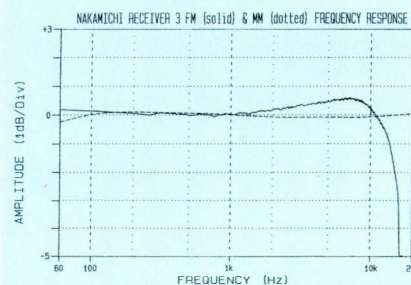
Conclusion

This is no small-scale version of the *Receiver 2* but an altogether less characterful and, ultimately, less stimulating bundle of electronics. It is undoubtedly well built and slick in operation but, to my mind, is rather less affordable than Nakamichi would have us believe.

TEST RESULTS

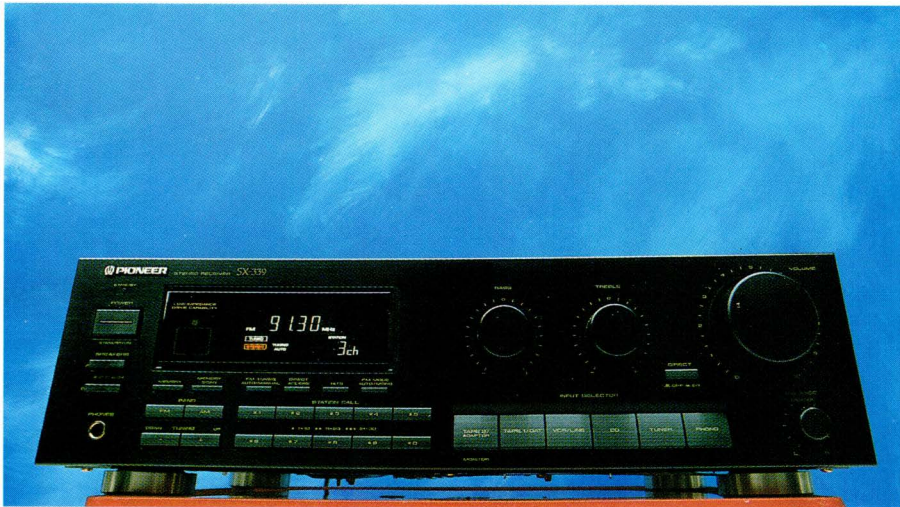
Tuner Section:	
Muting Threshold	4μV
Sensitivity, 50dB S/N (mono)	5.0μV
Sensitivity, 50dB S/N (stereo)	41μV
Sensitivity, 65dB S/N (stereo)	173μV
Ultimate S/N ratio, mono	76.9dB
Ultimate S/N ratio, stereo	69.9dB
Stereo Separation, 1kHz	37.6dB
Stereo Separation, 15kHz	31.4dB
Alternate channel selectivity	67dB
Second channel rejection ratio	83.5dB
Pilot Suppression, 19kHz	28.6dB
Pilot Suppression, 38kHz	58.3dB
FM Stereo Distortion, THD	-51.7dB
FM Stereo Distortion, IMD	-35.7dB
AM Rejection Ratio	53.2dB

Amplifier Section:		20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms		63.5W	66.9W	65.2W
4ohms		77.5W	92.2W	84.7W
Dynamic Headroom (IHF)		+1.4dB (92.2W)		
Peak Current (5msec, 1% THD)		8.8A*		
Output Impedance		0.244ohm		
Damping Factor		CD	MM	
		32.8	32.8	
Stereo Separation (1kHz)		64.7dB	64.7dB	
(20kHz)		41.0dB	40.3dB	
Channel Balance (1kHz, -60dB)		2.09dB	2.11dB	
Distortion, THD (2/3 power)		-73.0dB	-73.0dB	
IMD (2/3 power)		-74.3dB	-72.0dB	
Noise (A-wtd, 0dBW)		-82.4dB	-79.9dB	
(A-wtd, 2/3 power)		-97.0dB	-84.1mV	
Input Sensitivity (for 0dBW)		25.6mV	444μV	
(for full output)		211mV	3.67mV	
Typical Retail Price		£370		



Pioneer SX-339

Pioneer High Fidelity (GB) Ltd, Field Way, Greenford, Middlesex UB6 8UZ. Tel: (081) 575 5757



Pitched at a competitive £200, this receiver is clearly vying for the same customers as Kenwood's *KR-A5020*, so you won't be surprised at the number of parallels that exist between the two models.

Featurewise it's graced with a similar set of logic-controlled inputs for MM phono, CD, VCR and two tape decks, just as the volume knob is motorised for armchair control. A 'Direct' facility bypasses the balance and tone controls but even these are semi-intelligent, adjusting the maximum cut and boost depending on volume level. This prevents the amp blowing itself to bits if you've left the bass control on 'full'.

Alongside you'll find the AM/FM tuner section complete with 30 AM/FM presets, auto and manual tuning, direct frequency tuning and HITS. HITS searches either side of the tuned frequency to seek out adjacent stations. Sterling stuff so far, but look inside and you'll discover a skimpy RF front-end with an elementary IF stage and combined AM/FM receiver IC.

All mounted, I might add, adjacent to the MM phono and power stages, sharing a common ground plane and with scant regard to proper shielding.

Lab report

Plenty of juice under the bonnet even if relay protection limits the maximum current to 15A and the manual speaker selection pushes its output impedance to 0.23ohm. Distortion, noise and input sensitivities are all par for the course

In fact it's only when we look at the tuner that the compromises are really obvious. Its poor second channel rejection is equivalent to an image strength of just 1.8mV, sufficient to swamp the desired station with a breakthrough of some 50dB. A fairly wide IF bandwidth also means that its alternate channel selectivity is none too hot. Nevertheless this, plus the low FM sensitivity, is traded for

a very wide stereo S/N (72.4dB), excellent stereo separation and low distortion (0.16 per cent) with a full 75kHz deviation.

As a result the 3D plot is quite free of extended intermodulation products even though the filtering of pilot (19kHz) and subcarrier (38kHz) tones is obviously very poor. Weird.

Sound quality

Our initial impressions were very positive for here was an amp that sounded big and lively via CD. Yet, after a short time, the sheer forwardness of strings, vocals and percussion took their toll. Violins took on a 'shiny, ceramic quality', suggested one listener, a searing colouration that added hardness rather than richness and vibrancy.

The scale of instruments and the sense of dynamics was quite impressive but the dryness and starkness of its music were less attractive in the long term. We were hit by a wave from the front of the orchestra without any appreciation of its real depth or body. Superficially explicit, muttered one listener, so we moved swiftly on to the FM tuner.

Pioneer's radio 'neutered' the forwardness of the amp but succeeded in preserving its sense of sharpness and focus. Lisa Stansfield's voice was richer and fuller on this occasion, the incessant ricochet of percussion was now held in check, allowing the bass rhythm to escape in a free and easy manner. Not a bad tuner, they concluded.

Conclusion

So Pioneer's beastie is rather more powerful and enjoys certain technical advantages, especially via FM, over Kenwood's equivalent offering. Nevertheless, this did not prevent it from being mortally wounded on the battlefield of the listening room. Away from crowded airwaves the tuner could perform wonders but the amplifier section still tended to let the side down.

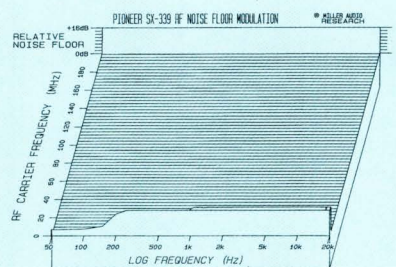
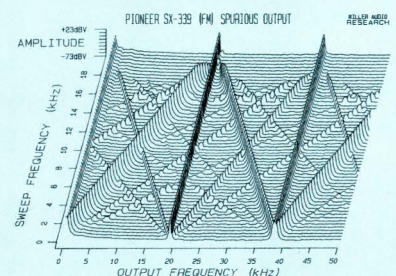
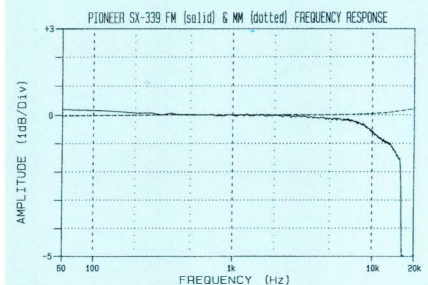
TEST RESULTS

Tuner Section:

Muting Threshold	1 μ V
Sensitivity, 50dB S/N (mono)	9.4 μ V
Sensitivity, 50dB S/N (stereo)	55 μ V
Sensitivity, 65dB S/N (stereo)	245 μ V
Ultimate S/N ratio, mono	76.5dB
Ultimate S/N ratio, stereo	72.4dB
Stereo Separation, 1kHz	40.7dB
Stereo Separation, 15kHz	33.9dB
Alternate channel selectivity	58dB
Second channel rejection ratio	45.6dB
Pilot Suppression, 19kHz	21.4dB
Pilot Suppression, 38kHz	28.6dB
FM Stereo Distortion, THD	-55.9dB
FM Stereo Distortion, IMD	-53.2dB
AM Rejection Ratio	57.4dB

Amplifier Section:

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	76.4W	83.2W	81.3W
4ohms	103.0W	119.8W	112.3W
Dynamic Headroom (IHF)	+1.28dB (111.8W)		
Peak Current (5msec, 1% THD)	15.0A*		
Output Impedance	0.234ohm		
Damping Factor	34.2		
	CD	MM	
Stereo Separation (1kHz)	74.3dB	74.2dB	
Stereo Separation (20kHz)	48.9dB	48.6dB	
Channel Balance (1kHz, -60dB)	1.07dB	1.20dB	
Distortion, THD (2/3 power)	-70.5dB	-70.0dB	
IMD (2/3 power)	-70.0dB	-66.7dB	
Noise (A-wtd, 0dBW)	-80.5dB	-76.0dB	
(A-wtd, 2/3 power)	-94.6dB	-78.2dB	
Input Sensitivity (for 0dBW)	19.1mV	327 μ V	
(for full output)	176.0mV	2.96mV	
Typical Retail Price			£200



Proton AV-445

Portfolio Marketing Ltd, 67 New Road, Little Kingshill, Great Missenden, Bucks HP16 0EU. Tel: (0494) 890 277



This no-nonsense receiver comes from Proton's new 'Intelligent' 400 series. It comes complete with a wacky-looking remote control that enables it to address other Proton separates but, other than preset and volume functions, the vast majority of features are reserved for the fascia.

Either side of the simple frequency display you're given access to the 16 FM and eight AM station memories as well as input selection for tape, CD, VCR and MM phono, all logic-controlled of course. A series of beacons aid in either manual or automatic tuning but Proton's muting threshold is set rather low to avoid the noisiest stations.

No fancy AV facilities then, but at least Proton has fitted decent speaker terminals and a rugged 75ohm terminal for your FM download, a welcome change from the far too common grotty spring-clip devices.

Lab report

Proton's tuner is a neat design, equipped with a proprietary RF front-end that uses the latest Schotz circuit to optimise its S/N in view of both signal strength and treble content of the program material. In practical terms the tuner is not the most sensitive in our test (45.2dB/μV RF for 65dB quieting) but its ultimate S/N of 73.3dB, low 0.17 per cent THD and superb 40dB separation (at 75kHz deviation) are up with the very best.

Two ceramics in the IF stage drop the 400kHz selectivity to 59dB while the pilot/subcarrier filtering and general 'character' of the 3D plot bears an uncanny resemblance to JVC's receiver.

The amplifier is capable of delivering some 115W into 4ohms, supported by a thumping great 18A of current (not bad for a 50-watter!). Residual hum is a little high at -55.7dBV, however. Proton's amp seems insensitive to RF noise but though the RF IMD plot looks clean enough the real noise floor was dynamically unstable during meas-

urement, a feature that might well be audible but is 'ironed-out' by the averaging techniques used for the measurement itself.

Sound quality

There is a fierceness about the sound of this amplifier, a sense of unease that lessened the longer the amp was kept running, but still persisted through all styles of music. At low levels and with simple material it can sound relatively spacious, but there is a lack of subtlety that escalates along with the complexity of the music.

Brahms' *Violin Concerto* was reduced to a brawl of tangled strings, a hard, jangly and steely coloration piercing through the collapsed soundstage. Bass-wise, however, it was quite respectable and went on to reveal the natural warmth of Christy Moore's voice. Nevertheless its glorification of all things metallic was still very obvious from the rough, heavy-handed and 'disturbing' percussive backdrop to Lisa Stansfield's CD.

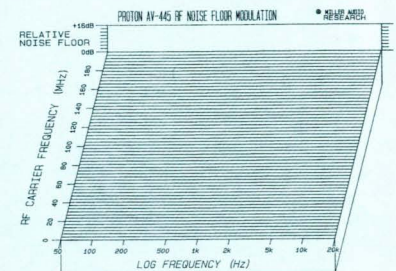
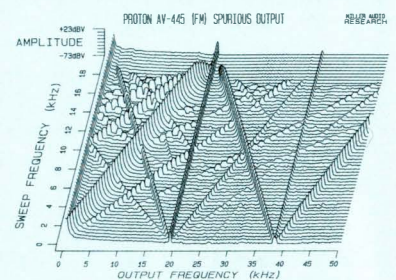
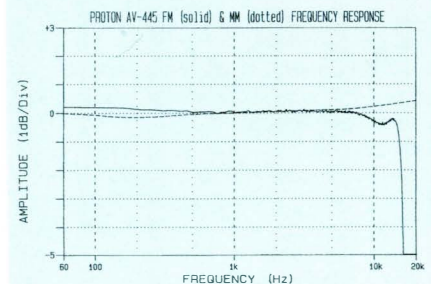
Remarkably, the tuner managed to struggle free of this glare and hardness, the natural HF roll-off of the FM band making the amplifier seem more capable than it actually was. A direct broadcast of Brahms' *concerto* was now undoubtedly warmer; at least there was less wincing from the direction of the panel. The steely hardness was pushed beneath the surface, breaking through on orchestral peaks but otherwise masked by the pleasant, rosy hue of the tuner.

Conclusion

Proton's integral tuner is definitely the star of this partnership, a quiet and warm-sounding design giving the sound stage a decent sense of width and depth. Yet these positive qualities are stomped over by the crudeness, abruptness and general lack of composure demonstrated by the partnering amplifier. A real pity considering the good intentions and care that have obviously gone into the construction of this product.

TEST RESULTS

Tuner Section			
Muting Threshold			1μV
Sensitivity, 50dB S/N (mono)			5.8μV
Sensitivity, 50dB S/N (stereo)			42μV
Sensitivity, 65dB S/N (stereo)			183μV
Ultimate S/N ratio, mono			78.2dB
Ultimate S/N ratio, stereo			73.3dB
Stereo Separation, 1kHz			40.1dB
Stereo Separation, 15kHz			34.1dB
Alternate channel selectivity			59dB
Second channel rejection ratio			82.2dB
Pilot Suppression, 19kHz			57.0dB
Pilot Suppression, 38kHz			85.6dB
FM Stereo Distortion, THD			-55.6dB
FM Stereo Distortion, IMD			-43.2dB
AM Rejection Ratio			62.1dB
Amplifier Section			
	20Hz	1kHz	20kHz
Maximum Continuous Power Output,			
8ohms	70.3W	79.4W	75.7W
4ohms	92.2W	115.5W	107.1W
Dynamic Headroom (IHF)			+1.12dB (102.8W)
Peak Current (5msec, 1% THD)	18.0A		
Output Impedance			0.264ohm
Damping Factor			30.3
		CD	MM
Stereo Separation (1kHz)	62.9dB	62.0dB	
(20kHz)	38.1dB	37.2dB	
Channel Balance (1kHz, -60dB)	2.03dB	2.13dB	
Distortion,			
THD (2/3 power)	-87.4dB	-79.3dB	
IMD (2/3 power)	-95.8dB	-83.1dB	
Noise			
(A-wtd, 0dBW)	-71.9dB	-69.7dB	
(A-wtd, 2/3 power)	-88.0dB	-77.7dB	
Input Sensitivity			
(for 0dBW)	20.9mV	338μV	
(for full output)	188mV	3.03mV	
Typical Retail Price			£250



Technics SA-GX505

Panasonic Consumer Electronics, Panasonic House, Willoughby Road, Bracknell, Berks RG12 8FP. Tel: (0344) 862 444



Any video buffs who have accidentally stumbled across this page will undoubtedly appreciate Technics' monument to Dolby Surround Sound. It's called the SA-GX505, a snappy title for quite the most sophisticated and flexible A/V receiver in our test.

Deep breath. Stage front you'll find a multi-function display that plays host to a 15 band 'spectrum analyser' as well as displaying the AM/FM tuner's current frequency, band and preset number. The tuner, and the five other inputs, are linked to a four-band parametric equaliser that allows you to cut and boost any one of 28 different frequencies. You can even vary the severity of the slope

As if this wasn't enough for even the most gadget crazed user you are also provided with three preset and three programmable equalisation options, and variable action bass, treble and conventional loudness controls. Both main and rear channel volume can be adjusted by remote control.

On the A/V front you've a choice of Dolby Pro-Logic decoding with normal, phantom and centre channel options together with Dolby 3 stereo that includes independent control over the rear, centre and front channel outputs. Incidentally, Dolby 3 is intended primarily for non-Dolby software, drawing centre-channel information like speech away from side and rear channels.

Lab report

Technics' FM tuner offers a combination of moderate sensitivity (45.8dB/ μ V for 65dB quieting), fairly poor separation and a unique spray of fourth-order intermodulation distortions visible on the 3D plot. Hardly inspiring. The wobbly FM frequency response with its 5kHz peak and abrupt high-treble cut is also rather unusual though this might be a spin-off from the sharp (-54dB) 19kHz pilot filter.

Inside, Technics' fan-cooled power amp module delivers a massive 140W into 4ohms

though the ancillary surround module is limited to around 15W or so. Peak current is a healthy 17A, however, so this is one A/V amp that won't mind driving several sets of speakers. The only fly in its technical ointment is a 2dB channel balance error.

Sound quality

Having ensured that the various eq and surround options were put on ice, we turned our attention to the CD input. A fresh and fairly clean sound greeted our panel, a little lightweight and 'topy' perhaps but hardly aggressive for all its reticence in the bass department. The classical pieces enjoyed a better sense of depth than usual just as the violins sounded sweet rather than scratchy or edgy. Sweet, but conservative in scale it must be said.

Phrases like 'easy listening' cropped up time and again, for though our orchestral CDs suffered an obvious loss in bass weight and impact, the music as a whole could hardly be described as thin or abrasive. Furthermore, though the grasp of dynamic contrasts was far from memorable, the music remained comfortable rather than dull or compressed.

But switch in the FM tuner and this meagre sense of dynamics is squeezed out of existence, producing a rather pinched, soft and generally very weedy sound. Pop discs lacked drive and guts as far as our panel were concerned, as the tuner proceeded to offer a very pale reflection of the scale and atmosphere of these recordings.

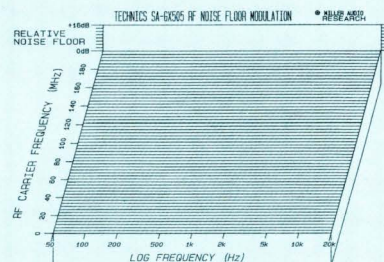
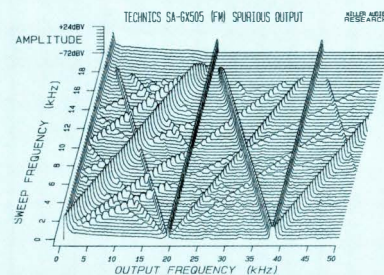
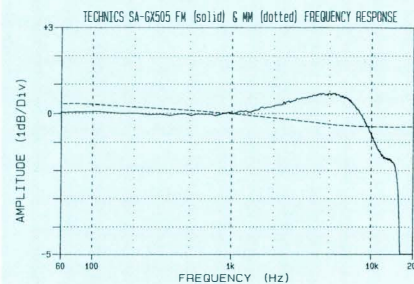
Conclusion

Along with the Kenwood KR-V7030, this feature packed amplifier is aimed more at the A/V scene than those looking for a dyed-in-the-wool receiver. Featurewise it's clearly out in front but in terms of sound the compressed and ineffectual tuner does little to redress the lack of weight and foundation displayed by the amp.

TEST RESULTS

Tuner Section	
Muting Threshold	<1 μ V
Sensitivity, 50dB S/N (mono)	7.0 μ V
Sensitivity, 50dB S/N (stereo)	45 μ V
Sensitivity, 65dB S/N (stereo)	195 μ V
Ultimate S/N ratio, mono	76.6dB
Ultimate S/N ratio, stereo	70.4dB
Stereo Separation, 1kHz	34.3dB
Stereo Separation, 15kHz	21.8dB
Alternate channel selectivity	66dB
Second channel rejection ratio	>105dB
Pilot Suppression, 19kHz	53.8dB
Pilot Suppression, 38kHz	56.6dB
FM Stereo Distortion, THD	-55.8dB
FM Stereo Distortion, IMD	-33.6dB
AM Rejection Ratio	60.5dB

Amplifier Section		20Hz	1kHz	20kHz
Maximum Continuous Power Output				
8ohms		87.7W	91.7W	87.0W
4ohms		128.7W	140.2W	136.7W
Dynamic Headroom (IHF)		+0.67dB (107.1W)		
Peak Current (5msec, 1% THD)		17.2A		
Output Impedance		0.199ohm		
Damping Factor		40.1		
		CD	MM	
Stereo Separation (1kHz)		68.0dB	68.4dB	
(20kHz)		42.4dB	43.1dB	
Channel Balance (1kHz, -60dB)		2.06dB	2.34dB	
Distortion				
THD (2/3 power)		-75.3dB	-68.9dB	
IMD (2/3 power)		-77.7dB	-77.9dB	
Noise				
(A-wtd, 0dBW)		-77.2dB	-76.1dB	
(A-wtd, 2/3 power)		-92.8dB	-83.3dB	
Input Sensitivity (for 0dBW)		28.4mV	328 μ V	
(for full output)		273.5mV	3.18mV	
Typical Retail Price		£350		



Tech Talk

In general terms both the test work and auditioning followed the pattern already established for both amplifiers and AM/FM tuners. All the receivers were auditioned under blind conditions with precisely matched listening levels between CD and FM tuner stages and from product to product. Selections were also transmitted by direct link from a broadcast-specification stereo encoder and RF generator to the receiver's 75ohm FM input.

The tests, amplifier section

Bearing in mind that receivers are composed of an amplifier and tuner the technical work was obviously

Paul Miller explains the laboratory tests and blind listening carried out on the receivers reviewed this month.

split between these two sections. Measurements such as the maximum power output into both 8 and 4ohms, dynamic headroom and the figure for peak current were all recorded relative to one per cent distortion. The remaining measurements cover channel balance at 60dB below full range, stereo separation between channels and the amp's input sensitivity for both 1W and full power output.

The RF IMD plot charts the susceptibility of the amplifier to incoming RF noise over a very wide spectrum, the products of intermodulation at these (inaudible) frequencies re-occurring as changes in the noise-floor of the amplifier at far lower (audible) frequencies. Where RF IMD occurs you will see an obvious discontinuity in the 'flatness' of the 3D plot.

On this occasion I reduced the RF scale from 1GHz (1000MHz) to just 200MHz, thereby concentrating on those frequencies that are handled by the accompanying tuner. So if any amplifier was sensitive to RF in the FM radio broadcast spectrum or at others, like the 10.7MHz Intermediate Frequency used by all tuners, interference between tuner and amp would be a near certainty. Unfortunately a 'flat' 3D plot is as much an indication of RF filters being used than of their inherent immunity to RF itself. So a 'perfect' plot won't necessarily guarantee a 'perfect' sound.

The tests, tuner section

FM stands for Frequency Modulation and, as far as we're concerned, this refers to an RF carrier frequency (87.5MHz to 108MHz) that is modulated by an audio signal. The resulting deviation of the carrier is directly proportional to the amplitude of the modulating (audio) signal where 100 per cent modulation is represented by a maximum deviation of 75kHz. 90 per cent of this (+/-67.5kHz) is accounted for by the music signal and 10 per cent (+/-7.5kHz) by the 19kHz pilot tone and residual subcarrier.

This maximum 75kHz deviation was employed for tests like RF sensitivity, ultimate S/N ratio, stereo separation, 400kHz selectivity, image rejection and

distortion. In practice, however, your receiver is likely to encounter modulations ranging from 30 to 50 per cent with occasional peaks reaching 90-100 per cent. Full deviation is simply more stressful and takes the tuner to the limits of its performance.

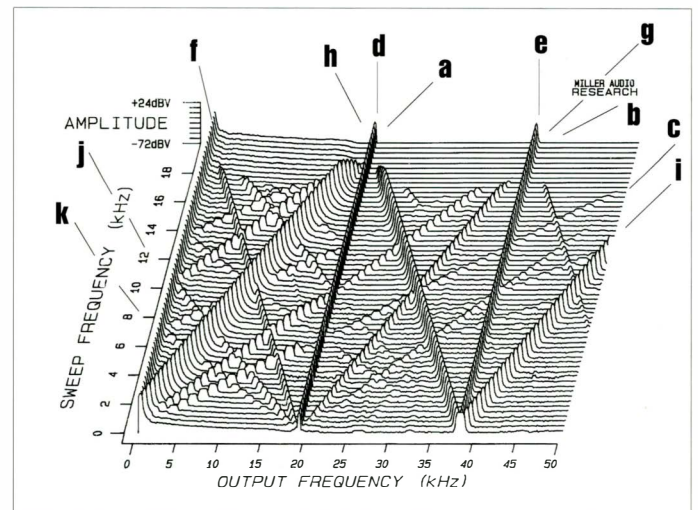
Sensitivity refers to the RF level required to achieve an A-wtd Signal-to-Noise of either 50dB or 65dB, the latter being very close to the BBC broadcast specification. The lower the figure the more sensitive the tuner. Increasing the RF level to 3mV (69.5dB/ μ V) gives us the maximum quieting (or widest S/N ratio) obtainable in stereo mode for that particular receiver.

Selectivity refers to its ability to reject RF signals some +/-400kHz adjacent to the tuned value. A receiver with a relatively wide IF bandwidth may not reject such interference as readily as one with a narrower bandwidth, for instance, but the latter is likely to produce more odd-order distortions.

The second 3D plot examines the output of the FM tuner/amplifier over a 50kHz span (the horizontal axis) as it receives and demodulates a stereo sweep running from 20Hz to 20kHz (the axis that runs into the page). A theoretically perfect tuner would reproduce the 20Hz-20kHz track (a) and nothing else! In practice you'll see harmonic distortions like (b) and (c) along with residues of the 19kHz pilot (d), and 38kHz subcarrier (e) that are not fully removed by the tuner's MPX filters.

These tones, in turn, interact with the sweep (a) and cause intermodulation distortions of their own. It's quite common to find these IM distortions at greater strength than the remains of the pilot and subcarrier! The traces (f) and (g) are second-order IM products of (d) just as (h) and (i) sprout in similar fashion from the subcarrier (e). Higher-order IM distortions, like (j) and (k) are also produced and can be seen tracking straight into the audio region.

Some tuners will show a far greater rejection of pilot and subcarrier - which can go on to cause problems either in the amp or loudspeakers - while others suffer less from both IM and harmonic distortions at the outset.



Conclusions, Best Buys & Recommendations

If this little lot is representative then, since receivers were last reviewed in *Choice*, the market has certainly diversified. It's now difficult to tell whether the most flexible of these are receivers with Dolby Surround built in or A/V amplifiers with sufficient house-room for an AM/FM tuner.

Think about that last statement and you'll realise this need not add up to one and the same thing. After all, what has been added as the 'sweetener' — the A/V facility or the tuner? Answer this question and you'll be clearer in your own mind which way to turn. For example between £300-£350 we have three A/V

Receiving loud and clear. Paul Miller picks the winners and the also rans from this month's contestants.

receivers clearly vying for the same sort of customer. These are the JVC *RX-505VL*, Kenwood *KR-V7030* and Technics *SA-GX505*, all of which are A/V amp first and receiver second. Of the three it's the Kenwood that emerges as the better value.

Why? Well, for a start the Technics receiver costs an extra £50 without offering any real advantage in power or flexibility. Both the Kenwood and the Technics come equipped with Dolby Pro-Logic surround processing, genuine video inputs and control over front, centre and rear channels.

Both have equally versatile tuner sections and both are fully remote controlled. Neither is anything special in the sonic department, but the rock-steady 'metronomic' quality of the *KR-V7030* is certainly a contrast with the weaker-sounding Technics, a receiver that's further undermined by its indifferent tuner section.

As for the JVC *RX-505VL*, it matches the Kenwood for price but it trades Dolby Pro-Logic for the older Dolby Surround and is crippled by a desperately under-powered amplifier. So the big Kenwood is left as the all-round better buy.

Kenwood's baby *KR-A5020* also emerged the victor in its tussle with Pioneer's *SX-339*, two receivers offering a very similar range of features, if not specs, at exactly the same price. Pioneer's amp will leave the Kenwood choking on the dust of its substantial 120W output, but it'll also brow-beat any listener who cranks up the volume too hard. It can sound exciting but it lacks the subtlety and smoothness occasionally demonstrated by the on-board tuner.

Kenwood's *KR-A5020* isn't perfect, but by simply ignoring the tricky parts of a performance it never consciously runs out of steam. Rather like a novice glossing over the complex sequences of a taxing solo, suggested one of the listeners. Recommended at £200.

Not so the *AV-445* from Proton which is equipped with a very promising FM tuner if a rather heavy-handed and fierce-sounding amplifier. We really expected something special from this trooper — great value on paper but a genuine disappointment in the listening room.

Moving up market

Those of you with £350-plus to spend might consider either the Harman Kardon *HK3400* or Nakamichi *Receiver 3*, units that are both better built and more luxurious to the touch than the Proton, Pioneer or Kenwood, although neither is especially remarkable in its subjective performance. The Nakamichi has an advantage in power but it lacks the fullness, the weight and impact of the HK. Then again the Nakamichi's FM tuner is more impressive, avoiding the messy, fuzzy quality that spoiled things for HK. Worth considering, but no more than that.

If money is not really the main question then try either the *HK3500* or Nakamichi *Receiver 2* which, at £450 and £600 respectively, provide scant reason to justify their existence. Once again they are beautifully built and very reassuring in operation but, when it comes to the crunch, you'd never believe you were listening to products at this sort of price. In HK's case it's the amp section with its beefy but forward and very 'dead' sense of acoustic that destroys any chance of recommendation. Nakamichi's *Receiver 2* can also seem fiercely detailed but it retains a better sense of perspective and ambience, especially via FM. The radio, at least, sounds very classy indeed. But the cost!

Conclusions

In the end the best of our dozen receivers were not the most expensive. Take Marantz's *SR-50L* (retailing at £240) as an example. When the time came to spin the Lisa Stansfield CD, the natural bounce, the expression in her voice and sprightly percussion were all in perfect harmony, prompting bobbing feet and nodding heads all round. The Marantz attracted mild criticisms for its slight loss of space and focus, yet the body, the solidity and infectious rhythm were equally hard to ignore. Hard to ignore, that is, until the *NAD 7225PE* took the stage.

This receiver was as traditional as they come: no remote control, no fancy A/V facilities and just a handful or two of tuner presets. Power was hardly in abundance while its sober, unimposing fascia concealed a rat's nest of wiring. Nevertheless the *7225PE* succeeded where every other receiver failed in our test. Here, at last, was a receiver capable of holding its own against favourite budget amplifiers with the bonus of a sensitive, fresh-sounding tuner on tap. A well-defined, confident and distinctive sound packed with fine, crisp detail. It's yours for £250.

Choice Offers

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

Goldring Magic Record Cleaner

This is a kit consisting of a double sided velvet brush and spray on Goldring Magic record rejuvenating fluid. Unlike some other record cleaning potions this one makes old grubby records sound smoother and less gritty, reducing surface noise quite significantly. For best results use with the mk10 brush.

£11.95 ref: A13

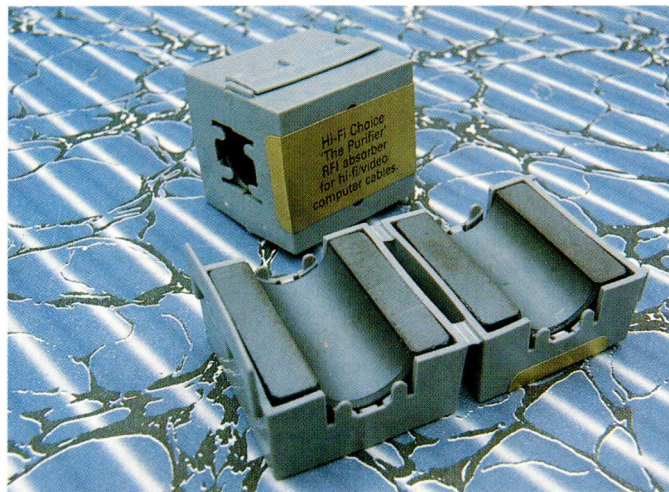
The Purifier

The Purifier is a ferrite cable clamp designed to reduce RF induced noise in audio, video and computer systems. The clamps will accept single or multiple cables of up to half an inch in diameter and can be used on both signal and mains cables. The main benefit is a general cleansing of a system's sound allowing finer resolution of low level detail. They can be particularly beneficial for digital interconnections.

Price £16.90 per pair ref: A14

Nagaoka Anti-Static Record Sleeves no.102

Packs of 50 plastic record sleeves that can be used on their own or inserted into an existing card or paper sleeve. They keep records dust free and eliminate static, but are of course hampered if the record isn't cleaned before it's stored. No great



sound quality claims but in these days of disappearing vinyl it pays to take care of what precious vinyl you've got, after all there may never be a format to beat it!

£6.99 ref: A15

Mk 10 Carbon Fibre Brush with Velvet Pad

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

£9.99 ref: A8

Monotrack Support Cones

Supplied in packs of four, these

turned steel support cones are ideal for supporting just about any item of hi-fi, from subwoofers through to amplifiers. The cones provide effective isolation and de-coupling at a bargain price.

£8.00 ref: A12

System Cleaning Kit 1

Everything needed for maintaining a hi-fi system, all contained in one handsome wallet pack. Stylus cleaner, auto reverse wet tape head cleaner and cleaning fluid, manual CD cleaner and cleaning fluid and a carbon fibre record cleaning brush.

£15.99 ref: A9



Interconnects

We have a variety of interconnects on offer, all sourced from the respected Japanese specialist Furakawa.

The FA21 Series balanced analogue interconnect cables

The FA21 Series of analogue interconnects is supplied in matched pairs employing the Furakawa all PCOCC RCA plug with a flying earth or ground lead which is designed to be terminated to the ground tag of the source component for the purpose of transmitting a balanced signal with a totally separate ground path.

These interconnect cables are recommended for the connection of analogue devices where RCA sockets are provided, such as power amplifier to preamp and tape deck, turntable, step-up transformer etc to a preamp or integrated amplifier. They can introduce a wide stereo image with good depth and height.

Furakawa FA11S Series balanced analogue interconnect cables

The FA11S Series of analogue interconnects is supplied in matched pairs employing the Furakawa hermetically sealed all PCOCC RCA phono plug with a flying earth or ground lead.

These interconnect cables are recommended for the connection of high quality analogue devices.

The cable's ability to transmit a vast amount of information has the effect of creating an awe inspiring bass, transparent mid range and simply superb unfettered treble.

Improve the sound of your system for a mere £15

Ever wondered why some people get taken seriously in hi-fi shops while others are given the run around?

Wonder no more. The answer to all your hi-fi problems is the Hi-Fi Choice sweatshirt. Tastefully printed in red and black on grey, as well as being this year's most crucial fashion accessory, it will also readily identify you as a reader of Britain's fastest growing hi-fi magazine. You'll almost certainly be taken more seriously and end up with a better system – and all for a mere £15. We can supply the shirts in two different sizes – Large and Extra Large.



Order Form

Speaker Cables

Furukawa FS-2T14 PCOCC speaker cable

FS-2T14 PCOCC speaker cable is Furukawa's entry level speaker cable consisting of two 1.4mm square drawn PCOCC concentric strands.

Furukawa FS-2F09 PCOCC speaker cable

Two 0.09mm square drawn PCOCC strands are contained in a neat, flat, flexible PVC insulation.

The FS-2F09 is highly regarded by audiophiles around the world.

Furukawa FS-2T30F Evencap speaker cable

PCOCC speaker cable consisting of two 3mm square drawn PCOCC rope lay strands.

FS-2T30F speaker cable, by virtue of its low resistance and 3mm section, increases the audible bandwidth, most particularly in the low frequencies.

FS-2T20P PCOCC speaker cable

PCOCC cable consisting of two twisted 2mm² drawn PCOCC strands laid in a concentric pattern.

The two conductors are insulated in polypropylene and contained in a circular outer sleeve of soft PVC.

Furukawa FS-2T35P PCOCC speaker cable

Produced from six concentric laid conductors in a rope lay this large cable has a low DC resistance and a larger occupation area for the skin effect, therefore bass is larger and treble is even sweeter.

Furukawa FS2T55F Evencap speaker cable

FS2T55F is a 5.5mm 2 rope lay cable of similar construction to the FS2T30F.

Furukawa Price Table

Please circle the cables you require.

Interconnects

	0.5m	1.0m	1.5m	2.0m
FV11 (each) RCA-RCA	42.50	45.50	52.50	57.50
FD11 (pair) RCA - RCA	75.00	85.00	95.00	NA
FA21 (pair) RCA-RCA	NA	95.00	105.00	NA
FD11S (pair) RCA-RCA	NA	220.00	NA	NA

Fibre optics

FO11 (each) TOSLINK	NA	37.50	42.50	NA
FO12 (each) TOSLINK	NA	90.00	100.00	NA
FO13 (each) TOSLINK	NA	105.00	120.00	NA

Speaker cables

Please state termination required, solderless, gold plated banana plugs, spades or pins or any combination. All prices are per pair.

	FS2T14	FS2F09	FS2T20P	FS2T30F	FS2T35P	FS2T55P	FS2T15
1.0m	38.00	37.00	44.00	53.00	56.00	74.00	129.00
1.5m	42.50	41.00	51.50	65.00	69.50	96.50	179.00
2.0m	47.00	45.00	59.00	77.00	83.00	119.00	229.00
2.5m	51.50	49.00	66.50	89.00	96.50	141.50	279.00
3.0m	56.00	53.00	74.00	101.00	110.00	164.00	329.00
3.5m	60.50	57.00	81.50	113.00	123.50	186.50	379.00
4.0m	65.00	61.00	89.00	125.00	137.00	209.00	429.00
4.5m	69.50	65.00	96.50	137.00	150.50	231.50	479.00
5.0m	74.00	69.00	104.00	149.00	164.00	254.00	529.00
6.0m	83.00	77.00	119.00	173.00	191.00	299.00	629.00
7.0m	92.00	85.00	134.00	197.00	218.00	344.00	729.00
8.0m	101.00	93.00	149.00	221.00	245.00	389.00	829.00
9.0m	110.00	101.00	164.00	245.00	272.00	434.00	929.00
10.0m	119.00	109.00	179.00	269.00	299.00	479.00	1029.00

Cleaning Accessories

Please indicate which items you require by ticking the appropriate box.

- | | | | |
|--|--------|--|--------|
| <input type="checkbox"/> A8 Mk 10 Carbon Fibre Brush with Velvet Pad | £9.99 | <input type="checkbox"/> A13 Goldring Magic Record Cleaner | £11.95 |
| <input type="checkbox"/> A9 System Hi-Fi Cleaning Kit 1 | £15.99 | <input type="checkbox"/> A14 The Purifier | £16.90 |
| <input type="checkbox"/> A12 Monotrac Support Cones | £8.00 | <input type="checkbox"/> A15 Anti-Static Record Sleeves | £6.99 |

- Yes! Please send me Hi-Fi Choice sweatshirts at a mere £14.99 each. Please tick size required** Large XLarge

Please complete the coupon in BLOCK CAPITALS and send with correct payment to:
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Audiophile Recordings

We are pleased to be able to offer a selection of records from the world famous Reference label. Guaranteed to get the very best from your system these recordings have been selected for the merits of the performance as well as their outstanding sound quality.

Prof Johnson's Astounding Sound Show: Sampler.

Orchestral Fanfare - Red Norvo Quintet - Cal Arts Ensemble - Richard Morris - Organ - Susan Mc Donald, Harp - Kronos Quartet - David Rosenthal, Tubulung.

A perennial audiophile favourite, this sampler of Prof Johnson's early work shows what Reference can do with a wide variety of musical and sonic experiences.

Includes the only known recording of an unusual tuned mallet instrument, the Tubulung. Guaranteed to give your playback system a royal wringing out!

Kronos Quartet: *In Formation. The funky chicken - Remember - Blues - When - Enantiodromia - Joan's Blue - Wind on my back - The Junk food blues - Dark jazz*

Ever heard a quartet play the blues? Kronos, celebrated exponents of 20th Century masterpieces have another side, represented by this collection of lighthearted tuneful scores, all written specially for the group.

Recorded in St Mary's Cathedral, San Francisco, for an unusual, highly effective soundstage.

Copland: *Appalachian Spring Suite, Eight poems by Emily Dickinson.* Keith Clark/Pacific Symphony Orchestra, Marni Nixon, Soprano (in the poems).

Music by America's best loved composer, *The Appalachian Spring Suite* is presented in its original version for 13 instruments. Also included is the world premiere recording of Copland's orchestration of eight of his Emily Dickinson songs.

This recording was a Grammy Award nominee in 1987. The CD version also contains *An Outdoor Overture*.

Walker & Garson: *Reflections. Portrait of a friend - Love - First song - Ethereal - Yearnings - Pied piper - The park - Magic spell - You're one of a kind - Reflections - Reason.*

Jim Walker on flute and Mike Garson on piano from the jazz group 'Free Flight' offer something peaceful and soothing for those quiet moments. Surpassingly natural sound.

Helicon Ensemble: *Vivaldi/Bach Vivaldi: Sinfonia in C-Trio Sonata in G minor - Double Concerto in E-Flat. Bach: Trio Sonata in C - Double Concerto in D minor.* (Compact Disc also contains *Prelude in C*)

Albert Fuller conducts from the harpsichord a varied original instrument ensemble in works featuring two solo violins, including the great *Double Concerto* by Bach and three rare, ingrating works by Vivaldi.

Featured solo artists are Japp Schroeder, Stanley Richie and Linda Quan.

Recorded at the John Harmes Centre for the Performing Arts in Englewood, New Jersey. CD also has Bach's *Prelude in C*.

Walton: *Facade Suite.*
Walton: *Facade Suite - Strauss/Hasnrohr: Till Eulenspiegel - Scriabin/Elliott: Waltz in A-Flat - Neilsen: Serenata in Vano.* Chicago Pro Musica.

An instrumental from Walton's whimsical *Facade* in the composer's original scoring makes a perfect vehicle for these brilliant musicians. A chamber version of *Till Eulenspiegel* and the seldom heard pieces of Scriabin and Neilsen complete this engaging programme.

Tafel Music: *Popular Masterworks of the Baroque.*
Pachelbel: *Canon & Gigue.*
Handel: *suite from 'Water Music'* **Purcell:** *air from Suite no. 3 in D and Suite from 'The Moor's Revenge'.* **Vivaldi:** *Concerto op. 10-2, 'La Notte'.*

Canada's finest original-instrument Baroque ensemble plays familiar favourites with outstanding scholarship and musical panache. Note the Pachelbel *Canon* with its seldom-heard companion piece, both to the composer's instrumentation. Strings, oboes, recorder and harpsichord offer delightful music recorded in a vaulted ceiling stone church.

Stravinsky: *L'Histoire.*
Stravinsky: *L'Histoire du soldat suite.* **Blackwood:** *Capriccio Espagnol.* Chicago Pro Musica.

Stravinsky's landmark composition for a mixed ensemble of seven. Grammy winning performances.

Catingub & Rivers: *Your Friendly Neighbourhood Big Band.*
Don't be that way - Honeysuckle rose - Bloozball - Work song - Easy living - You leave me breathless.

Current concert jazz with vocalist Mavis Rivers and her son Matt Catingub's cooking 20 piece ensemble.

Dancehall ambience, realistic balances, and Prof Johnson's patented punch give big band lovers the thrill of the real thing. CD contains two extra tracks.

Respighi: *Church Windows.* Keith Clark, Pacific Symphony Orchestra.

This grandiose work, scored for full symphony orchestra, pipe organ and tam-tam, has at last been given its due, musically and sonically, in this celebrated recording. *Church Windows* quite literally pushes to the theoretical limit the dynamic range it is possible to reproduce at home.

The CD also contains Respighi's rare mini concerto *Poema Autunnale* with the violinist Ruggiero Ricci.

Marni Nixon: *Marni Nixon sings Gershwin. Summertime - Let's call the whole thing off - Someone to watch over me - I've got a crush on you - But not for me - The real American folk song - Nice work if you can get it - Embraceable you.*

Marni Nixon's impeccable intonation and diction bring a welcome elegance to these songs which are perhaps too often jazzed up. By beautifully singing what Gershwin wrote, stylishly accompanied by Lincoln Mayorga' piano, Miss Nixon brings new insights to these immortal songs.

Eileen Farrell: *Torch Songs. Stormy weather - Round Midnight - The end of a love affair - Black coffee - When your lover has gone - Don't explain - Something Cool - and more.*

The album Farrell fans have been waiting for. America's great blues diva makes these songs of lost love her own.

Smoky night club arrangements set the stage for some unforgettable singing.

Dick Hyam: *Dick Hyam Plays Fats Waller. Ain't misbehavin' - Keepin' out of mischief now - African ripples - Honeysuckle rose - Willow tree - Stealin' apples - I've got a feeling I'm falling - Handful of keys - My fate is in your hands - Jitterbug waltz - Squeeze me.*

The world's first direct-to-CD on RR-33DCD. A technological and musical triumph, a true landmark in recording history. RR-33DCD (listed as Ref CD87 on the order form) is available as a deluxe numbered limited edition.

Encoded on the highly sophisticated, computerised Boesendorfer reproducing piano, Hyman's performances were played back for Prof Johnson's microphones, and the digitised signal was transmitted via microwave to the compact disc master as the music was being played.

No recording tape of any kind was used, nor was the digital bitstream corrupted at any stage by copying manipulation or editing.

The digits generated at the recording session are the very digits on the finished compact disc.

Also on ordinary CD and LP.

Michael Garson: *Serendipity. Lady - Autumn leaves - I should care - Spirit of play - Trio blues - My romance*

With illustrious sidemen Stanley Clarke (bass). Gary Herbig (sax), Peter Sparague (guitar) and fellow Free Flight members Jim Walker and Jim Laceyfield, Michael Garson has put together a tasty program of exciting mainstream acoustic jazz. Recorded by Prof Johnson in a real concert space, *Serendipity* represents an alternative, non-studio approach to jazz recording. A long standing favourite for audio demo, the CD contains two extra tracks.

Star of Wonder. Silent night - Nativity carol - We three kings - We'll Dress the house - Come all ye faithful - Deck the hall -

Festive music for the holiday season by an outstanding professional chorus, recorded in San Francisco's St Ignatius Church.

The spine tingling acoustics are ideal for this program and *Star of Wonder* contains the full range of Christmas music: imaginative arrangements of traditional carols, renaissance motets and dramatic 20th century compositions.

The CD contains three extra tracks.

Berlioz: *Fantastique. Symphonie Fantastique.* Varujan Kojian, The Utah Symphony Orchestra.

This is widely considered to be the recording of this magical work. The Utah Symphony Orchestra, playing in Salt Lake City's Symphonic Hall, gives world class performance, and the excellent recording captures it in its entirety.

The CD contains two versions of the explosive finale, one with standard orchestral bells, and another with digitally recorded church bells.

The 2-disc 45RPM LP set contains two copies of *March To The Scaffold* and *Dreams Of A Witches Sabbath*.

Nojima: *Nojima plays Liszt. Sonata in B minor - Mephisto Waltz - La Campanella - Harmonies du Soir - Feux Follets.*

The recipient of more rave reviews than any piano recording in recent memory, this is truly one for the history books.

Japan's most celebrated concert pianist won the Silver Medal at the Van Cliburn competition

Connoisseurs of great piano playing will treasure this recording, which has also been acclaimed for its outstanding sonic realism.

Blazing Redheads: *Paradise drive - Sea Level - February song - Get down (and stay down) - Final segment - My Picasso - Santa Fe - Mozambo.*

The Blazing Redheads play their own special blend of Latin flavoured jazz - 'funky with a dash of salsa'. The seven woman combo plays alto and tenor sax, flute, harmonica, keyboards, bass drums and a lot of percussion.

The Blazing Redheads perform live in packed clubs on tour and in San Francisco.

This vivid live-to-two-track studio job was engineered by Paul Stubblebine and Prof Johnson. The CD contains two extra tracks.

Chicago Pro Musica: *Weill, Varese, Bowles and Martinu. Threepenny Opera suite - Octandre - Music for a farce - La Revue de Cuisine.*

Chicago Pro Musica gives brilliant performances of four magnificent 20th Century works. Kurt Weill's pungent suite for wind, brass and percussion is the centrepiece.

Featuring the first stereo recording of a rare piece by Paul Bowles, best known as the author of *The Sheltering Sky* but also a distinguished composer for the stage.

Martinu's Parisian ballet from the 1920s contains the steamiest of tangos and a mad Charleston.

Eileen Farrell: *Rogers & Hart. I could write a book - I wish I were in love again - Wait till I see him - I didn't know what time it was - Love me tonight - Nobody's heart - It never entered my mind - Mountain greenery - Sing for your supper - Can't you*

do a friend a favour - Lover - My heart stood still - Little girl blue - You're nearer.

A wide ranging survey including many great standards and more than a few rarities. Farrell's affinity for the songs of this era is undisputed.

Beautifully sung as her earlier pop recordings were, these new performances reveal an added dimension to the Farrell art - total involvement with the lyrics. And what lyrics! A must for admirers of Lorenz Hart.

Nojima: *Nojima Plays Ravel.*

Miroirs: Noctuelles - Oiseaux tristes - Une baroque sur l'océan - Alborada del gracioso - La valse des cloches - Gaspard de la Nuit: Odine - Le gibet - Scarbo.

Here is the eagerly awaited sequel to Nojima's first American recording, featuring some of his most renowned specialities.

Gaspard de la Nuit is the pianist's Everest, attempted by only a few. *The Miroirs* are a distillation of Ravel's impressionist style, requiring a totally different technique.

The Nojima performances are incandescent.

Order Form

Record and CD Price Table

Prof Johnson's Sound Show:

Ref RR-7 (LP only) (£17.99)

Berlioz: *Fantastique*

Ref RR-11 (2x45rpm) (£24.99)

Ref RR-11CD (£18.50)

Tafel Musik: *Baroque*

Ref RR-13 (45rpm) (£18.50)

Ref RR-13CD (£18.50)

Your Friendly Big Band:

Ref RR-14 (£18.50)

Ref RR-14CD (£18.50)

Respighi: *Church Windows*

Ref RR-15 (45rpm) (£18.50)

Ref RR-15CD (£18.50)

Walton: *Facade Suite*

Ref RR-16 (£18.50)

Ref RR-16CD (£18.50)

Stravinsky: *L'Histoire*

Ref RR-17 (£18.50)

Ref RR-17CD (£18.50)

Copland: *Appalachian Spring*

Ref RR-22 (£18.50)

Ref RR-22CD (£18.50)

Helicon Ensemble: *Vivaldi/Bach*

Ref RR-23 (£18.50)

Ref RR-23CD (£18.50)

Kronos Quartet: *In formation*

Ref RR-9 (£18.50)

Ref RR-9CD (£18.50)

Nojima Plays Liszt:

Ref RR-25 (£18.50)

Ref RR-25CD (£18.50)

Eileen Farrell: *Rogers & Hart*

Ref RR-32 (£18.50)

Ref RR-32CD (£18.50)

Nojima Plays Ravel:

Ref RR-35 (£18.50)

Ref RR-35CD (£18.50)

Mike Garson: *Serendipity*

Ref RR-20 (£18.50)

Ref RR-20CD (£18.50)

Walker & Garson: *Reflections*

Ref RR-18 (LP only) (£17.99)

Marni Nixon: *Marni sings...*

Ref RR-19 (£18.50)

Ref RR-19CD (£18.50)

Star of wonder:

Ref RR-21 (£17.99)

Ref RR-21CD (£18.50)

Blazing Redheads: *Paradise Drive*

Ref RR-26 (£18.50)

Ref RR-26CD (£18.50)

Chicago Pro Musica: *Weill*

Ref RR-29 (£17.99)

Ref RR-29CD (£18.50)

Eileen Farrell: *Torch Songs*

Ref RR-34 (£18.50)

Ref RR-34CD (£18.50)

Eileen Farrell: *Rogers & Hart*

Ref RR-32 (£18.50)

Ref RR-32CD (£18.50)

Dick Hyams Plays Fats Waller:

Ref RR-33 (£18.50)

Ref RR-33CD (£18.50)

Ref RR-33DCD (£29.99)

Reference Jazz Sampler:

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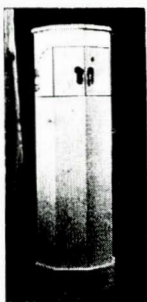
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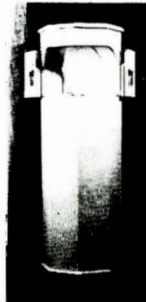
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KIMBERLEY HI-FI, 193 Broadway, Bexleyheath, Kent. (081) 304 3272. Pioneer, Technics, Kenwood, Denon, NAD, Aiwa, Tannoy, Mission, Wharfedale, Castle. Separate dem room, no appt nec. Free installation. Service Dept. Instant credit facilities. 9.30-5.30. No early closing
PANATEC SOUND & VISION CENTRE, 83b High Str, Gillingham. (0634) 5731141. Kenwood, Pioneer, Sony, Technics, Bose, Tannoy, B&W, Goodmans PANATEC SOUND & VISION, 17 Week Str, Maidstone. (0622) 661488. See above for details.
PHOTOCRAFT HI-FI, 40 High St, Ashford (0233) 624441. No. 1 in Kent for Linn, Naim, Rega, Roksan, Exposure, Onix, Epos, Royd, Creek. But before you choose equipment choose where to buy it. Dem room, appts necessary. Home trial and free installation. Visa, Access, Bada Chargecard. 9-5.30 mon-Fri (Wed & Sat to 5 only). Service Dept. **BADA**
VOLUME ONE, 41 Upper Wickham Lane, Welling, DA16 3AD. 081 304 4622. Arcam, Creek, Dual, Epos, Exposure, Mordaunt Short, Monitor Audio, Nakamichi, Pink Triangle, Rotel. Large dem room, no appt nec, darts & snooker facilities. Evening dems in shop by appt. Home trial & demo, free delivery & installation. Access & Visa, credit up to £1000. 9.30-5.30 Mon-Sat
V J HI-FI, 29 Guildhall St, Folkestone. (0303) 56860. Mon-Sat 9-6. NAD, Yamaha, Marantz, Cambridge Audio, Denon, Kenwood, Rogers, Dual, Musical Fidelity, Quad, Dem and home trial facilities, free install, credit to £1000. Amex, Diners, Visa, Access. Service dept
V J HI-FI, 119 High Street Margate. (0843) 226977. Mon-Sat 9-6. NAD, Yamaha, Marantz, Cambridge Audio, Denon, Kenwood, Rogers, Dual, Musical Fidelity, Pioneer. Dem and home trial facilities, free installation, credit to £1000. Amex, Diners, Visa, Access. Service dept.

LANCASHIRE

NORMAN AUDIO, 216 Church Street, Blackpool FY1 3PT. 0253 295661. For details see Preston branch entry (below). Open 9-5.30, Closed Wed. **BADA**
NORMAN AUDIO, 131 Friargate, Preston PR1 2EE. (0772) 53057. Fax 562731 Sony Hi-Fi News Area Winner. Aiwa, B&W Loudspeakers, Denon, Marantz, Mission, Cyrus, Monitor Audio, Nakamichi, Quad, Roksan, Rotel & many others! 2lux. dem lounge. Home trial by arrangement. Free install. Service dept. Inst. cred. facs. with several companies. Most credit cards accepted. 6 days 9-5.30. **BADA**

LEICESTERSHIRE

ALPHA AUDIO, 1-3 Guildhall Lane, Leicester LE1 5FQ. (0533) 530 330 Allison, AR, Denon, Luxman, Proton, Revox, Teac, Thorens, plus lots more. 3 demo rooms. Jovial, friendly, crazy staff. Relaxed atmosphere. Home trial facilities, free installation, service dept on premises. Credit facilities (sort of interest free). 10-5, closed Thurs afternoons (sometimes). MAYS HI-FI, 27/33 Churchgate, Leicester. LE1 3AL. (0533) 625625. Sony, Technics, Denon, Kenwood, Pioneer (Reference Point) Philips, B&W, Tannoy, Mission/Cyrus, Dual, Listening room, free install, service dept. Full range of credit facilities. Open Mon-Sat 9-5.30 Thurs 9-1.30 MJS HI-FI, 80 Stapleton Lane, Barwell, Leicester LE9 8HE. (0455) 846977. The Rock, Audio Innovations, Kelvin Labs, Albarry, Ortofon, S.D. Acoustics, Opus, Finestra, etc. Large range of records stocked, free installation, home trial facilities. Please phone for appts open by appt. THE LEICESTER HI-FI CO, 6 Silver Walk, St. Martins Square, Leicester LE1 5EW. Tel: (0533) 539753. Fax: (0533) 626097. Acoustic Energy, Arcam, Marantz, Micromega, Mission/Cyrus, Musical Fidelity, Nakamichi, Meridian, Rogers, Roksan, "and oodles more". 2 dem rooms, home trial arranged, free install, service dept. Credit facilities. Access, Visa, Diners, Amex. 6 days 9.30-5.30. Bada member. **BADA**
SOUND ADVICE, The Factory, Duke St, Loughborough LE11 1ED. (0509) 218254. Mission Cyrus, Rega, Naim, Linn, Meridian, Yamaha, Rotel, Arcam, Nakamichi, JPW. 3 demonstration areas, no appts necessary, free installation, service department. Lombard credit charge, Access, Visa Mon-Fri 9-6.00, Sat 9.30-5.30

LINCOLNSHIRE

BOSTON HI FI CENTRE, 65a Wide Bargate, John Adams Way, Boston, Lincs PE21 6SG. (0205) 365477. Quad, Nakamichi, Arcam, Marantz, NAD, Castle, JPW, Rogers, etc. Separate demo studio. Home trial. Free installation. Access, Visa. Tues - Sat 9-5 pm. **BADA**
STAMFORD HI-FI CENTRE, 9 Red Lion Square, Stamford, Lincs PE9 2AJ. (0780) 62128. Pioneer, Technics, Cyrus-Mission, Rotel, NAD, Yamaha, Kenwood, Marantz, Quad, plus all major speaker manufacturers. Expelt advice, compositor demonstrations, on two floors, part exchange Hi-Fi purchased for cash. No appointments necessary, home trial facilities, free installation, service department. Mastercard, Visa & credit charge, finance available. Mon-Sat 9-5.30pm, closed Thursdays.
SUPERFI, 271A High Str, Lincoln LN2 1JG. (0522) 520265. See main entry under Nottinghamshire for full details.

LONDON

ANALOG AUDIO, 849 High Road, London N12. (081) 445 3267. Cambridge, Denon, Rotel, Yamaha, Marantz, Wharfedale, Teac, Mordaunt-Short, Cerwin Vega, Nad. Free install. Service dept. Instant credit up to £1000. Visa & Access. 9.30-6.6 days
AUDIO T, 190 West End Lane, West Hampstead, London NW6 1SQ. (071) 794 7848, Fax (071) 431 3570. Great hi-fi from Linn, Arcam, Denon, Meridian, Mission/Cyrus, Rotel, Proac, Micromega, Yamaha and many more. Tue-Sat 10-6pm. 2 single spker dem room. Free del. and instal. **BADA**
BILLY VEE SOUND SYSTEMS, 248 Lee High Road, London SE13. (081) 318 5755. Arcam, Linn, Naim, Quad, etc. 2 dem rooms. Int. free credit. Access, Visa. Closed Thurs. **BADA**
CORNFLAKE SHOP, 37 Windmill St (just off Tottenham Court Rd), London W1. (071) 631 0472. Mon-Sat 10-7. Rega, Roksan, Naim, Monitor Audio, Koetsu, Marantz, Yamaha, SME, DNM, Epos. 3 dem rooms. Del and instal. service. Credit facilities, Access, Visa
COVENT GARDEN RECORDS, 84 Charing Cross Road, London WC2 HOJA. (071) 379 7427, Fax (071) 836 1345. London's premier digital audio centre, single speaker dem rooms, appointments suggested, installation service available, service department. All major credit cards accepted. Mon-Sat 10am-7.30pm
DOUG BRADY HI-FI, 14-18 Monmouth St. London WC2H 9HB. (071) 379 4010. Wide range of top specialist hi-fi from Britain, America and Japan. 3 dem rooms. **BADA**
DEANS, 283 Edgeware Road, London W2 1BB. TEL (071) 402 666, FAX (071) 724 2135. Aiwa, B&W, Dual, Harman Kardon, JBL, JVC, Kenwood, Marantz, Pioneer, Technics. Mail order, fast efficient delivery, all goods dispatched same day. Service department. Guarantees on all products. All major credit cards accepted. Open 6 days to 6pm, Thurs till 8pm.
GALAXY AUDIO VISUAL, 230 Tottenham Court Road, London. (071) 637 2624. Aiwa, Akai, Dual, Hitachi, Philips, Pioneer, Sony, Rotel, Technics, Infinity. Demos available on request. In car audio dept. No appts nec. Service dept. Access, Visa, Amex, Diners, Switch, instant credit subject to status. 9.30-6pm.
GRAHAMS HI-FI, Canonbury Yard, 190a New North Rd, London N1 7BS. (071) 226 5500, Winner Sony/HFN Greater London Dealer Award 1986-1989-1990. Linn, Naim, Rega, etc. £400-£3000-£13,000. **BADA**
HI-FI EXPERIENCE, 227 Tottenham Court Road, London W1P 0DH. 071 580 3535, Fax 071 436 4733. B+W, Acram, Meridian, Cyrus, Musical Fidelity, Rogers, Quad, Rotel, Linn, Marantz, Listening Rooms, no appts necessary, home trial facilities, free installation, service dept. Visa, Access, Amex, Diners. Mon-Fri 10-7, Sat 9-6.
KJ WEST ONE, 26 New Cavendish St, London W1M 7LH. (071) 486 8262/63. Fax (071) 487 3452. Arcam, Audio Research, Acoustic Research, Apogee, Arcam, Audiolab, Creek, Epos, Linn, Meridian, Musical Fidelity, Pink Triangle. Appts nec. Home trial. Free installation. Service dept. Major credit cards. Mon-Sat 10-6pm. (Late night Thur til 7pm)
THE LISTENING ROOMS, 161 Old Brompton Road, London SW5 0LJ. Tel (071) 244 7750/59, Fax (071) 370 0192. Linn, Epos, Quad, Arcam, Musical Fidelity, Meridian, Rogers, Acoustic Energy, Audiolab, Pink Triangle, etc. - See main advertisement - 2 dem rooms, appointments preferred, home trial facilities, free installation, service department. Visa, Access, Amex, Full credit facilities, including interest free. Mon-Sat 10-6
MCQ ENTERTAINMENTS, 218 Walthow Road, London SE17. Telex: 071 701 3204. Teac, Technics, Ortofon, Shure, Stanton, Cerwin-Vega, Jamo, Koss, Sennheiser, QED, plus a full range of audio & video accessories. Hiring facilities, no appts necessary, service dept. Access, Visa, (all major credit cards) Open 9.30-6, 6 days.
SOUND ORGANISATION LONDON, 4 Pickfords Wharf, Clink St, London, SE1 9DG. (071) 403 2255. Linn, Rega, Roksan, Micromega, Radford, Rotel, Nakamichi, Onix, Creek, Naim, Exposure, Royd, Heybrook, Epos. Interesting new equipment always under evaluation. Single speaker listening room. Credit facilities. Appts. preferred, free install, Service dept Open Tues-Sat 10-6. Late dem. by appt.
SOUND SENSE, 350 Edgeware Road, London W2 1DX. (071) 402 2100 Alphason, B&W, Nakamichi, Celestion, Cambridge Audio, Dual, Denon, Monitor Audio, Marantz, NVA, Sony ES. Appts preferred. Installations available. Access, Visa, Standard credit facilities. Mon-Sat 9.30-6.30

The Choice Dealer Directory

STUDIO 99, 79-81 Fairfax Road, Swiss Cottage, 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. **BADA**

SUPERFI, 2-4 Camden High Street, Camden, NW1 QJH (071) 388 1300. See main entry under Notts for full details.

UXBRIDGE AUDIO - CHISWICK, 109 Chiswick High Road, Chiswick, W4 2ED (081) 742 3444 Fax (081) 742 3295. 2 Demo Rooms, Installations, 2 Year Guarantee, 7 day exchange. Major credit cards, Tues - Sat 10 - 6, See Middx entry for brands stocked. **BADA**

VOLUME ONE, 41 Upper Wickham Lane, Welling, (081) 304 4622. For full details see entry under Kent.

ZEBRA, 18-24 Brighton Road, South Croydon CR2 6AA. 081 688 2093. Rotel, NAD, Technics, Philips, Aiwa, Kenwood, Tannoy, Wharfedale, MA, Infinity, and large range of AV equipment. Single speaker & comparator demo in a more casual environment. Service department. Mon-Sat 9.30-6.00. Access, Visa & instant credit up to £1000 subject to status.

GREATER MANCHESTER

THE AUDIO COUNSEL, 12 Shaw Road, Oldham, Manchester OL1 3LQ (061) 633 2602. Linn, Naim, Rega, Rotel, Arcam, Micromega, EPOS, Creek, Nakamichi, Denon. 2 dem rooms. Free install. Visa, Access, Licenced credit brokers up to £1000 instant credit. 10.00-5.30 Tues, Weds, Sat: 10.00-7 Thurs & Fri. Closed Mon.

CENTRAL RADIO, 30-32 Shudehill, Manchester M4 1 EY. Tel: (061) 834 6700. JBL, Mission, B&W, Wharfedale, Grundig, Harman-Kardon, Panasonic, Technics, Sony, Bose, Aiwa, Trio Kenwood. Call for details.

CHRIS BROOKS AUDIO, 10-12 Oak Street, Hazel Grove, Stockport SK7 4EJ. (061) 419 9050. Tues-Sat 10-6, 2 dem rooms, credit facilities. All credit cards. Just like the Warrington shop - total absence of bull****

MURRAY HI-FI, 19 Middle Hillgate, Stockport. (061) 429 7666. Linn, Naim, Rega, Arcam, Yamaha, Royd, Epos, Creek, Nakamichi, Rotel. Full demo facilities, free installation & delivery, service dept. Full 2yr guarantee on all products. Access, Visa, Lombard Tricity, licensed credit broker. 10-6 Tue-Sat

SWIFT HI-FIDELITY, 12 Chapel Street, Cheadle. (061) 428 7222. Arcam, Denon, Kenwood, Marantz, Nad, Cyrus, Rotel, Pioneer, Mission, Tannoy Demo room. 9.30-6. Closed Wed **BADA**

MIDDLESEX

AUDIOT, 159a Chase Side, Enfield, Middx EN2 0PW. (081) 367 3132, Fax (081) 367 1638. Great hi-fi from Linn, Arcam, Denon, Linn, Mission/Cyrus, Philips, Rotel, Yamaha, and many more. Tue-Sat 10-6pm. 2 single spker dem rooms. Free del. and instal. **BADA**

HARROW AUDIO, 27 Springfield Rd, Harrow. (081) 863 0938. Mon-Sat 9.30-5.30. A&R, Audiolab, Cyrus, Denon, Epos, Monitor Audio, Musical Fidelity, Nakamichi, Quad, Rotel, Tannoy, Thorens, Yamaha etc. **BADA**

RIVERSIDE HI-FI LTD, 422 Richmond Road, East Twickenham, Middlesex TW1 2EB. Tel. (081) 892 7613 Fax (081) 892 7749. A.R., Arcam, Audio Innovations, Castle, Dual, Denon, KEF, Luxman, Michell, Musical Fidelity, Micromega, Marantz, Nakamichi, Rotel, Spenhdor, Systemdek, Tannoy, Yamaha. One demo room, in-car demo for car hi-fi systems. Appts not always necessary. Home trial facilities. Free installation, service dept Lombard Tricity, Access, Visa, Amex, Diners Club. Mon-Sat 9.30-6, Thurs, Fri 9.30-7.

SIGHT N SOUND, The Treaty Centre, Hounslow, Middlesex TW3 1ES. 081 572 5418, fax 081 572 5417. Sony, Kenwood, Finlux, Toshiba, Philips, Sanyo, Grundig, Pioneer, Technics, Akai. No appts nec, free intall, service dept. Access & Visa, financing available. 9-6pm Mon-Sat.

UXBRIDGE AUDIO, 278 High St. Uxbridge, Middx UB8 1LZ. (0895) 230 404, Fax (0895) 273 626. Acoustic Energy, Arcam, Ariston, Audiolab, Castle, Creek, Cyrus, Denon, Epos, Exposure, Heybrook, Ion, JYW, Kef, Linn, Marantz, Meridian, Michell, Mission, MA, NAD, Naim, Nakamichi, QED, Quad, Revolver, Revox, Rotel, Rogers, Royd, Ruark, Stax, Tannoy, Thorens, Wharfedale. 2 dem rooms. Installations. 2 yr guarantee. 7 day exchange. Service dept. Access, Amex, Diners, Visa. Mon-Sat 10-6. Closed Wednesday **BADA**

MERSEYSIDE

W.A. BRADY & SON, 401 Smithdown Rd, Liverpool L15 3JJ. (051) 733 6859. Largest choice of specialist Hi-Fi in N.W. £100-£20K. All credit cards. 3 dem rooms. Closed Monday. **BADA**

IN CONCERT HI-FI, 144 Seaview Road, Wallasey, Wirral, Merseyside. (051) 630 5055. Denon, Kenwood, QED, G-Alexander, Spica, Shan Acoustics, Systemdek, Musical Fidelity, Audio Dimensions, Voyd. Single speaker dem. room. Home trial, free installation. 10-6 - closed Mon. Access, Visa

P & A AUDIO (BIRKDALE) LTD 31 Liverpool Road, Birkdale, Southport (0704) 68373. Arcam, Cambridge, Creek, Denon, Michell, Mission/Cyrus, Mordaunt-Short, NAD, Pink Triangle, QED, Revolver, Rogers, Rotel, Royd, Tannoy. 3 Single speaker demo rooms and Nicam surround sound dem room. Free delivery, installation (Merseyside) Service dept, Mon-Sat 9 - 5.30 Half day Tues, Access, Visa, Lombard

PETERS HI-FI, 11 St Werburgh Squ., Grange precinct, Berkenhead. (051) 647 5626. 9-5.30 closed Thurs. See Cheshire branch for full details

PETERS HI-FI, 8 High St, Bromborough, Wirral. (051) 334 1874/2825 9-5.30 6 days. See Cheshire branch for full details.

WEST MIDLANDS

AMADAEUS SOUND & VISION, 10 Boldmere Rd, Sutton Coldfield, West Midlands. (021) 354 2311. Arcam, Audio Innovations, B&O, Carver, Castle, QED, Wharfedale, Yamaha, Cambridge Audio, Hafler. Single Speaker dem, appts preferred, service available, installations, B&O link install, home trials. Access, Visa, interest free credit available subject to status. 9.30-6pm 6 days.

AUDIO BY MAINWAY, Sharing Asda Car Park, High Street, Bloxwich, Walsall, W. Midlands. (0922) 473499. /493499. Meridian, Kef Reference, Alberry Arcam, Quad, Rogers, Musical Fidelity, TDL, System Dek, QED Elect, Ariston, Linn, Audio Technica, JPW, Van den Hul etc. The Midlands most exclusive Hi-Fi Centre with private listening studio. Open evenings by appt. Home trial. Free install. Own service dept. Inst. credit. Chargecard Interest free. Access, Barclaycard. Mon-Sat 9-5.30.

FRANK HARVEY HI-FI EXCELLENCE, 163 Medieval Spon Street, Coventry (0203) 525200. All major agencies. Free inst. Service dept. Part ex. 3 dem rooms. Mon-Sat 9.30-5.30. Wed til 8pm **BADA**

GRIFFIN AUDIO LTD, 94 Bristol Street, Birmingham. (021) 692 1359/ (021) 622 2230. Arcam, Castle, Cyrus, Denon, Linn, Marantz, Naim, Quad, Rega, Rotel. Tues-Sat 10-6. **BADA**

HORNTONELECTRONICS (1987) LTD, 8-9 Lower Temple St, Birmingham B2 4JD. (021) 643 0972. Aiwa, Acoustic Research, Denon, Marantz, Mordaunt Short, JVC, Mission, Sony, Technics, Wharfedale. Credit to £1000. Access, Visa. 9-5.30 Mon-Sat. Service dept.

MUSICAL APPROACH, 37 High Street, Aldridge, Walsall, W. Mids. (0922) 57926. Linn products, Arcam, Creek, NVA, Revolver, Onix, Epos, Marantz, Rotel, Quad & more. Dem facs. Home trial. Service dept. Credit facs available. Access, Visa. 9.30-5.30 Mon-Sat. 9.30-1 on Thurs.

MUSIC MATTERS, 351 Hagley Road, Edgbaston, Birmingham B17 8DL. (021) 429 2811. Roksan, Nakamichi, Arcam, Audiolab, Musical Fidelity, Mission/Cyrus, Meridian, KEF, Monitor Audio, Pink Triangle. 2 single speaker luxury demo rooms. Appts nec, home trial facilities, free installation, service dept. Access, Visa, instant credit up to £1000, interest free credit available. Tue-Thur 10.30-6, Fri 10.30-8, Sat 10-5.30.

NAAM HI-FI VISION, 122-123 New Street, Birmingham, (021) 633 4944 Pioneer, Akai, Aiwa, Panasonic, Toshiba, Hitachi, Bose, Wharfedale, Sony. Demo facilities available, appointments preferred. Access, Visa, 10 month interest free credit. Amex, Lombard Tricity Creditcharge. Mon-Sat 9-6.00.

NORFOLK

BASICALLY SOUND, The Old School, School Rd, Bracon Ash, Norwich NR14 8HE. (0508) 70829. Arcam, Linn, Naim, Denon, Spondor, Exposure, Audio Technica, Creek, Rega, Epos, etc. 2 comprehensive dem rooms Home trial. Free installation. Visa, Access, HP facilities. Tues-Sat 9.30-1, 2-5.30

MARTINS HI-FI, 5 High Street, Kings Lynn. (0553) 761683. Est. 1968. **BADA**

MARTINS HI-FI, 85/91 Ber Street, Norwich. (0603) 627010. Est. 1968. **BADA**

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.

NOTTINGHAMSHIRE

CHANTRY AUDIO, Chantry Walk, 18a Eldon Street, Tuxford, Nr Newark, Notts NG22 0LH. (0777) 870372. Pink Triangle, Deltac, Rotel, SD Acoustics, Ruark, NVA, Michell, Art Audio, Croft Acoustics, Kelvin Labs, and much more. 2 dem rooms. Home trial, free installation. Access, Visa & credit facilities and mail order. Mon-Fri 10am-4.30pm, Sat 9.30-5.30. Sun & evenings home dem by appt. Closed Weds.

DEFINITIVE AUDIO, (0602) 813562. For a carefully considered approach to building a true hi-fidelity audio system with components derived from the following manufacturers: Systemdek, Goldring, Revox, Voyd, Audio Innovations, Snell, Audionote, SME, Helius, impulse, TEAC, Deltac, Wadia, Ortofon Premier dealer, Pioneer dealer, Huygens loudspeaker stands. Demos by appt. Please phone for further details. Installation free of charge. Mon-Sat 10-7pm. Closed Wed a.m.

NOTTINGHAM HI-FI CENTRE, 120-122 Alfreton Road, Nottingham. (0602) 786919. Over 25 years experience, superb demo rooms, extensive range, free parking. Mon-Sat 9-5.30. **BADA**

SUPERFI, 15 Market Str, Nottingham NG1 6HY. (0602) 412137. Kenwood, Technics, Denon, Aiwa, Rotel, Wharfedale, Mission, Marantz, NAD< Celestion, and many more. 2 single speaker dem rooms. Free install on systems, service dept. Access & Visa, Amex. Open 9-5.30, 6 days.

OXFORDSHIRE

ASTLEY AUDIO LTD, 3 Marketplace, Wallingford, (0491) 39305/34349. Technics, Panasonic, Pioneer, Kenwood, Sony, Yamaha, Denon, Dual, Mission, Tannoy. Home trial, free installation. Service dept. Access, Visa, Amex, Diners. Instant credit. Tue-Fri 9-5.30, Sat 9-5. Records & CDs stocked.

AUDIOT, 19 Old High St, Headington, Oxford OX3 9HS. (0865) 65961, Fax (0865) 60415. Great hi-fi from Linn, Arcam, Denon, Meridian, Mission/Cyrus, Rotel, Yamaha, B&O and many more. Tue-Fri 10-6pm, Sat 9.30-5.30. 2 single spker demo rooms, A/V dept. free del. & instal. **BADA**

OXFORD AUDIO CONSULTANTS LTD, Cantay Hse. Park End Street, Oxford OX1 1JE. (0865) 790879 fax (0865) 791665. NAD, Rotel, Musical Fidelity, Pioneer, Marantz, Rogers, TDL, Thorens, Audio Research, Proceed 2 Demo rooms. Service Dept, Home trial and free installation. Instant credit, Access, Amex, Visa. 10-6 Mon-Sat.

WITNEY AUDIO VISUAL, 28 High St, Witney, Oxford. (0993) 702414. Aiwa, Akai, AR, Bose, B&W, Cambridge, Quad, Mordaunt-Short, NAD, Onkyo, Pioneer, Roberts, Sony & Sony ES, Tannoy, Wharfedale, Yamaha, Reference Point Dealer. Dem facilities. Mon-Sa 110-6 Free installation, credit to £1,000. Access, Visa. Service dept.

SHROPSHIRE

AVON HI-FI, 12 Barker Street, Shrewsbury, Shropshire SY1 1QJ. (0743) 55166. NAD, Quad, B&W, Arcam, Kenwood, Aiwa, Bose, Nakamichi, Revolver, Onkyo. Dem room Home trial. Free install. Service dept. Access, Visa. £1000 instant credit. Mon, Tues, Wed, Fri, Sat 9-5.30.

CREATIVE AUDIO, 9 Dogpole, Shrewsbury, (0743) 241924. Linn, Naim, Roksan, Mission, Arcam, Rogers, Denon, Marantz, Rotel, Celestion, etc. Dem room. Home trial and free installation. Credit to £1000. Access, Visa. Tues-Sat 9.30-5.30. Service dept.

MID-SHROPSHIRE AUDIO, 4 Holland Court, Dawley, Telford TF4 2EX. (0952) 630172. Audio Innovations, Marantz (inc Music Link), Denon, Tannoy, Ortofon, Pink Triangle, Ion Systems, Systemdek, Ruark, Monitor Audio etc. 2 dem rooms. Home trial, service dept. Instant credit up to £1000 Access, Visa, Amex.

SHROPSHIRE HI-FI, St. Michael's St., Shrewsbury, Shropshire, (0743) 232065. Ariston, Audio Technica, Cambridge Audio, Deltac, Denon, Dual, Infinity, Kenwood, Mordaunt Short, Musical Fidelity, Etc. Demo room, free parking, free installation, repairs.

SOMERSET

MIKE MANNING AUDIO, 110 Middle Street, Yeovil, Somerset BA20 1NE. (0935) 79361, Fax (0935) 32923, Mobile(0850) 325965. Linn, Naim, Roksan, Pink Triangle, A+R (Arcam), ION, NAD, Pioneer, Rotel, Denon, etc. Dedicated listening lounge, for relaxed and unpressured demonstrations. Appts not usually nec. but best to phone first. Home trial facilities on request, free installation, service department. Instant credit. Access & Visa, etc. 9-5.30 closed Mondays.

BRITISH AUDIO DEALERS ASSOCIATION



INDICATES MEMBERSHIP OF
BRITISH AUDIO DEALERS ASSOCIATION

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STAFFORDSHIRE

ACTIVE AUDIO, 29 Market Street, Tamworth, Staffordshire. (0827) 53355. Arcam, Ariston, Celestion, Denon, Exposure, Heybrook, Kef, Cyrus, Musical Fidelity, Marantz, Revox, Rotel, Rogers, etc. etc. The only BADA Member in Staffordshire. Full dem & home trial facs. Account and credit cards. Ring for opening times and free Fact Pack. **BADA**

ACTIVE AUDIO, 95 Stafford Street, Hanley, Stoke-on-Trent. (0782) 214994. Arcam, Ariston, Celestion, Cyrus, Denon, Exposure, Kef, Kef Reference, Marantz, Rogers, Rotel, etc. etc. The only BADA Member in Staffordshire. Full dem & home trial facs. Account and credit cards. Ring for opening times and free Fact Pack. **BADA**

GRANGE HI-FI LTD, 153 Branston Road, Burton-on-Trent, Staffordshire DE14 3DQ. (0283) 33655. Audio Innovations, Arcam, Castle, Denon, Pink Triangle, Rotel, Rogers, Systemdek, SME, Quad, Voyd. Demonstrations facilities available, appointments necessary on Saturdays. Free installation. Service department. Access, Visa. 9.00-5.30pm. Closed Wednesday. Closed for lunch 12.00-12.30.

MUSICAL APPROACH, Unit 7, Woodings Yard, Bailey Str., Stafford. (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 **BADA**

SURREY

AUDIO SOUTH, 24 (The Woolmead) East Str, Farnham, Surrey GU9 7TT. (0252) 714555. Audio Innovations, JPW, Luxman, Marantz, Ortofon, Rotel, Snell, Sugden, Teac, Voyd. Dem room and evening appointments available. Home trial facilities. Free installation. Access, Visa. 10.30-6 Mon-Sat. Closed Tuesday.

COSMIC, 244/256 Station Road, Addlestone, Surrey KT15 2PS. (0932) 854522/851753/843769. Fax: (0932) 841615. Most brands stocked, including: Aiwa, Arcam, Denon, Mission, Cyrus, NAD, Nakamichi, Pioneer, Quad, Rotel, Yamaha, etc. Open 7 days 9-6pm. Part exchange, large free car park, service dept, instant credit available. Access, Visa, Switch

DATASOUND, 23 South Street, Dorking, Surrey RH4 2JZ. (0306) 882897. Arcam, Celestion, Denon, Dual, Marantz, Mission, Musical Fidelity, NAD, Rotel, Tannoy. Dedicated listening room. Free install. Service dept. Up to £1000 instant credit subject to status. 9.30-5.30 6 days

PJ HI-FI - the Hi-Fi Shop, 3 Bridge Street, Guildford, Surrey GU1 4RY. Tel: (0483) 504801. 9-6 Mon-Sat. Linn, Meridian, Creek, Arcam, Quad, Revox, Musical Fidelity, Rotel, NAD, Nakamichi, Marantz. **BADA**

RIVERSIDE HI-FI, 422 Richmond Road, East Twickenham, TW1 2EB. Tel: (081) 892 7613. Fax: (081) 892 7749. See main entry under Middlesex.

ROGERS HI-FI, 13 Bridge Street, Guildford, Surrey. (0483) 61049. Aiwa, Denon, Dual, JPW, Marantz, Monitor Audio, Philips, Pioneer, Systemdek, Tannoy. Demonstration facilities available, no appointment necessary. Free installation. Service department. Access/Visa. Instant credit up to £,000 subject to status. Monday-Saturday 9.30-6pm, later by appointment.

SOUNDS EXCLUSIVE, 1 Kent House, High Str, Cranleigh GU6 8AU. (0483) 268185. Michell (amplification & decks), Marantz, Ariston, Ortofon, AME, Sumo, Proac, Jamo, Origin Live, Kiseki. Demo room, appts preferred, home trial facilities, free install, service dept. Access, Visa. Open 9-5.30 Mon-Sat.

SPALDINGS HI-FI, 352-4 Lower Addiscombe Rd, Croydon, Surrey (081) 654 1231/2040. 3 dem rooms and home dem. Free installation, credit Mon-Sat 9-6. Tues to 8. Closed Wed. Service dept **BADA**

SURBITON PARK RADIO, 48 Surbiton Rd, Kingston-Upon-Thames, Surrey (081) 546 5549. Quad, Castle, Dual, Denon, Kenwood, Rotel, Pioneer, QED, B&W, Tannoy. Demo facilities. Access, Visa. 9.30-5.00 Tues-Sat. Service dept

SURREY HI-FI, 45 High Street, Godstone, Surrey RH9 8LS. (0883) 744755. Parking, easy access - just 2 mins off junction 6, M25. Quad, TDL, Nakamichi, Kef, Thorens, Musical Fidelity, Rotel, Marantz, Michell, Sennheiser, Diamond Acoustics, Audio Technica, Tannoy. Single speaker demo room. Appts not necessary. Demonstratin by appointment, free installation, service dept. Access, Visa, Mastercard. Open 9-6, closed Wed.

TRU-FI SOUND AND VISION, 2 Central Parade, Redhill, Surrey. (0737) 767404/766128. Aiwa, Audio Technica, B&W, Nakamichi, Mission, Mordaunt-Short, Nakoaka, Sony, Technics. Dem. facilities. Free installation. Service dept. 0% finance. Access, Visa. Mon-Sat 9.30-6.

TRU-FI SOUND & VISION, 10 Church Street, Leatherhead, Surrey. (0372) 378780. Sony, Technics, Panasonic, Mitsubishi, Ferguson, Aiwa, Pioneer, Sanyo, B&W, Mission. Free installation. Credit facilities. Access, Visa. 9.15-5.30 Mon-Sat. Closed Wed. Service dept

UNILET HI-FI, 35 High Street, New Malden, Surrey KT3 4BY. (081) 942 9567. Kef, Mission, Musical Fidelity, NAD, Nakomichi, Quad, Rotel, Tannoy, Dems. Amex, Access, Visa, etc.

ZEBRA 18-24 Brighton Road, South Croydon CR2 6AA. 081 688 2093. See main entry under London

SUSSEX (EAST)

THE POWERPLANT, 66 Upper North Street, Brighton BN1 3FL. (0273) 775978. Roksan, Musical Fidelity, Onix, Marantz, Rotel, Yamaha, Bryston, Tannoy, Monitor Audio, JPW, etc. Comfortable single speaker demonstration rooms. No appts. nec. Home trial facilities, free install. Service dept. Credit facilities available on request. Mon-Sat 10-1.00, 2.00-6pm

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AUDIO DESIGNS, 26 High Street, East Grinstead, W. Sussex RH19 3AS. 0342 314569. Linn, Naim, Alphason, Arcam, Rotel, NAD, B&W, Quad, Tannoy, Thorens, TEAC, etc. Very comfortable listening room. No appts nec., Home trial facilities, free installation, service dept. Access/Visa. 9-5.30 Mon-Sat. late Tue till 8pm

BOWERS & WILKINS LTD, 1 Becket Buildings, Little Hampton Rd, Worthing. (0903) 64141. B&W, Nakamichi, Castle, Denon, Dual, JVC, Mordaunt Short, Philips, Quad, Sony, Technics. 3 dem rooms. Mon-Sat 9-5.30, Wed 9-1pm. Home trial facilities, free install. Credit to £1000, Access, Visa. Service dept. *

CHICHESTER HI-FI, 7 St. Pancras, Chichester, W. Sussex PO19 1SJ. Tel: (0243) 776402. Linn, Naim, Rega, Creek, Nakomichi, A&R, Denon, Roksan etc. Tues-Sat, 10-1, 2-5.15 (closed Mon) **BADA**

TYNE & WEAR

BILL HUTCHINSON LTD, 87A Clayton Street, Newcastle-Upon-Tyne. Tel: (091) 230 3600. A.R., Aiwa, Denon, Dual, JVC, Mission, Mordaunt Short, Omar, Technics, Yamaha, etc. Demonstration facilities. Free installation, service department. Instant credit, Access, Visa. Mon-Sat 10-6

RED RADIO SHOP AND HI-FI CENTRE, 11 Olive Street, (Off Park Lane), Sunderland. Tyne & Wear SR1 3PE (091) 567 2087. Castle, Carver, Denon, JVC, Kenwood, Mordaunt-Short, Michell, Teac, Tannoy, Monitor Audio etc. Dem room, large with comparator facility. No appts nec. Free install. Service dept. Interest free credit and no deposit 9am-5.30pm daily.

NEWCASTLE HI-FI, 153 Kenton Road, Gosforth, Newcastle-Upon-Tyne NE3 4NQ. (091) 285 7179. Linn, Arcam, Creek, Marantz, JPW, NAD, Denon, Ruark, Custom Design, Aiwa, etc. 2 single speaker demonstration rooms. Installation, delivery, 2 yr guarantee on all products. Access, Visa. 10-5.30 Tue-Sat

WARWICKSHIRE

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YORKSHIRE (NORTH)

SCARBOROUGH HI-FI CENTRE, 53 Dean Road, Scarborough, N. Yorks YO12 7SN. (0723) 374547. Aura, B&W, Mission, Quad, NAD, Oxford, Alphason, Rogers, Nakamichi, Ruark, Voyd. Dem room, appointment preferred. Home trial facilities. Free installation. Service dept. Access/Visa/Creditcharge/£1,000 instant credit/Amex/Diners. 10-6 Tues to Sat.

HARROGATE HI-FI CENTRE, 15 Commercial Street, Harrogate, N. Yorks HG1 1UB. (0423) 504274. Aura, B&W, Mission, Quad, NAD, Oxford, Alphason, Rogers, Nakamichi, Ruark, Voyd. Dem room, appointment preferred. Home trial facilities. Free installation. Service Department. Access/Visa/Creditcharge/£1,000 instant credit/Amex/Diners. 10-6 Tuesday to Saturday.

SOUND ORGANISATION YORK, 2b Gillygate, York YO3 7EQ. Tel: (0904) 627108. Linn, Meridian, Micromega, Naim, Rega, Roksan, Arcam, Mission, Denon, Epos, Rotel. 2 single speaker dem rooms. Appts preferred. Home trial. Free installation. Service dept. Credit facilities on request. Access, Visa. 10am-5.30pm Tues-Sat. Sony dealer. Award nominated '86', '87', '88. **BADA**

VICKERS HI-FI, 24 Gillygate, York (0904) 629659. Audiolab, Harman-Kardon, Marantz, Musical Fidelity, Pink Triangle, Quad, Systemdek, Tannoy, Technics, & lots more. 3 demonstration studios (2 by appointment) superb showrooms, 2 year guarantee on all hi-fi products. Appts as above, home trial facilities, free installation, service department. Qualified and experienced staff, over 20 years experience. 12 months interest free credit. 10.30-5.30 Mon-Sat.

YORKSHIRE (SOUTH)

BARNLEY HI-FI CENTRE, 40-42 Sheffield Road, Barnsley, S. Yorks S70 1HP. (0226) 205549 Fax (0742) 467207. Arcam, Quad, Audiolab, Mission Cyrus, Technics, Denon, Tannoy, Nakamichi, Dual, Aiwa. Purpose built demo room, no appts necessary, free install, service dept. Access, Visa, varying finance packages. Open 9.30-5.30, 5 days (closed Thurs)

HI-FI STUDIO, Sunnyfields, Doncaster. (0302) 781387. Heybrook, Monitor audio, Art Audio, TDL, Michell, Sugden, Acoustic Energy, Alphason, Teac, Dual. Listening room demos. Home trial. Free installation. Licensed credit broker, 2 yr guarantee on all equipment. Service available. Access, Visa. 10-8pm 6 days. Phone for further info & FREE fact pack.

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

AUDIO VISION (BRIGHOUSE) LTD, 5 Bethel St, Brighouse, W. Yorks H D6 1JR (1 mile from junc. 25, M62). 0484 713996. Largest range of Technics hi-fi in Yorkshire. Stockist of the new Technics digital reference series. Aiwa hi-fi separates, Mordaunt-Short & Castle Acoustic speakers; Panasonic, Finlux & Mitsubishi Nicam Stereo TVs & hi-fi video recorders, Technics dolbysurround sound systems, reproduction furniture. Excellent CD dems. using comparator facilities from a choice of over 1000 compact discs for sale. Please phone us, free expert install., in-store service dept. Visa, Access, Credit charge. Open Mon-Sat 9-5.30

CLEARTONE (Formerly Erricks), Rawson Square, Bradford, (Near John St Market). (0274) 309266. A&R, Linn, Quad, Exposure, Nakamichi, Mission, Denon, Kenwood. Private demo rooms, no apt nec, home trial facilities, free installation, service dept. Access, Visa, licenced credit broker. Mon-Sat 9-5.30 (Tue 10-5.30) **BADA**

DOUG BRADY HI-FI, The Forge Cottage, 19 Crossgate, Otley, West Yorkshire LS21 1AA. (0943) 467689. Naim, Arcam, Rotel, Pink Triangle, Meridian, Epos, Castle. Two dem rooms, free install, service. Access/Visa. Open 10-6pm Tues-Sat. **BADA**

EMPIRE HOME ENTERTAINMENT CENTRE, 94 Kirkgate, Wakefield, W. Yorks WF1 1TB. (0924) 361736. Bang & Olufsen, Sony, Kenwood, Marantz, NAD, ioneer, Panasonic, Toshiba. No appts nec, home trial, free install, service dept, interest free credit usually available. Open 9.30-5.30 6 days. *

The Choice Dealer Directory

ERIC WILEY, 85 Beancroft Rd, Castleford, (0977)553066/556774. Arcam Audio, Cambridge Audio, Celestion, Kenwood, Marantz, NAD, Pioneer Reference Piont, Rotel, Technics, Quad. Car audio specialists. Demo facilities. No appts nec. Access, Visa, Lombard tricity credit chrgae. Mon-Sat 9-5.30, closed Wed.

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 reqd. Mon-Sat 9-5.30, Thurs 9-8. Closed Wed. Free installation, credit facilities. Access, Visa.

IMAGE HI-FI, 17 The Springs, Wakefield, WF1 1QE. (0924) 200272. AR, Audio Lab, Denon, Linn, Marantz, Meridian, Mission, Monitor Audio, NAD, Quad. **BADA**

NORTHERN ISLAND

ARMAGH

LYRIC HI-FI, 84 Bridge Street, Portadown, Armagh, N. Ireland. (0762) 358 059. Linn, Naim, Rega, Arcam, Denon, Rotel, Musical Fidelity, Revox, Mission, Akai, Panasonic, etc. Mon-Sat 10am-6pm. **BADA**

BELFAST

LYRIC HI-FI, 163 Stranmills Road, Belfast. (0232) 381 296. Linn, Naim, Rega, Arcam, Denon, Rotel, Musical Fidelity, Revox, Mission etc. Mon-Sat 10-6, Late night Thurs **BADA**
HI-FI EXPERIENCE, 47-49 Fountain Str, Belfast BT1 5EB. (0232) 249117. Quad, Musical Fidelity, Denon, NAD, Pioneer, Kenwood, Cyrus, Mission, Tannoy, B&W. No appts necessary home trial facilities, free install, service dept. Credit facilities available. Open 9-5.30, late night Thurs 9pm

COUNTY DOWN

ASTON AUDIO, 17 Hillhead Road, Dundonald, Belfast. 0247 872431. Akai, Technics, JVC, Pioneer, Mitsubishi, Panasonic, Toshiba, Sharp, Sanyo. Demos available. No appts nec, service dept. Please phone for directions. Mon-Fri 2-8, Sat 10-4.

LONDONDERRY

ZEUS AUDIO, 23a Kingsgate Str, Colrairie, BT52 4LB. (0265) 56634. Marantz, Mission Cyrus, Aiwa, Akia, Alphason, Sony, Pink Tri, Celestion, Rotel. Open Mon-Sat 10-5.30, Closed Thurs. **BADA**

SCOTLAND

EDINBURGH

BILL HUTCHINSON Ltd, 43 Clarke St, Edinburgh. (031) 667 2877. AR, Aiwa, Denon, Dual, JVC, Mission, Mordaunt-Short, Omar, Technics, Yamaha etc. Dem facilities. Mon-Sat 10-6. Free installation, instant credit. Access, Visa. Service dept.

GLASGOW

BILL HUTCHINSON Ltd, 43 Hope Street, Glasgow. (041) 248 2857. A.R., Aiwa, Denon, Dual, JVC, Mission, Mordaunt-Short, Omar, Technics, Yamaha etc. Dem facilities. Mon-Sat 10-6. Free installation, instant credit. Access, Visa. Service dept.
STEREO STEREO, 278 St. Vincent St, Glasgow G2 5RL. (041) 248 4079. Linn, Naim, Rega, Arcam, Creek, Epos, Exposure, Revox, PT, etc. Mon-Sat 10-6. Interest free credit **BADA**

GRAMPIAN

HOLBURN HI FI Ltd, 441 Holburn St, Aberdeen (0224) 585713. Arcam, Audiolab, B&W, Celestion, Denon, Dual, Epos, Heybrook, ION, Kenwood, Linn, M.A., Marantz, Meridian, Mission Cyrus, M.S., NAD, Nakamichi, Pioneer, QED, Quad, Revox, Rogers, Rotel, Ruark, Tannoy, Technics, Wharfedale, Yamaha. 9.30-5.30 Mon-Sat **BADA**

ROSS-SHIRE

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J.D. BROWN, 28-36 Castle St, Dundee DD1 9NZ. (0382) 26591. Technics, Pioneer, Rotel, QED, Castle, Celestion, Mordaunt Short, Wharfedale, Bose. All equipment ready for demonstration. Noappt nec, free installation, service dept. Mon-Sat 9-5.30

W.M. COUPAR, 33 Reform Street, Dundee, Tayside. (0382) 29588. Bang & Olufsen, NAD, Technics, Denon, Kenwood, Dual, Nakamichi, B&W, Acoustic Research, JBL. No appointment necessary, free installation, service department. All demonstration systems wired through a demonstration comparator. Licensed credit broker, Access, Visa. Monday-Saturday 9.00 am-5.30.

WALES

CLWYD

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.

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. **BADA**

GWYNEDD

I&H GRIFFITHS & SONS, 313 High St, Bangor LL57 1YA. (0248) 370655. Yamaha, Tannoy, Teac, Goodmans, Dual, Sherwood, Wharfedale. Demos available, no appts nec, home trial facilities, free installation, service dept. Access, Visa, Lombard credit charge. Mon-Sat 9-5.30, Wed 9-1.
PETERS HI-FI, Victoria Buildings, Mostlyn Ave., Craig-y-don, Llandudno. (0492) 876788. 1 single spker dem room. Open 9-5.30, closed Wed. See Cheshire branch for full details.

Advertisers Index

ACOUSTIC ARTS	20	MAINWAY	146
ALTERNATIVE AUDIO	90	MARANTZ	1FC
AUDIO BY DESIGN	42	MIKE MANNING AUDIO	52
AUDIO CHOICES	120	MISSION	OBC
AUDIO EXCELLENCE	76	MPI	10
AUDIO SOUTH	36	P M COMPONENTS	60
AUDIO T	60	PAUL ROBERTS HI FI	86
BARTLETTS	22 - 23	PIONEER	6, 7, 9
BILLY VEE	89	QED	38
BRINKMANS AUDIO	66	REFERENCE IMPORTS	40
CANON	14 - 15	ROGERS AUDIO	52
CASTLE HI FI	36	ROTEL	IBC
CLASSIFIED	110-119	SAUCIERS	68
DOUG BRADY	36	SEINHEISER	12
DYNAVECTOR	38	SEVENOAKS	48 - 51, 84
ELECTROTRADER	86	SOUTH LONDON HI FI	74
GRAHAMS (KEF)	64	SPALDINGS	89
HARROW AUDIO	66	THE CHORD COMPANY	86
HI FI CONFIDENTIAL	52	THE LISTENING ROOMS	44
HI FI EXPERIENCE	66, 88	TREBLE A	38
KAMLA	56	WENTWORTH AUDIO	40
LINTONE	46	WEST MIDLANDS AUDIO	72



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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 current retail price is placed in its respective category in alphabetical order. The prices of the products are updated on a regular basis, although it should be noted that our value rating are based on the product's price at the time of review.

The next column contains the ratings for the standard achieved in laboratory and listening tests, with the exception of certain product groups where lab tests were not carried out. One important point to remember is that they cannot be used to compare products from different categories — for example, a cassette deck rated 'excellent' in sound quality will not usually offer the same standard of fidelity as a similarly rated turntable or CD player (unless you can get hold of first generation copies of the master tape!).

The Comments column contains a potted summary based on the original review, emphasising the

salient points of a product's character and sonic performance. The space available doesn't allow for great detail but in the 20 or so words we have attempted to put across the essence of the review, in some cases using quotes from the review itself. Obviously, important information on compatibility or auxiliary equipment used in the test cannot be included, and we would advise you to refer to the original review for this, of which more later. Please note that these comments are those of the reviewer and not, as is the case with some magazines, those of the manufacturer.

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

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

Perhaps the most influential letters in the *Directory* are those found in the Value column, the Rs and BBs denoting the Recommended and Best Buy ratings that are appended to products we consider meritworthy. The Best Buy tag

means that a product not only offers good sound quality, but is reasonably priced as well. With source components a price limit of approximately £300 is usually used as a guide.

Recommended means that either the performance of a product is particularly good irrespective of price or, alternatively, that a good value standard is achieved but overall attainment falls short of Best Buy classification. Please note that an expensive Recommended product will nearly always sound better than a cheap Best Buy. An ideal situation would be to choose suitably priced Best Buy or Recommended products from relevant categories and create a Best Buy system, but, due to the variety in tonal balance that exists in much audio equipment, system building is unfortunately not quite that simple.

These ratings make a useful guideline for shortlisting components, but only experiencing the actual combination will tell you whether it works for you.

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

INDEX

Amplifiers	122
Cables - Interconnect	127
Cables - Loudspeaker	127
Cassette Decks	128
CD Players	130
CD Transports	133
DACs	133
DATs	134
Equipment Supports	135
Headphones	136
Loudspeakers	137
Loudspeakers - Sats & Subs	143
Personal Cassettes	143
Personal CDs	144
Tuners	144
Turntables - Cartridges	145
Turntables - Integrated	149
Turntables - Motor Units...150	
Tonearms	151
Videos	151

SYSTEM BUILDING

Pre-packaged one-make systems have been commercially very successful, with advantages like cosmetic consistency, competitive pricing, and (assumed) technical compatibility. However, despite the mass market clout of the consumer electronics giants, the hi-fi tradition of specialised separate components seems to be as strong as ever, and certainly represents the route taken by those who place sound quality first.

The first step in putting together a system is to decide which sources you require. There are now three different prerecorded music media competing for the affection of the hi-fi user, and to go for all three will either cost a lot of money or involve substantial compromises in the sound quality of each. For this reason many separates purchasers may start with just one source, adding others or a tuner when funds permit.

Cassette has never really challenged vinyl's superior quality,

but it's a multiple role format, offering 'go anywhere' flexibility, a useful recording capability, plus a broad catalogue of prerecorded music cassette material. As a hi-fi medium cassette suffers from prerecorded material which has been improving but is still patchy in quality and can usually be bettered by a home recording. There is also the worry that a tape made on a specific machine usually plays best on that machine, which may cause aggravation when upgrading a few years hence.

CD is the relative newcomer but in the last decade it has come to dominate the market. The sound quality remains controversial, hailed as near perfect by its fans but derided by vinyl freaks. It is probably fairest to say that CD is fine for the majority of listeners, but may not suit everyone. Certainly the lack of background noise and deterioration are major strengths.

The advent of two box audiophile players has certainly

helped to gain better acceptance for the format and unless you are prepared to spend a substantial sum, CD arguably offers the best performance in terms of sound per pound. Players are now exceptionally cheap, having been reduced dramatically since the format was launched, however, the prices of the discs remains extortionate.

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

The loudspeakers are most critical of placement, because it is their job to create the stereo image, and it will be impossible to do this if the sound from each is not roughly similar at the listening position. Each loudspeaker should operate in a simi-

lar immediate acoustic environment, unencumbered by other furnishings and structure, and a similar distance from listeners, nearby walls, and corners. Some loudspeakers are designed to operate close to a rear wall, others a metre or so out into the room, but all loudspeakers benefit from rigid support

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

The *Directory* has been compiled as a guide in the sense that you should use the information in it to make a shortlist of equipment and then audition it before taking the plunge. Tastes inevitably differ and it's unwise to buy purely on the basis of our recommendation, as dealers are the most experienced people around when it comes to making systems work as a whole.

The Directory

AMPLIFIERS

The amplifier sits at the heart of the system, processing the outputs from all the various music sources as necessary and then driving the loudspeakers. These two (quite separate) functions are integrated into a single box at the low-to-middle price points; separated pre- and power amplifiers become increasingly common as one moves upmarket. At the upper end of the specialist market, valve amplifiers provide a popular alternative to the transistor types amongst enthusiasts.

There is a substantial difference between specialist (sound quality oriented) amplifiers and the consumer electronics style models. The

former are bleakly simple, avoiding all unnecessary features to provide the most direct signal path in the interests of best sound quality. The latter range from models with just basic tone controls and tape recorder switching, to those with elaborate facilities such as graphic equalisers, remote control (including volume), surround sound options etc. etc.

Lab measurement provides some useful data, particularly in regard to an amplifier's ability to drive a wide range of different types of loudspeakers, but this is only obliquely related to sound quality. We also include our measured power output (RMS, 8ohm load, 1 channel

driven) – but again, paradoxically, this doesn't necessarily correspond to the loudness capability of the amplifier, which has as much to do with the elegance of the overload characteristics within a given system (valve amplifiers invariably sound more powerful than their rating would suggest). The listing of features provides some indication to the complexity of an amplifier: many users prefer to retain the option of tone controls to 'shape' the overall sound according to taste; many others have found living without tone controls surprisingly easy, with additional benefits in terms of transparency

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Acoustic Research A03 £170	Average + Average	New slimmed down version of the A04 with less power and facilities but also a slightly 'fuzzy' sound	38W, MM disc, CD direct and 3 aux inputs		74
Acoustic Research A05 £200	Good + Good +	Capitalises on the strengths of the A-03 and A-07 but escapes the ignominy of their deficiencies. The amp for all AR-based systems	67W, 2 tape, 3 line and both MM/MC inputs, Tone defeat	R	97
Acoustic Research A07 £300	Very Good Average +	Relatively smooth but ineffectual sound quality that lacks some weight and impetus at very low frequencies	75W, 4 line, 2AV and MM/MC inputs		68
Aiwa XA-006 £135	Good Average	Competent enough performer with plenty of facilities. A gutsy sound though one that's rougher via CD than MM.	67W, MM and 5 line i/p's plus independent rec out		92
Akai AM-47 £200	Very Good Good +	Something of a surprise from Akai: a made-for-Germany amp with plenty of widgets and an unexpectedly sharp, open and detailed sound. Looks ghastly but sounds strainfree.	104W, 3 tape, 4 line and MM disc inputs. 4mm speaker outlets.	R	104
Akai AM-52 £230	Average + Average -	Basically equipped, this amplifier offers a comfortable but hardly over-detailed sound	95W, MM/MC disc, 5 line inputs, loudness		74
Akai AM-65B £299	Good Average	On-board 18-Bit DAC's actually give better sound than standard CD inputs! Punchy via MM disc	101W, MM, 6 line, digital inputs		80
Akai AM-93 £550	Average Average -	Unfortunately Akai's on-board D/A converters were less successful than its conventional analogue CD input.	112W, coax and optical dig inputs. MM/MC		68
Albarré PP1 £400-£500	Average Good +	Available with or without various MM/MC disc options, the 'basic' PP1 has an attractively warm, earthy sound. The budget MM stage needs some further work, however.	48W, 4 inputs with extra gain available for low-level sources	R	104
Alphason Apollo £300	Average- Average+	Our early production sample was beset with a variety of niggling problems. Laid-back though not unmusical sound.	54W, 5 line, tape and MM/MC inputs. Solid wood fascia		92
Amadeus Gold £360	Average - Good	There is some indication of instability but otherwise sounds very rich, warm and musical. High-ish IMD	56W, MM/MC plug-in cards, 3 line R inputs		74
Amadeus Silver £270	Average - Good	Limited headroom via disc but still offers a sweet, lush sound. Limited current delivery	37W, MM/MC, 3 line inputs	R	80
Aragon 4004 £1795	Good Good	Despite its imposing bulk, the Aragon is something of a softy at heart. It can deliver oodles of power but its musical presentation is more laid-back	231W power amp		72
Arcam Alpha 3 £200	Good Average	After the enthusiastic reception earned by the older Alpha 2 the generally lacklustre and bland sound offered on this occasion met with (unexpected) disapproval.	53W, 3 line, tape and MM disc inputs. Direct option.		104
Arcam Delta 110/120 £720/£520	Good+ Good	Overall performance is limited by the power amp - in isolation the PDM-preamp offers a remarkably open and detailed sound, particularly in 'digital' mode.	112W power amp, MM/MC + four line inputs + coax/opt digital inp	R/-	92
Arcam Delta 60 £300	Good Good +	Very refined and highly detailed sound via MM and CD without any of the hardness noted via the MC stage	59W, 4 line, MM/MC inputs, no tone controls	R	68
Arcam Delta 90.2 £410	Average + Average +	Dark but slightly dead or conservative sounding version of the original Delta 90. Improved disc stage	73W, MM/MC, 4 line inputs, tone bypass, bi-wire	R	74
Art Audio Quintet £725	Average Very Good	Switchable triode/ultralinear output stage. There's 15W and 15W, but in triode mode these are 15 of the sweetest watts around. Surprisingly gutsy	15/25W, variable feedback	R	100
Audio Innovations Series 1000 2nd Audio Amp	Poor Excellent	This valve combination offers awesome dynamic range with superb transparency and power to match. Compatibility with other brands is unpredictable	15W, MM, 6 inputs, monoblocks	R	63
Audio Innovations Series 200 £449	Poor Very Good	Like most 'Innovations valve power amps, compatibility with other brands is unpredictable. Hardly a powerhouse, but nicely 'open', transparent and dynamic sound in small(ish) systems	12W	R	77
Audio Innovations Series 300II £500	Poor Good +	Under-powered and over-distorted yet capable of realising an open and captivatingly expressive sound. Sensitive speakers are a must	9W(!) integrated valve amp with tape, 3 line and MM disc inputs	R	97
Audio Innovations Series 400 £669	Poor Very Good	Superior styling and better build quality than the Series 300 make for a very attractive integrated valve amp. Capable of fine results in the right system, but can sound too 'thin'	12W, MM and 4 line inputs	R	77
Audio Note Ongaku £34,000	n/a Excellent	An out and out audiophile product, a single ended, zero negative feedback, triode, line level integrated amp. Probably the best amplifier in the world!	6 line inputs, 27W	R	Coll '90
Audiolab 8000A £410	Very Good Very Good	Recent mods have cured the slightly glassy treble, replacing it with a smoother but richer and more solid style of music making	81W, 3 tape, 4 line and both MM/MC inputs. Tone defeat	R	97
Audiolab 8000C/8000P £375/£545	Very Good Good	Audiolab has revamped its pre/power combo though the very distinctive almost stark neutrality that results will not appeal to all listeners. Good value engineering, nevertheless	157W pow amp + bi-wire outputs. 3 Tape, 4 line + MM/MC on preamp		97
Audion CD-1 £399	Average + Very Good	Nicely presented valve (line-only) preamplifier with fine bandwidth and enjoyable, musical sound. Great if you can justify the cost. Well worth hearing	5 line inputs		77
Aura VA-40 £190	Average Average +	Based on ITL's earlier MA80, this amp sounded slightly withdrawn or 'dead' if inoffensive	55W, MM 4 line inputs, MOSFET output		80
Aura VA-50 £200	Good Very Good	Superficially similar to the cheaper VA-40 but with much more of the old MA-80's magic! Great sound from a slimline package	65W, one tape, 4 line and MM only. New tape monitor switch	BB	97
Beard Audio CA35/P35mkII £695/£895	Average + Very Good	Good build quality and a very smart finish combine with a characteristic valve sound to make a first class amplifier capable of giving hours of musical enjoyment	35W, MM/MC, 4 inputs	R	63
Beard M70 £1995 pair	Good Good +	A substantial British monoblock power amplifier, but not a great deal more impressive than the P35 at half the price	70W		50
Bryston 0.5B/2B £695/£695	Very Good Good	Very rugged Canadian pre/power combo that sounds cool, confident and punchy. Headamp available to suit MC cartridges	65W, MM and 4 line sources, overload LEDs on power amp	R	74
Bryston 12B/4B £1295/£1395	Good + Good	Bryston's massive 4B power amp stood out as the backbone of this combo, the preamp sounding a trifle unbalanced between MM and MC inputs	272W, bridgeable to 800W. 6 line, 2 disc inputs, subsonic filter		68
Cambridge P25 £180	Good+ Average	Despite clocking-up a solid set of measurements the sound of the P25 proved to be as grey as its appearance.	37W, 4 line and MM/MC inputs + tone defeat.		92
Cambridge P50 £200	Good Average	A pleasant enough sound with full bass yet with a slightly mechanical quality that reduced its sense	56W, 4 line inputs + MM/MC + tone		85

AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Carver CM-1090 £595	Average	Looks very professional with its meters and handles but suffers from a loose and dirty sound that shies away from busy tracks	141W, 2 tape, 4 line and MM disc. Sonic Holography feature		97
Cello Audio Suite £1200	Excellent	Cello's preamp represents a whole new ball game in flexibility and sound quality (or war of attrition on your wallet)	Optional inputs MC etc	R	50
Chord SPM-900 £1850	Average + Good +	Technically very interesting, this mini-powerhouse uses a switched-mode supply to deliver a crisp and refined sound	236W with protection into lower loads	R	85
Concordant Excelsior £856	Very Good Excellent	Cottage industry styling might not inspire confidence, but sonically this preamp is tremendously vivid and detailed. Real high-end performance. We loved it!	MM plus 3 line inputs. External power supply	R	77
Concordant Exultant £700	Average+ Very Good	Individual appearance of this valve pre contrasts with sonic invisibility. An extremely dynamic performer. Recommendation withheld pending more appropriate p.s. plug	3 line, MM, variable gain		100
Conrad-Johnson PV-10 £1100	Excellent Excellent	Pricey, yes, but a fabulous preamplifier which confirms C-J's high reputation in the States. Beautiful imaging, superb detail, plenty of gain on the phono stage. Classy build quality too.	MM plus 4 line inputs	R	78
Conrad-Johnson Premier 7A £8995	n/a Excellent	Price has increased since we tested it but at this price who cares? The 'Seven is designed without compromise, and it's clearly one of the finest (valve) preamplifiers money can buy.	MM, 4 line inputs, sep. Rec Out, versatile cartridge matching	R	Coll.'90
Creek CAS 4040s3 £200	Good Good	Now in mk3 guise the '4040 offers a dry but tidy sound via disc and one that's slightly leaner and better focussed on CD.	41W, 3 line and one MM disc i/p. Tone controls.	R	92
Creek CAS 4140s2 £230	Average Good	Disc headroom still poor but the open and detailed, if slightly bright, sound wins through	40W, MM/MC, 3 line inputs, mono R and mute	R	80
Creek CAS-6060 £470	Good Good	An amp that looks like the '5050 but employs the sort of big, confident and meaty-sounding electronics used in the earlier '4040. Dynamic and impressive.	81W, 3 line, 2 tape and MM/MC disc inputs. Bridge-mono facility		104
Croft Series 4S £850	Good Good	The original IV is still available now supplemented by the higher price and power (S); both are fine performers	40(60)W channel	R	57
Croft Series 4SA £1000	Good Very Good	Featuring tuned components chosen for their sound quality, the 'A' variant is an impressive example of Croft's technique in valve design	60W special supply regulation	R	57
Croft Super Micro A £549	Average + Very Good	The looks are somewhat improved, while this 'hot rod' version with tuned components performed very well indeed. There is still no gain on the line inputs. Now in mk.II form	4 inputs, MM, straight line	R	57
Croft Super Micro A OT/Series V £689/£555	Average+ Good	Micro is still unashamedly "cottage" but offers good performance. Combo is let down by the very low powered Series V	15W, valve, dual vol control, 2 line, MM, tape out		100
Cyclone Catalyst £1995	Good + Very Good	Exceptionally load tolerant and very refined in delivery. Extra options available in future	74W, external MM or MC stages, 3 R line inputs		80
Cyrus I £230	Very Good Very Good	Crisp, meaty and exquisitely detailed, this latest Cyrus amp had us enthralled via CD. MM/MC enjoyed a lesser clarity	34W, 4 line + MM/MC i/p's with dual-conc vol.	R	85
Cyrus II £350	Very Good Very Good	Recently updated this popular favourite captured our attention, once again, with its robust and very convincing sound.	60W, 4 line and both MM/MC disc. No tone controls	R	92
Cyrus PSX £250	Very Good Very Good	The PSX does make the Cyrus Two sound better; and also improves the PCM II CD player giving more wallop and clarity	Auxiliary power supply	R	62
DNM 3A From £1	Good + Very Good	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art preamp	5 inputs MM/MC twin vol controls	R	44
Deltec DPA 100S £2200	Very Good Very Good	A top-quality transistor power amp, sounding fast, articulate and well controlled, though maybe a touch clinical for some tastes	80W	R	50
Deltec DSP-50S/DPA-50S £725/£925	Excellent Excellent	Remarkable pre/power combo based around the highly linear DH-OA32 hybrid op-amp. Unmatched detail resolution, control and transparency	63W, external feedback wiring, 3 line, MM/MC no tone controls	R	68
Denon DAP-2500/PDA-4400A £550/£600 pr.	Very Good Good	Denon's fully-fledged preamp also incorporates D/A converters that did not improve the sound of our £299 CD player. The power amps are brilliant!	172W, monoblocks Opt/Coax dig + 2 tape, 4 line and MM/MC inputs		68
Denon PMA-250II £130	Good Good +	Spacious yet tactile and gutsy sound via all inputs. Worthwhile upgrade over original PMA-250	53W, MM 3 line inputs, source-direct	R	80
Denon PMA-350 £160	Average+ Good	Bold claims were made at its launch but the sweet and inoffensive sound, though very pleasant, is not mould-breaking at the price.	88W, 5 line and MM disc inputs + source direct.	R	92
Denon PDA-6600 £1000 p	Excellent Very Good	Delivers abundant high quality sound, solid engineering expertise and content clearly compensating for any compromising of purist audiophile principles - now in revised A form	250W monoblok, remote power	R	60
Dual CV600RC £150	Good + Good	The heart of Dual's latest budget range enjoys a very lively, open and vibrant sound. Slightly sanitised via CD perhaps, but still damn good for a features-first integrated amp!	63W, 3 line, 2 tape and MM inputs. Remote control	R	104
E.A.R. 549 £3628 pair	Very Good Very Good	A valve monoblok that measures like a solid state amp is itself an achievement, but exceptional power delivery and bass 'slam' is not fully matched by delicacy and transparency elsewhere	200W monoblok, bias setting		60
E.A.R. 802/509mkII £1098/£1868	Average Very Good	Extremely well made and combining the sonic strengths of both transistors and valves this EAR combo warrants attention	100W, MM, 6 inputs, monoblocks	R	63
Entire Sound EX50 £500	Average- Average+	A new and fairly costly Mosfet power amp of limited output. Resolution of detail is pretty good but sound is cold-hearted.	40W Power amp. Internal P/S included for ES preamp.		92
Exposure VI/VII*/VIII £1580	Good Very Good	An established company like Exposure could do more to improve the 'look' of these amps which, nevertheless, sounded confident, dry and musical. Dual version no longer available	63W, Super mod. 4 line and 2 disc R inputs with full rec-out switching	R	68
Exposure VII/VIII £530/£580	Very Good Good	Supplied as a combination without the separate preamp power supply, this pre power combination performed satisfactorily especially on the moving coil input	50W, MM/MC, 3 inputs, straight line		62
Exposure XI/XII/VIII Super £1900	Good Very Good	New preamp and improved power amp led to a smooth and refined sound, MM/MC less transparent than CD	61W, MM/MC, 5 line inputs	R	80
Goodmans GSA-600 £140	Good Poor	Designed to form the heart of a Goodmans separates system, the wishy-washy and faceless sound of this amp fails to stack up	76W, tape, 3 line and MM inputs. Remote control		97
Grant G60AMS £948 pr	Good Very Good	This neat and compact 60W valve monoblok gave good sound on the 8ohm tap, better still on 4ohms. The midrange was particularly natural	60W monoblocks 8ohms	R	57
Hafler SE-100/SE-120 £370/£380	Good + Good +	The smallest of Hafler's pre/power range but still imbued with the open, sparkling quality of their bigger models. Preamp sounds significantly better via CD than MM or MC	96W, bridging option. 2 Tape, 3 line + Aux or MM/MC	R	97
Hafler XL-600 £1200	Very Good Very Good	Sounds remarkably open, transparent and inherently 'musical'. XL-600 is tremendously powerful and very compatible	426W in stereo mode, 1.5kW in bridge	R	74
Harman Kardon Citation 25/22 £699/£899	Good Average +	Not as outrageous as previous Citation amplifiers but neither as punchy nor exciting in the sonic stakes. A good all-rounder but lacks sparkle	138W, MM/MC full range of input and record out		74
Harman Kardon HK6100 £170	Good Good	Re-packaged version of the popular PM635. Still offers very up-beat and exciting sound	47W, MM, 5 line inputs, tone controls	R	80
Harman Kardon HK6200 £250	Good Good	Supposedly a beefier version of the HK6100 but in practice there's little to distinguish the two amps	50W, 5 line inputs + MM, tone controls		97
Harman Kardon HK6300 £330	Good Average +	This amp offers the features of the HK6500 with an internal design culled from the HK6200. Unfortunately its generally bright, grating and mechanical sound is no match for either!	61W, 3 line, 3 tape and MM/MC inputs. Loudness button		104
Harman Kardon HK6500 £380	Good+ Good+	The best of HK's current range. A firm sound that enjoys an impressive grip on the most complex music. Great bass!	74W, 3 line, 2 tape and MM/MC. Tone controls + loudness	R	92
Harman Kardon HK6600 £500	Good + Average +	This amp comes as a real disappointment after the HK6500. Differences in design yield a flat and uninspiring sound	87W, 2 tape, 4 line and MM/MC inputs. Tone defeat		97

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AMPLIFIERS

■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ FEATURES	■ VALUE ■ ISSUE
Harman Kardon HK6800 £700	Good + Good	Smother and more evenly paced than previous H/K superamps, this model sounded both confident and nimble. A fine result	115W, 4 line + 2 tape i/p's + MM/MC	R 85
Heybrook C3/P3 £479/£660	Average + Average	Since we last looked at this combo Heybrook has improved the manufacture of its power amp though flaws in the preamp's disc input remain unchecked	146W, oodles of current, passive line inputs	104
JVC AX-A3TN £140	Very Good Good	A true minimalist amp from the masters of mass-production! Offers a very comfortable, accessible sound yet with some loss of deep bass and extreme treble.	50W, 3 line, 1 tape and MM i/p's. CD DiRT and 'Bass Compensator'	R 92
JVC AX-A441 £210	Good+ Average	A return to the traditional style of mass-market design brought an inconclusive reaction from our panel. Blowing 'hot and cold', our listeners ultimately found its music uninteresting	93W, 3 line, 3 tape, MM/MC inputs. CD direct facility	104
Jadis JP30/JA30 £4990/£4900	Average Excellent	Two-box preamp plus monoblok power amps, classic valve design gives stereotype valve sound. Beautiful build, nostalgic styling and delightful sounding midrange transcend limitations at	30W 2-box pre-, monoblok power, MM-only, 4 line inputs	R 60
Jeff Rowland Coherence One/Mod	Very Good Very Good	The technical design of these amps is very elaborate but ensures they achieve an extraordinarily transparent and potent sound. However, the CD i/p is clearly superior to the disc inputs	448W monoblok MM/MC with loading options. Balanced topology	R 72
Kelvin Digital Integrated £550	Good + Very Good	Not so Class A as before but now fitted with a PDM DAC which offers a smooth, detailed and naturally 'musical' sound	34W, digital, line and MM i/p's only	R 85
Kelvin Integrated £449	Good Good	Recent mods have reversed the Integrated's previous good fortune, this unit was just too syrupy.	21W with 10-12W in Class A. Four line + MM/MC.	92
Kelvin Labs Absolute Zero/M30 £395/£295/£595	Good + Average +	Latest versions of the M30 offers a true 30W Class A and a slightly muddled but very comfortable sound. MC preamp is a very linear design	33W monoblok MC only + 4 line inputs. Separate L/R balance	R 74
Kenwood KA-3020 £140	Good + Good +	An unassuming little amplifier that turns in a remarkably balanced and entertaining sound Lively, detailed and engaging	66W, 2 tape, 3 line + MM disc. Source direct	BB 97
Kenwood KA-4020 £170	Good + Average +	On paper this is a beefier version of the '3020 yet our listeners thought it sounded weaker, lacking richness and detail	103W, 2 tape, 3 line + MM/MC. Source direct	97
Kenwood KA-4040R £220	Good + Average +	In many respects this sophisticated amp is a 'digitised' version of the KA-4020 with relay-switched inputs and full remote control. Unusual looks but can seem insubstantial via CD.	82W, 3 line, 2 tape, MM/MC inputs. Full remote control	104
Kenwood KA-5020 £220	Very Good Good+	Something of a powerhouse on the cheap this amp can keep pace with the most challenging of dynamics. Its sound is vibrant but some fine detail is lost.	115W, 3 line, 3 tape and MM/MC. Source direct.	R 92
Klyne SK5a £2590	Very Good Very Good	Beautifully made and presented, this American thoroughbred has a good lab performance, but although versatile, is rather expensive for the quality of sound offered	Balanced output, versatile cartridge loading	72
Lecson Quattra £350	Average+ Good	Underpowered but with the flexibility of four independent power amps. Very deep, captivating sound with 3D soundstaging.	19W via all 4 channels. 5 line and MM/MC inputs.	R 92
Lecson Stereo £200	Poor Very Good	Can reflect the full weight and ambience of a tense, classical performance. A genuinely deep, detailed and enthralling sound marred by unreliability of our sample. New stock will be cured.	76W, 4 line, 2 tape, MM/MC inputs.	104
Lectron JH50 £2300	Average Very Good	Sexily presented valve power amplifier from France. Lovely valve sound too, with delicate and airy top end. Not especially powerful and rather expensive but very desirable!	50W	78
Linn Intek £398	Good - Average +	Linn have slashed its price and made various internal revisions, but their no-nonsense Intek still lacks the authority and confidence to support its forward balance.	55W, 3 line, 2 tape, MM/MC inputs, rec-out, mono + mute	104
Linn LK1/LK280 £598/£763	Good Good -	A very modern, logic-controlled amp with distinctive and inoffensive sound quality. Its restrained sound could do with extra insight and zip.	84W, compact amp CMOS sw. for 2 tape, 2 line and MM/MC. xlr sockets	68
Linx Nebula £500	Average + Average +	Ambitious both in style and design this amp was less impressive in the sonic arena — positive but two-dimensional	88W, logic-controlled i/p switching	85
MFA Magus £1147	Good Very Good	Versatile valve preamp from USA, genuine MC compatibility and high class construction make the Magus a bargain	3 line, MC, tape out, variable gain	R 100
Magnum MP150/MF150 £320/£320	Average + Good	This is no technical masterpiece but the strain-free, fluid sound augers well for CD-based systems. Excellent value	89W, 3 line + MM/MC i/p's. No tone cont.	R 85
Marantz PM-30 £130	Good + Good +	The building-block for Marantz's popular budget 'SE' amplifier is no slouch, providing a lively and very expressive sound with plenty of strong bass. A good 'un.	49W, 3 line, 2 tape and MM inputs, source-direct	BB 104
Marantz PM-30SE £150	Very Good Good+	The breathed-on version of Marantz' PM-30 offers an engagingly detailed and spacious sound though one that's warmer via MM disc than CD.	50W, 3 line, 2 tape and MM disc. Source direct	R 92
Marantz PM-40SE £240	Very Good Good +	The improved version of their basic PM-40 model has itself been updated to provide a bigger and more exciting sound. A good 'un	61W, tape, 3 line + MM/MC disc. Source Direct	R 97
Marantz PM-50 £260	Good + Average +	One of Marantz's new breed, the PM-50 has a big and beely sound yet one that lacks refinement	92W, MM/MC, 4 line inputs, source- direct	80
Marantz PM-75 £500	Good Average	More successful than most amps with on-board DACs but still not as balanced as other Marantz products	136W, opt/coax dig inputs, 6 line + MM/MC	68
Marantz PM-80 £400	Very Good Good +	Technically robust with an equally beefy and tactile sound. Great sense of power and control but spatially a little flat	133W, 3 tape, 4 line + MM/MC. Class A option	R 85
Meridian 201/205 £760/£525 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
Musical Fidelity A1 £299	Average + Average +	Just scraping a recommendation, this current A1 sounded lush but sleepy — lacking the bite and sparkle of old	26W with 9W of Class A. 4 line + MM/MC inputs	R 85
Musical Fidelity A100 £499	Good + Very Good	This is another one recommended for fine sound with which you could keep your Chinese carry-overs warm	50W MM/mc 5 inputs straight line	R 62
Musical Fidelity B1 £200	Average + Good +	The subject of much controversy, this 50W wonder offers a very deep, solid and powerful sound	50W, MM/MC, 5 line inputs, tape monitor	R 80
Musical Fidelity B200 £349	Very Good Good +	Running cooler than other MFs, the B200 delivered fine musical and dynamic sounds with plenty of power	80W MM/mc 4 line inputs straight line	BB 62
Musical Fidelity MA50 £875 pa	Good Excellent	An audiophile bargain. One of the best sounding power amplifiers made	50W, monoblok	R 62
NAD 3020i £150	Very Good Good +	The most balanced and communicative of NAD's 3020 series. Great at revealing subtle musical clues without aggression	31W with tone controls, 3 line + MM inputs	BB 85
NAD 3225PE £160	Average + Average +	Light and detailed if not as rich or weighty sounding as others. MM input sounds warmer than CD	42W + 70W dyn. headroom; soft-clipping, MM only	R 68
NVA P70MC/A60 £830	Average Average +	NVA's speaker cables are a must, the amp offering well-integrated but not particularly crisp sound	68W, MC, 3 passive line inputs	80
Naim Separates £750 pl	Very Good Good	A consistent and coherent series of 'building blocks' for conventional passive or active operation. Sound quality ignores conventional audiophile standards of presentation, but	40-70W, MM/MC etc	R 60
Onix OA-21s/SOAP £350/£180	Average + Good -	Via MM disc this amp comes alive with a fresh and vibrant sound though its CD input sounds utterly dead by comparison.	60W, 1 tape, 3 line and either MM or MC. Outboard PSU option	R 97
Orell SA-040 £359	Good Good +	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/MC, 4 line inputs, straight line	R 56
Orell SA-040SE £400	Average Average +	Very natural, relaxing if not overly exciting via CD, the sound closed-in to become 'pinched' or fettered via disc	64W, 5 line + MM/MC i/p's. Tweaky components.	71
Philips DFA-888 £300	Good Average	As above but including a modified disc input and onboard DAC. Sounds tight but also slightly thin	107W, as above + opt and coax digital inputs	74

The Directory

AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Philips FA-880 £200	Good Average	A new and cheaper design from Philips that sounds best via MM disc. Can appear soft and unbalanced via CD	108W, MM/MC source-direct tone		74
Philips FA-890 £230	Good + Good -	Based on their FA880 model but tarted-up with a remote control facility. Inoffensive, civilised but unexciting sound is retained	120W, 6 line + MM/MC logic-controlled input switching		97
Pioneer A-229 £130	Average + Average	An unambitious amplifier that fights shy of tricky speakers with a sound that's equally unadventurous. Slightly soft and comfortably even-handed presentation	60W, 2 line, 2 tape and MM inputs, loudness and direct		104
Pioneer A-300 £160	Very Good Good	The cheapest of Pioneer's dynamic duo gives off its best with CD rather than MM disc which failed to shine quite so brightly.	55W, 3 line, 2 tape and MM. Independent rec out facility.	R	92
Pioneer A-400 £240	Very Good Very Good	Pioneer's design concept snaps into focus with the A-400, an amp that seems to bubble with musical detail. A bench-mark that other manufacturers should strive for.	71W, 3 line, 2 tape, MM/MC. Independent R-out switching.	BB	92
Proton 520 £115	Average Average	Very well equipped budget amp with a slightly flat and undynamic sound - acceptable at the price though	31W, MM/MC with variable MC gain, 4 line inputs	R	74
Proton AP-1000/AA-1150 £250/£395	Good + Average +	Bags of headroom available from this pre/power combo, but can seem bloated or unrefined via MM	67W, MM/MC, adjustable MC gain, 5 line inputs		80
QED A240 CD II £249	Good + Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	62
QED A270CD/PA £369/£429	Good Good +	Recent updates have bolstered the output of the A270 without adding to its colourations. The PA option is a touch expensive	61W, 2 tape, 3 line + MM or MM/MC from PA board	R/-	97
QED C300/P300 £329/£370	Good Good	A cost-effective combo, limited in its resolution but no less beguiling as a result. Disc stage is sweeter but samey	58W, 2 tape, 3 line, MM/MC + mono/biamp opt.	R	85
Quad 34 £366	Very Good Average	This well-built durable preamp has useful filtering and above average tone controls but was found lacking in sound quality (viz: detail/dynamics)	4 inputs MM/MC tone controls		44
Rational Audio £175	Average- Average+	This wacky newcomer from Czechoslovakia offers a very open and fluid sound via CD but its performance via MM depends very much on the cartridge's load impedance.	129W, caters for line and MM disc sources but has no i/p selector.		92
Ray Lumley Model 75 £1995 p	Average Good +	Monstrous valve monobloks which represent good value. What they lack in musical subtlety they make up for in sheer muscle. And these are Lumley's small monobloks!	75W monoblok		78
Revox B150 £1047	Very Good Average +	Beautifully constructed but hampered by Revox's convoluted logic control. Open and smooth sound. Still costly.	117W, CMOS sw. for 3 line, 2 tape and MM		68
Revox B250 £1467	Very Good Good	With much improved sound over its predecessors plus amazing remote control facilities, this could form the heart of a round-the-dream-house system	150W MM/MC system/house remote tone controls		56
Rose RV-23 £395	Good Very Good	Beautifully built classy British 'hybrid' preamplifier. You can spend more to get a more transparent sound but it's hard to criticise the Rose given the competitive price	MM plus 3 line inputs	R	77
Rotel RA-930AX £160	Good - Very Good	Based on the original RA-820AX but featuring a new look and a tweaked circuit design, this budget wonder captivated our listeners with its clean, vibrant and thoroughly involving sound	53W, 3 line, tape and MM inputs, tone bypass	BB	104
Rotel RC-960BX/RB-960BX £150/£180	Very Good Good -	With excellent standards of construction, flexibility and plenty of power under the bonnet, this duo represents an ideal choice for the first-time buyer.	80W, bridge-mono facility. 3 line, 2 tape and MM/MC on preamp	R	104
SAE P102/A202 £499/£599	Average + Average +	Microprocessor-controlled pre and power amp that sounds much better at low rather than high volume levels. Pro-oriented aesthetics	151W, MM/MC + 2 liner and 2 tape, tone memory, spk switching		74
Sansui AU-X111 £100	Good Average	Sansui has engineered an amp that's both solid and flexible for the price, but its sound is rather bland compared to competition in the £110 sector	5 line inputs, MM, 52W		92
Sansui AU-X911DG £700	Very Good Good +	At its best when used with the on-board MASH/PWM DAC where it sounds technically neutral but still emotionally charged	112W, 4 dig, 3 line and MM/MC i/p's. Rec-out	R	85
Sony TA-F440E £180	Very Good Good	A new budget amp based on tried-and-tested circuits but free of spurious widgets like tone controls. It has a fresh and up-beat sound with plenty of detail, can sound smeared via CD	109W, 3 line, 2 tape and MM + rec out	R	104
Sony TA-F540E £230	Very Good Good -	An extra £50 buys you an MC input but little else over and above the TA-F440E. This version sounds more consistent from input to input but is still rather superficial or unconvincing	108W, 3 line, 2 tape, MM/MC + rec out		104
Sony TA-F730ES £450	Very Good Good	A very stable and coherent amp but one that lacks a crucial sense of involvement	133W, MM/MC, 3 tape, 2 line, full rec-out		80
Sound Audio VP3a/HBP60a £599/£599	Good Average ++	Hybrid power amp and valve line stage. Big 'n' beefy power amp is the stronger partner	4 line, 1tape 60W	R	100
Sugden A21a £395	Average+ Good	The modern-day relative of Sugden's original Class A amp and one that offers a smooth, easy-going sound. Best partnered with sensitive speakers.	25W power amp with a good 16W inPure Class A.		92
TEAC A-X400 £115	Average Average	Sibilance and a lack of crisp vitality hamper the performance of this amp, as does the stringent protection circuitry	59W, 4 line + MM + tone + mic i/p level control		85
TEAC A-X5000 £229	Good Average -	This amplifier is compromised by a grey and muddled sound that taxed the concentration of our listeners. Better via MM disc	107W, 3 tape, 3 line + MM/MC Source Direct		97
Technics SU-810 £130	Average + Average	Our sample started off sounding fast, taut and well-integrated yet eventually failed on the MM disc input	66W, 2 tape + 3 line + MM. Tone + loudness		85
Technics SU-VX600 £200	Good + Good	What looks like a fairly ordinary mass-market offering is actually the first 'tweaked' amp from Technics, its solid and sharply focussed sound a taste of things to come.	90W, 3 line, 2 tape, MM/MC + power-amp inputs	R	104
Technics SU-VX800 £450	Very Good Average	On the other hand, this is a mass-market amp still hampered by over-enthusiastic protection circuits! It sounds raw and congested when the going gets tough - positive but raucous	148W, 3 line, 3 tape, balanced input + MM/MC		104

**“The Lecson Quattra is the most radical & innovative amplifier for years”
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AMPLIFIERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Threshold FET 10e system/ £2995	n/a Very Good	Almost valve-like limpidity and excellent soundstaging are star qualities of the Threshold amps. Line input resistive loading is too low	Component FET phono stage, line pre, FET power amp 100w		Coll '9
Woodside SC26/STA35 Renaiss £2895	Good Good+	Synergistic pairing with a cool, controlled sound, good focus and transparency. More about poise than grunt	35W, valve, 3 line, optional MM or MC, 2 tape outs	100	
YBA 1 power amp £2995	Good Excellent	This equally well finished power amp offers front rank stereo staging and transparency, and is capable of driving the most difficult loads	85W	R	62
YBA 1 preamp £2895	Very Good Excellent	A front line French audiophile product. Great stereo and a fine Krell style finish	MM/MC, 3 inputs, straight line	R	62
YBA 2 pre & pwr £1395/£1695	Very Good Very Good	Superbly finished French separates, with very good space and transparency, slightly softened bass. Needs extra transformer (£300) for MC cartridges	70W MM (MC extra) straight line	R	56
YBA Model 3 £995/£9	Good Good	Suited to highish sens. loudspeakers this duo produced see-through, ethereal stereo images that were more convincing towards the centre of the soundstage than at the edges	56W stereo amp MM only with 3 line i/ p's.		72
YBA Model 3 £995/£995	Good Good	Suited to highish sens. loudspeakers this duo produced see-through, ethereal stereo images that were more convincing towards the centre of the soundstage than at the edges	56W stereo amp MM only with 3 line i/ p's		72
Yamaha AX-330e £100	Average + Average +	An improvement on earlier efforts but still a little bland or lack-lustre. Very compatible though	48W, MM, 3 line inputs, source-direct option		80
Yamaha AX-750 £399	Very Good Average	Big and bulky with remotely-controlled input and volume. Impressive handling, but two samples split the opinion of our listeners, one sounded squashed the other fast and articulate	149W, 3 line, 2 tape, MM/MC inputs + remote control		104

CABLES AND CONNECTIONS

Although cables and connections are sometimes thought to be the least important items in an audio system there has been a growing awareness in recent years that they have a significant effect on sound quality. To this end there is now a vast array of exotic cables and interconnects available to those interested in experimentation. The key observation on cables is that they are much more than mere accessories. Carrying the audio signal, just as any amplifier does, it's really not too surprising that they can influence sound quality.

The characteristics of any cable are determined by the materials and topologies utilised in its construction. The purity of the conductor, nature of the insulator dielectric, mechanical construction, physical geometry, RF characteristics, efficiency of screening and finally the connectors themselves, all play vital roles in the sonic character. These factors tend to vary more with interconnect cables which are used to carry the signal between active components like pre and power amplifiers. The interconnects summarised here were tested in 1m terminated lengths and therefore the results and prices relate

to that length - some cables may well perform differently when used in longer lengths. What's more, most cables are significantly cheaper if you are prepared to fit the plugs yourself. The features column contains information on the material makeup of the different cables with the following abbreviations: OFC - oxygen free copper, OFHC - oxygen free high conductivity (Audionote defines HC as high crystal), PC-OCC - pure copper by ohno continuous casting, LC-OFC - linear crystal oxygen free copper.

CABLES - INTERCONNECT

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Audio Note Copper ANA £44	Average Good	ANC sounded punchy with a faintly lean but tightly-focused bass character. This crystalline precision waned slightly at higher frequencies	OFHC copper twin-axial	R	59
Audio Note Flexible Silver ANS £99	Average Very Good	ANS scored a hit with its transparent midband and revealing but quite unforced treble quality. Bass transients were slightly softened	Silver signal & Copper screen	R	59
Audio Note Silver ANV £154	Poor Excellent	Far weightier-sounding than the flexible ANS, ANV interconnect also possesses a fair degree of treble clarity and sparkle	21 strand silver Litz		59
Audio-Technica AT-6115 £40	Very Good Average	This cable sounds somewhat 'quieter' than the original LC-OFC interconnect, but is also less transparent and three dimensional	PC-OCC copper coaxial		59
Audioquest Livewire Ruby £49	Average Good	Smoother sounding than the Topaz, the extended crystal Ruby is less grainy and coarse, better able to resolve complex passages	FCL copper twin axial	R	59
Audioquest Livewire Topaz £35	Good Average	Sounding 'bigger' and faintly richer than Reference 2, Topaz was also slightly grainy at the top end	Gold-plated plugs, OFHC copper		59
Chord Mono-t £27/1.2m	Average + Average +	Offers a slightly rolled-off treble but its rich sound is an upgrade from patch-cords	Unsymmetrical 4-conductor cable	R	83 Supp.
Deltec Gortex Black Slink £152	Very Good Excellent	A true reference quality cable providing an exceptionally detailed and transparent sound	Symmetrical, 8-conductors, Gore-tex ins.	R	83 Supp.
Deltec Slink £32	Good Very Good	Ideally used in lengths of under 4 metres, it errs on the lean side of neutral but has an uncommon transparency in the midrange	4 silver plated OFC strands PTFE dielectric	BB	59
Kimber Kable KC-1 £65.55	Very Good Average	Tonally faintly leaner and brighter than the more open-weave PSB, KC-1's treble detail was just too sharp and grainy	Multi-gauge PTFE dielectric		59
Kimber Kable PSB £41.40	Very Good Very Good	An exceedingly transparent midband but slightly 'clanky' treble. It always managed to sound remarkably uncluttered and open	OFC, PTFE dielectric	BB	59
Monster Interlink 300 £30	Average + Average	A big, larger-than-life sound but with some emphasis of midband detail and loss of bass	Screened, symmetrical cable		83 Supp.
Monster Interlink 400 £50	Good Good	Bass is solid and punchy, counterpointed by a slightly overblown midband which tends to make vocalists sound larger-than-life	Multi-gauge	R	59
Origin Live Soli-Core Super £60	Good Average	Improves over previous Soli-core samples in stereo depth and bass weight, but a 'loud' treble presentation remains	Solid-core gold-plated AT plugs		59
QED Incon Graphite P1G Gold £19.95	Average Average	A shielded version of Incon P1, it sounded thicker at the frequency extremes, the top end being coarser and more out of focus. Good for long runs though	OFHC Graphite shielding	R	59
QED Incon P1-Gold £16.95	Good Good	A lively open presentation that just borders on the lean side of neutral, the quick and lucid delivery affording considerable musical insight	OFHC, gold plated Deltron plugs	BB	59
Supra EFF-1 £60/0.75m	Average Average	A new, costly and mildly disappointing addition to the range. Edgy, smeared sound plugs	Screened, symmetrical dir. cable		83 Supp.
van den Hul MC-Gold £230	Average Good	It possesses a rich and beguiling treble balance that matches a weighty, slightly warm bass character. Seductive balance may prove worthwhile in some circumstances	Silver & gold plated copper		59
van den Hul MC-Silver £750	Good Good	Although remarkably transparent for an asymmetric design this costly cable was not considered to be of 'state-of-the-art' standard, and is bettered by cheaper models	19 silver plated copper strands		59
van den Hul MCD-102 III £61.50	Good Good	Possessing the same endearing qualities as the D300, it presented open and transparent soundstages and improved timbral resolution	Twin axial silver plated copper	R	59
van den Hul Thunderline £92	Good Average	Thunderline essentially parallels the sonic performance of the cheaper D102. HF is occasionally tainted by a 'tizzy' coarseness, bass is tight and dryscreening	Silver plated 'matched copper'		59

The Directory

CABLES - LOUDSPEAKER

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Absolute Wire Force 4 £4.75 per metre	Good Average +	By current standards there was a loss of fine, sharp detail at the frequency extremes, but it has a big, friendly sound	744 OFC strands, PVC dielectric		64
Audio Innovations OR-200 £16 per metre	Average + Average +	Open and detailed throughout the midband but a grainy coloration tended to corrupt subtle timbral information at very high frequencies	200 LC strands, polyurethane and cotton dielectric		64
Audio Note AN-SP £100 per metre	Average - Excellent	A clean and open sounding cable that offered a deep and pleasantly detailed perspective. Bass was slightly restricted, but seemed tight and coherent	15 silver strands, polyethylene dielectric		64
Audio-Technica AT-6120 £10 per metre	Average + Average	Compared to earlier LC-OFC cables, this PC-OCC derivative sounded smoother and less aggressive	PC-OCC, PVC dielectric		64
Audioquest Livewire Black £15 per metre	Good Good	It proved clear and punchy but with some grain across the treble. Nevertheless Black remains an interesting concept and proved better than Livewire Green	OFHC, surface only - foam core construction	R	64
Cyrus £2.50 per metre	Average + Good	Because of its impedance characteristic this cable will deliver a smooth and unfatiguing treble balance with loudspeakers offering an easy load	0.8mm single strand, PVC dielectric	BB	64
Deltec 8S £144 - 5m pair	Good Good +	The unerring transparency and detail resolution of 8S throughout the midband makes it a cleaner and more spacious sounding cable than others at the price	4 silver plated OF copper strands, PTFE	R	64
Deltec Gortex Black 16 £528 - 4.5m pair	Very Good Excellent	Improvements in bass resolution, transparency and treble poise maintains status of this cable	Silver-plated OF copper with Gore-tex ins.	R	83 Supp
Exposure £2.50 per metre	Good Good	It could sound a trifle matter of fact but this emotive flattening was also somewhat dependent on the music program. It is also highly suited to long runs	56 OFC strands, webbed PVC dielectric	R	64
Furukawa FS-2F09 £3.50 per metre	Good Average +	Some loss of bass weight but otherwise offers a fresh and open sound. Good value	Multi PC-OCC stranding, PVC dielectric	R	83 Supp
Furukawa FS-2T15S £50 per metre	Good + Very Good	An advanced solid-core cable with a highly fluid, detailed and inherently musical sound	Single 1.5mm Super PC-OCC	R	83 Supp
Kimber 4VS £7.15 per metre	Average + Average	Similar construction to 4TC but dissimilar materials infer a slightly tizzy sound	Open-weave, multistrand, PVC ins.		83 Supp
Kimber Kable 4PR £54 - 5m pair	Average Average +	This directionally marked cable benefited from an open and airy treble quality but seemed notably leaner than 4TC. Bass was well round and satisfyingly taut	4 x 7 copper strands per conductor, PVC diel.		64
Kimber Kable 4TC £17.65 per metre	Good Good +	4TC made a great impression in the listening tests with an open midband, a smooth and unfatiguing treble with slightly rich but suitably weighty bass	OF copper, PTFE dielectric	R	64
Linn K20 £2.95 per metre	Good Average	Subjectively, it erred on the forward and bright side of neutral but enjoyed an essentially clear and punchy delivery	56 OFC strands, webbed PVC dielectric		64
Monitor PC Silverline PC4 £5.75 per metre	Good Average	Sonically, it laboured under a heavy and claustrophobic balance, lacking the see through transparency and lucidity of the better solid core cables	2072 x 0.07mm silver plated copper strands		64
Monster Original £3.49 per metre	Good Average +	Original sounded relatively congested and murky at higher frequencies but possessed weight and conviction in the bass	Multistrand		64
Monster SCI 16-4 £3 per metre	Average Average	Not as thick-sounding as early Monster cables but still slightly unbalanced. Versatile construction	4 x 16-gauge conductors, OFC strands		83 Supp.
NVA LS1 £6 per metre	Average + Good	A light and breezy sounding cable best suited to short lengths, NVA benefited from a clear and transparent outlook	7 x 0.25mm silver alloy strands, PTFE	R	64
QED 79-Strand £1 per metre	Good Average	For much of the last decade QED 79-Strand has been the first port of call for enthusiasts on the upgrading ladder, a tradition that should still hold true today	79 strand, PVC dielectric	R	64
QED Flat 200 £2.20 per metre	Good Good	I detected a degree of confusion at low frequencies but this did not stifle the acoustic atmosphere which remained open and positive	200 strands, flat webbed PVC dielectric	R	64
QED Incon Graphite £2 per metre	Average + Average +	This graphite version of Incon sounded cruder and generally more heavy handed than the cheaper unshielded type. Overall presentation was mildly restricted and cloaked in a faint aural fog	OFHC, polymeric screen		64
Rotel Supra 10 £8.95 per metre	Good + Good	Supra 10 provided a very free and open sound that was unhindered by any excess at low frequencies. Worth its weight in scrap copper!	2,562 OFC strands, webbed PVC dielectric	R	64
Rotel Supra 4 £3 per metre	Good + Good	Ideal for both long and short runs, it furnishes a big sound that benefits further from a smooth, unfatiguing treble	1,036 OFC strands, webbed PVC dielectric	R	64
van den Hul CS-122 £6.50 per metre	Average + Good -	Characterised by a driving and powerful bass, CS-122 is a heavy sounding cable. Mid treble detail was refreshingly clear but there was a slightly muted air about the extreme treble	19 x 0.45mm silver plated strands, rubberised dielectric	R	64
van den Hul D-352 £12 per metre	Good Average +	Subjectively it sounded like CS-122 only more so, the deep rumbling bass tending to overwhelm subtle musical details. It also appeared a trifle peaky in the treble	7 x 0.76mm + 168 x 0.125mm silver plated strands, rubberised diel.		64
van den Hul SCS-12 £10 per linear metre	Good + Good +	SCS-12 set a high standard with a tight and well focused soundstage populated with tactile stereo images. Bass wasn't as extended or resolved as some other cables	19 silver plated strands of 12 different gauges, PTFE dielectric	R	64
van den Hul SCS-2 £99.95 per linear metre	Good + Good +	Overall it was commendably neutral and transparent but nothing less would be acceptable bearing in mind the tremendous cost of a stereo pair	665 silver plated matched crystal copper strands, PTFE dielectric	R	64

CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal – at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes.)

There is no problem in connecting a cassette deck to any normal amplifier, but some care needs to be taken in choosing the best tapes for a

specific machine. (Trial and error is one effective technique, but many decks have manual bias adjustment and some match up to the tape automatically.)

Lab performance and sound quality often go hand in hand, and are frequently somewhat dependent upon factory alignment. The mechanical integrity of the mechanism itself is another crucial factor, that is often reflected in the asking price

All modern hi-fi decks have Dolby B and the majority have Dolby C besides; the very worthwhile HX Pro system is becoming steadily

more widespread. Remote control remains rare, though sometimes it is available as a system option.

Three-head recorders allow simultaneous checking of the recording being made. Auto-reverse is a useful convenience feature, but usually with some mechanical compromise, while double-mechanism 'dubbing' decks of dubious quality are fashionable at the bottom end of the market. The welter of different 'music search' systems available is some indication of their frequent ineffectiveness.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Acoustic Research RD-06 £300	Average Average	Acceptable middle market player with very simple facilities and cramped control section, but unusually good looks	Dolby B/C/HX Pro, fine bias, counter memory, repeat		69
Aiwa AD-F410 £100	Average Average	Comparable to AD-F500 but cheaper. Good all round performance, well adjusted, useful basic and not so basic features	2 head, Dolby B/C/HX Pro, bias adjust	BB	99
Aiwa AD-F500 £160	Average Good	Noise levels are a little higher than usual, but sound quality is otherwise very good - open, explicit and very neutral tonally	Dolby B/C/HX Pro, cue/review, fine bias, record sensitivity adjust	R	93
Aiwa AD-F810 £200	Good Good	First class budget 3-head machine with a dual capstan transport that really works at reducing the 'fudge' factor	Dolby B, C, HX Pro, bias adjust, track search, variable hdpd	BB	99

CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa AD-WX616 £160	Poor Poor	Sonically sub-standard twin transport deck which has sensible range of well implemented features, yet which sounds compressed and uneven.	Twin full logic, 1 records, Dolby B/C track search	R	93
Aiwa AD-WX777 £190	Very Good Very Good	Excellent, middle price dual deck with quick side change and a living, breathing sound though prerecorded tapes sound bright	Twin auto-reverse, one records. Dolby B/C, fine bias	BB	75
Aiwa AD-WX888 £260	Good Good	Inaccurate set-up spoils metal tape operation, but with other tapes the deck works well. This deck offers fine engineering, facilities and sound	Dual auto-reverse twin deck, Dolby B, C and HX Pro	R	75
Aiwa XK-S9000 £700	Good + Excellent	Genuine state of the art in battleship pale gold/wood gloss clothes. Fabulous build, clunky transport and sharp, refined sound quality with Dolby S or B and metal tapes	Dolby B/C/S/HX Pro, built in DAC, tape alignment	R	105
Akai DX-57 £200	Good Good	Confident sounding deck which eschews fancy gadgets for a good transport and decent electronics. Sound quality is firm and tidy under most conditions of use; avoid Dolby C.	3 heads, dual capstans, Dolby B/C/HX Pro, variable bias		105
Akai GX-32 £170	Average Poor	Constrained and smeared sum up this deck well. It has poor bass and treble definition alike, though it proved well aligned for prerecorded cassettes	Dolby B/C, variable bias, headphone out, track search		69
Akai GX-52 £250	Very Good Very Good	Well finished and a pleasure to use, this well specified deck sounds clean and defined with all tape groups, with or without Dolby	Dolby B, C, HX Pro, track locate features	BB	57
Akai GX-65 £300	Average Average	Fine ungimmicky middle ranking deck with simple, purposeful controls, works best with metal tapes. Performance standards fair to good	3-head, dual capstan, Dolby C/HX Pro		87
Akai GX-95II £400	Good Very Good	Sharp, clear and articulate sounding deck, with superb performance extending to frequency extremes	3 heads, dual capstans, tape calibration, Dolby B/C/HX Pro	R	99
Akai GX-R35 £200	Average Average	Middling sound quality at best with Dolby B; deteriorates with Dolby C and unsatisfactory anyway with testing material due to loss of low level information	Auto-reverse (optically triggered), Dolby B/C/HX Pro, bias adjust		99
Denon DR-750A £250	Average Average	Workmanlike and simply equipped dual deck which is more appealing on audio grounds than most of its type	Dual transport, Dolby B, C & HX Pro	R	99
Denon DRM-510 £140	Good Average+	An amnesic Dolby switch and lack of timer standby detract from an otherwise strikingly successful deck with a consistently good performance	2 heads, Dolby B/C/HX Pro heads, record return	R	99
Denon DRM-710 £230	Average Average	Although this is a fair performing model, the design has lost some of the competitive edge of its predecessor, the DRM-700. Memo: must try harder - and where's the timer standby?	Dolby B/C/HX Pro, fine bias adjust, record return		105
Denon DRS-810 £300	Poor Average	Basically good deck with non-stressful material let down by an inability to deal with high energy tapes properly. The horizontal loading mechanism is a success.	CD style loading drawer, real time remaining display, Dolby B/C/		105
Denon DRW-650 £200	Average Average	This simply equipped model is a little fiddly to operate at time, partly because of the way the single set of transport keys is assigned. But sound quality is generally workmanlike - good value	Twin transport, Dolby B/C/HX Pro	R	93
Dual CC800RS £150	Average - Average -	Low(ish) cost auto-reverse deck has mic input but lacks some niceties. Delivers a punchy but ultimately rather crude impersonation of source material, and a thin, lightweight bass.	Auto reverse, Dolby B, C, HX Pro, microphone input.		105
JVC TD-R431 £170	Poor Poor	Modestly specified auto-reverse cassette deck which suffers the usual problems of the breed, to wit unstable, homogenised sound quality	2-head, Dolby B/C/HX Pro, auto reverse		99
JVC TD-R441 £170	Average - Poor	This deck would make a good choice for those who need the unattended recording time to deal with absentee recording off air, but is a less than wholly convincing musical advocate.	Auto reverse transport, Dolby B/C/HX Pro, CD direct input		105
JVC TD-V531 £260	Average Average	A simple but potentially Good deck with an excellent transport, let down by poor setting up. With all tapes, sound quality was thin and lacking in both substance and colour	3 heads, dual capstans, Dolby B/C/HX Pro, var bias		99
JVC TD-V541 £280	Very Good Very Good	Crisp, lively sounding deck with excellent timing and occasionally slightly thin tonal quality. Best with metals and Dolby B	Dolby B/C/HX Pro, 3 heads, fine bias, display off	BB	105
Kenwood KX-5030 £200	Good Average	confusing mishmash of listening impressions caused by poor set-up afflicting metal tapes and Dolby C in particular. Promising otherwise	2 head, Dolby B/C/HX Pro, auto-bias, track search		99
Kenwood KX-5530 £190	Average - Average -	Neat looking and well equipped deck, adequately engineered but somewhat lacking musically. Worth considering if auto-reverse is the key to your happiness.	Dolby B/C/HX Pro, auto reverse, auto biasing, auto fader		105
Kenwood KX-7030 £260	Good Good	Fine, articulate middle price cassette deck whose only (mild) failing with some programme material is a just perceptibly synthetic glaze	3 heads, dual capstans, Dolby B/C/HX Pro, auto bias	R	99
Marantz CP230 £330	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52
Marantz CP430 £400	Average Average	Uniquely flexible and compact package for outside work which at a pinch can double as a domestic cassette deck. dbx is useful for location work; results with Dolby B are acceptable	Portable 3 head, dbx, fine bias, charger/adaptor	R	87
Marantz SD315 £180	Average Average	Sound quality is promising, but somewhat offset by 'shut in' top end. Pitch integrity suspect. Dolby C sound quality and dubbing performance poor	Dolby B/C/HX Pro, twin transports, one rec/play, one play only. Mic i		93
Marantz SD40 £150	Average Very poor	Obstructive aesthetics are offset by apparently good build and sensible features, but sound quality is uneven or worse	Dolby B/C/HX Pro, fine bias	R	93
Marantz SD50 £230	Good Very Good	Fine, exacting all-rounder offering good stereo, precision and focus. Good with prerecorded tapes too.	Dolby B/C/HX Pro, track & intro search, variable bias etc	R	81
Marantz SD515 £350	Poor Poor +	Good electronic design is let down by mediocre alignment and poor transport stability. Disappointing at the price.	Twin auto-reverse, both transports record, HX Pro, parallel recording		93
Marantz SD60 £350	Good Very Good	A first rate, highly capable deck offering energetic yet refined sound largely due to good electronic design	3-head, Dolby B/C/HX Pro, variable bias & sensitivity	R	81
Memorex SCT-5 £150	Poor Poor	Poor example of a twin cassette deck where everything has been sacrificed on the altar of flexibility	1 rec/play, 1 play only transport, Dolby B/C		87
Nakamichi Cassette Deck One £700	Good Good	New modernised Nakamichi is still curiously old fashioned in many ways, but offers unusually articulate sound of great insight	Dolby B/C, 3 heads: dual capstans, var azimuth	R	99
Nakamichi Cassette Deck 1.5 £500	Good Very Good	High grade 3 head deck with minimal features but fine engineering and sweet, open though slightly coloured sound quality.	Dolby B/C 3 heads, bias adjust	R	105
Nakamichi Cassette Deck Two £350	Very Good Very Good	Not completely neutral, this deck is assured, dynamic and quick, with abundant detail and some coarseness. Stable transport but rudimentary features accompany fine under the skin engineering	Dolby B/C, manual tape type selection, bias adjust	R	93
Nakamichi RX-202E £600	Good Very Good	Fine, clear and articulate sounding player. Excellent with prerecorded material, but idiosyncratic and sometimes obstructive control	Auto reverse, Dolby B, C, 2 head	R	63
Philips FC870 £250	Average Average	Disappointing at the price, this is a well equipped deck with off-tape monitoring, but a somewhat listless, smeared musical style	Dolby B/C/HX Pro, 3-heads, track/intro search etc		81
Pioneer CT-339 £150	Average + Average	Auto BLE tape alignment is the most interesting feature. Sound quality is a little flaky, but reasonable, though pitch problems were encountered with cheap tape stock.	Auto tape align, Dolby B/C/HX Pro, mic inputs	R	105
Pioneer CT-676 £250	Average Poor	Dull, compressed and hard sounding deck, which is hamstrung by high measured transport flutter. Good points include sophisticated (and accurate) tape alignment	Dolby B/C/HX Pro, auto tape alignment, 3 heads		99
Pioneer CT-900S £500	Good Average	High spec and well built derivative of CT-93, but disappointingly lacklustre sound	Dolby B/C/S/HX Pro, dual capstans, 3 heads, auto alignment		99
Pioneer CT-93 £800	Excellent Excellent	State of the art deck, built like something out of NASA's shuttle, with superb all round performance. Dolby S can muddle ambient information, but increases effective dynamic range	Dolby B/C/S/HX Pro, auto tape align, 3 heads, dual capstans	R	99
Pioneer CT-W650R £200	Average Average	There were some intermittent problems with the tape alignment system on the test sample, but the deck was otherwise good, despite a coloured bass and inability to exploit Type IV tape	Twin deck, both reverse, one records, auto align, B/C/HX Pro	R	105
Revox B215 £1727	Very Good Very Good	Fine, consistent and solid sound quality, with excellent under the skin engineering and many useful features — but you're also paying for the same	Dolby C/HX Pro, 3 heads, dual capstans, auto tape align	R	87

CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Revox B215-S £1826	Very Good	This is a superbly engineered deck with a classically fine performance that almost transcends the stereotypes. Ergonomics are flawed but the user interface is both powerful and flexible	3-head, dual capstan, Dolby B/C/HX Pro, auto calibration	R	75
Revox H1 £1,145	Very good	Bare bones version of B215 is still a sophisticated piece of kit, and lacks for none of the 215's engineering prowess	3 heads, Dolby B/C, auto tape align, semi-auto record level set.		99
Revox H11 £938	Average + Average +	Costly and well engineered deck which boasts the bare minimum of facilities and which is primarily designed for the Revox multi-room H-Line system. Moderate performance.	3 head, Dolby B/C/HX Pro, manual tape alignment		105
Sansui D-X111E £120	Poor	Very high levels of flutter, and a shabby, hollow sound with metallic colorations and a severe loss of detail - is it necessary to go on?	Dolby B/C/HX Pro, fine bias adjust		105
Sansui D-X211HXR £170	Good	Clean, stable and open sounding recording quality distinguishes this player, - and auto-reverse too. A great improvement on earlier mid price Sansui models, and excellent value.	Auto reverse, Dolby B/C/HX Pro, bias adjust	BB	93
Sansui D-X311WR £250	Poor	Not wholly successful auto-reverse deck which suffers because it has tried to be all things to all people. Lack of clarity is the main limitation	Twin optically triggered auto-reverse, Dolby B, C & HX Pro		99
Sony K870ES £350	Average+ Average+	Good but not outstanding deck which proved slightly disappointing on audition. This model is no standard setter	3 heads, dual capstan transport, Dolby B/C/HX Pro, tape calibration		99
Sony TC-K520 £170	Average	Fine, assured and detailed performer with a very well designed and straightforward user interface	Dolby C/HX Pro, variable bias, display on/off	BB	87
Sony TC-K570 £200	Good	Good if slightly untransparent sounding recorder, comfortable with all noise reduction circuits and all tape groups	3 heads, Dolby B/C/HX Pro, bias adjust	R	99
Teac V-5000 £300	Average+ Good-	Fine middle ranking heavyweight with blemish free overall performance, beaten only on subtleties by the best at the price	3 heads, dual capstans, bias/sensitivity adjust, Dolby B/C/HX Pr		99
Teac V-7000 £400	Good	Intrinsically sharp, clear and solid sound spoiled by exaggerated detail with prerecorded material and losses imposed by Dolby circuits	3 heads, quartz locked dual capstans, tape align, Dolby B/C/HX		99
Teac R-9000 £450	Good +	Much better than average auto-reverse deck, well worth considering, though short of the special qualities required for formal endorsement at this price. Nicely engineered too.	Auto-reverse, 3-head, tape calibration, Dolby B, C, HX Pro		105
Teac V-8000S £700	Good + Excellent	Superb stability and real subtlety from a cassette deck, this must be the best Teac yet. The only disappointment was the Dolby C circuit which was coloured and lacking in transparency	3 heads, dual capstans, Dolby B/C/S/HX Pro, tape calibration	R	105
Technics RS-B965 £380	Very Good	Messy control layout, but ultra capable deck with clear electronics and excellent headroom, low noise, an ultra-stable transport - and first rate sound quality	3 head, dual capstan, Dolby B/C/HX Pro, dbx, assisted tape alignment	R	93
Technics RS-BX606 £180	Average + Average +	Good middle ranker with accomplished metal tape handling but some HF roughness. Good with both noise reduction systems and with prerecorded material.	Dolby B/C/HX Pro, 3 heads, variable bias	R	105
Technics RS-BX707 £220	Average	Uneven but ultimately messy sounding deck with a number of oddities, including a tape calibration system lacking in accuracy and poor Dolby alignment	3 heads, Dolby B/C/HX Pro, bias & level calibration		105
Yamaha KX-250 £150	Good	Excellent if somewhat fiddly deck with all mod cons. Play trim helps bring recalcitrant tapes back into line. Refined, expressive sound quality and stable transport	Dolby B/C/HX Pro, Intro Scan, Play Trim	BB	93
Yamaha KX-330 £180	Average	Cramped control panel but a strong, dynamic and comparatively stable performance distinguish this strong middle-price deck	Dolby C/HX Pro, optional remote control	R	87
Yamaha KX-530 £230	Good	Excellent all-rounder that does most things at least competently and many things well. One of the best middle price decks	Dolby C/HX Pro, 3 motors, optional remote control	BB	87
Yamaha KX-650 £300	Average+ Good	Fine audio manners, especially in the midband and treble, mark this high class deck out from the crowd	3 heads, dual capstans, Dolby B/C/HX Pro, play trim, bias adjust	R	99
Yamaha KX-930 £400	Good	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

CD PLAYERS

Now nearly a decade old, this all digital music source is well established despite high disc prices and the opposition of many hi-fi enthusiasts. Compact Disc's strengths over conventional vinyl are complete freedom from surface noise, ease of use, and more robust software. Remote control is just about standard on all new players.

However, many vinyl enthusiasts find CDs

sound less involving than top quality vinyl.

Prices average out at a little over £200, although entry level models are now available for little more than £100. Even the most basic models can sound very good indeed and employ state of the art decoding chips and the most useful play features. Extra money can buy remote volume control, audio 'tweaks', plus improved build and component quality control.

Digital outputs facilitate an easy upgrade path

Machines can be split into bitstream and multi-bit with each school having its adherents. Bitstream is the newer technology and will probably win in the end, although the development time spent on multi-bit systems means that excellent results can still be obtained.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Acoustic Research CD-06SE £450	Average-	Basic Philips machine with beefed-up chassis and a revised analogue board. Distortion is higher than normal while the sound lacks both immediacy and clarity.	Remote control, programming but no direct track access, 16bit 4x		95
Acoustic Research CD-07 £300	Good	AR's first Bit Stream CD player relies heavily on Rotel know-how to produce a smooth, detailed but undemanding sound	Few features on player, remote, dig o/p. SAA7321 PDM DAC	R	100
Aiwa XC-700 £180	Good+ Very Good	Generously equipped player that harbours a top Philips' Bit Stream DAC. Offers a characteristically smooth and effortless 'bitstream sound'. Exceptional value	Remote control plus index skip, midship transport and 7350 PDM DAC	BB	95
Aiwa XC-900 £210	Good + Good -	The loss of transparency and general awkwardness of this player comes as a surprise after the XC-700. Extra features have taken their toll	Remote control with variable o/p, midship transport, 7350 PDM DAC	R	100
Akai CD-52 £249	Good	A nice surprise from Akai, genuinely good sound from this mid-priced model. Better linearity will help further	Remote, digital output, headphone socket	BB	64
Akai CD-55 £230	Good	Budget model which fails to compare with the CD52	Remote, hdph, Good programming		83
Akai CD-62 £330	Average	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 is improved, it would probably sound even better	Remote, programme, hdph, comprehensive display etc	BB	70
Akai CD-73 £450	Good	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imagery, Worth auditioning	Track entry keypad remote, menu display (switchable)		62
Akai CD-93 £700	Good	Undoubtedly a CD player of real class in build, presentation, lab performance and sound quality, but also a shade expensive for formal Recommendation - though that's not to dissuade lovers of black lacquer wood finish	Track entry remote, menu display etc.		58
Arcam Alpha £420	Very Good	Arcam's new star, its best CD player yet and great value	Remote, etc, coax dig. out	BB	83
Arcam Delta 70.3 £650	Good	Latest in a line of Delta 70 CD players and one that offers a distinctly rugged, beefy sound. Plenty of power behind individual instruments but lacks a feeling of involvement	Remote control, display dimmer, variable and dig outputs. 7350 PDM		95
Ariston CD1 £400	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

The Directory

CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Ariston Maxim CD2 £550	Good+ Good+	Yet another re-worked Philips player with chunky alloy casework and sophisticated analogue stage. Narrowly escaped a recommendation with its dynamic and purposeful sound. Still a hint of graininess through the treble	Remote control, coax digital output. 16bit 4x chipset.	95	
Cambridge Audio CD3 £649	Poor Good +	Unique internal configuration gives the CD3 a fluid and detailed sound falling off at the frequency extremes. The controls and displays are primitive	Optical/electrical digital out, remote control	87	
Carver TL-3100 £340	Average Average -	The sound quality did not live up to the excellent fascia. Carver's DTL did not aid the indifferent sound	DTL sound shaping, usual facilities, remote, memory	76	
Carver TL-3220 £495	Good Average	A lightweight player with primitive display. We thought it sounded rather sparse and dry, and though Carver's DTL feature certainly fleshed-out the bass it also softened the stereo focus	Remote control with volume keys, 'Digital Time Lens', 18bit 8x	95	
Carver TL-3300 £595	Good + Poor	Carver needs to listen critically to CD sounds; in our opinion. DTL does not improve the recipe	DTL, remote, programming, digital output	83	
CEC 880CD £230	Poor Average	The dynamic and spritely sound of this machine is gratifying in the light of its primitive design but is otherwise poor value	Remote control, direct track access, dig o/p, hybrid PWM DAC	100	
Denon DCD-1460 £400	Good+ Average+	Here's a player that benefits from solid casework and decent features yet the overly complex electronics knock the stuffing from its sound	Remote control, volume, index search. 18+2-bit DACs	100	
Denon DCD-2560 £550	Very Good Good	Beautifully built and, once again, generously equipped yet with a sound that's decidedly sluggish or reserved, particularly through the bass. Vocals are more forward but can sound a little glassy	Remote, pitch, tape edit features, opt/coax digital output, 20bit 16x.	95	
Denon DCD-860 £250	Average+ Good+	This is a well designed and generously equipped budget player that offers a very spacious and appealing sound. There's a hint of treble emphasis but it still sounds great at high volumes!	Remote, pitch and full tape edit facilities. 18bit 8x.	95	R
Denon DCD-960 £300	Good + Average	A fine feature package with sood lab results, but unfortunately an unexceptional sound quality	Remote inc vol, hdph, keypad, well featured	88	
Ferguson CD007 £130	Average Average	The cheapest recommendation in the test group; don't expect the earth but the value is good	Manual, digital output, headphone R socket	64	
Ferguson CD008 £150	Average Average	Not as strong as its relatives, sample fault perhaps? Though performance is fair enough overall	Remote, midi digital output, 2x O/s, timeshare 16 bit	64	
Goodmans GCD-435 £140	Poor Average -	Goodmans has the poweer to source with more care than this, music centre quality!	multibit, remote, basic facilities	88	
Harman Kardon HD7450 £300	Good Average	A very stylish machine but one that is let down by its aggressive and 'dirty' treble quality which pierces through most types of music. Weak bass resolution undermines the 'roots' of the player	Remote control but no headphone socket. MASH/PWM bitstream	95	
Harman Kardon HD7500II £350	Good+ Good+	An update of the original HD7500 but featuring superior analogue electronics to the HD7450. Tonal integration is much improved, packed with detail that's expressed with enthusiasm	Remote, variable, digital and headphone outputs. MASH/PWM	95	R
Harman Kardon HD7600II £429	Good+ Average+	Based on the HD7500II but with a motorised volume control and extra-heavy casework. Either way it lacks the transparency and sparkle of the cheaper machine	Remote, variable and digital outputs. MASH/PWM DAC	100	
Harman Kardon HK7300 £200	Average Average -	Budget low bit technology, does not deliver enough for a recommendation	No remote, no digital out; basic control features	83	
JVC XL-V231 £149	Excellent Average -	Text book lab result but below par sound, nice and boring. Must be some potential here	Remote, hdph (fixed), JVC 1-bit PFM	88	
JVC XL-V241 £160	Good Average	Even with its mkII PEM DAC this new machine sounds pleasant but not especially interesting. Stereo imaging is a trifle suspect	Remote control, slim centralised drawer, PEM bitstream DAC	100	
JVC XL-Z1011 £520	Very Good Good+	JVC's current flagship combines old K2 technology with PEM bitstream to deliver a full, beely and engagingly dynamic sound	Remote control, variable and digital outputs, PEM bitstream	100	R
JVC XL-Z431 £200	Very Good Average-	This is a player that started life off the back of the successful XL-V231 but whose performance fails to come up to scratch. The sound is weak and uninspiring - poor use of JVC's PEM DAC.	Remote operation, motorised volume + tape edit. PEM bitstream	95	
Kenwood DP-4030 £180	Good+ Good+	Kenwood's first and cheapest bitstream player enjoys a deceptively detailed and refined sound but one that is mildly veiled right across the spectrum. Excellent value nonetheless.	Remote, variable and opt digital outputs. NPC bitstream DAC	95	R
Kenwood DP-5030 £200	Good+ Good+	This looks like the DP-4030 but has more in common with the DP-7030 inside. Either way its neutral, uncluttered and intimately detailed sound is better than both	Remote control, motorised volume, R disc file. Sony PLM DAC.	100	
Kenwood DP-7030 £300	Good+ Good+	By adapting established Sony bitstream technology Kenwood has moulded its own exceptionally smooth and polite sound. Very nicely built machine with midship transport mechanism.	Remote, index scan, variable and optical outputs. Sony PLM bitstream	95	R
Kenwood L-1000D £830	Very Good Good	A beautifully constructed and very stylish player that really only gives off its best when teamed-up in balanced-mode with Kenwood's matching pre/power combination	Remote control, balanced XLR's, 16-bit integrating DACs	100	
Luxman D105u £699	Average Average	Visible valves are essentially for show in this rather ordinary player - both sound and lab	"valves", remote inc vol, hdph, well equipped	88	
Marantz CD-52 £200	Average+ Good+	Hardly the most neutral player on the planet but its rich, full and very generous sound cannot fail but warm the coldest of hearts	Remote control, FTS and dig outputs. SAA7350 PDM DAC	100	BB
Marantz CD-62 £300	Good Good-	Basically this is a Philips CD850II with Signetics op-amps all plonked into an old CD-50 chassis. Something of a range-filler	Remote control, index, 8-step volume and FTS. SAA7350 PDM	100	R

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The Directory

CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Marantz CD-80 £560	Very Good Good	A dynamic and bold sound from a machine that is equally bold in appearance. It betrays no fear of the most thundering crescendos yet can sound a little hard or glassy with pop CD's.	Remote, motorised volume + FTS programming, 16bit 4x.	R	95
Memorex CD1650 £200	Poor Poor	An overpriced music entre player. Surely the giant Tandy corp. can get a better standard than this?	remote, keypad, multi bit, midi		88
Meridian 206B £995	Excellent Excellent	What a stunner! Audiophile quality from the reference one box CD player, and at a most realistic price	Differential bitstream, keypad remote, prgming	R	88
Meridian 208 £1,550	Excellent Excellent	State of the art CD sound combined with a decent preamp and full remote control	Hdph + remote level. Programming, R phase invert, various outputs		83
Micro Seiki CD-M100 £5541	Very Good Good	One of the hernia inducing bricks of hi-fi, the Micro is extravagantly styled, finished and built. The good lab performance led to an 'only good' sonic display when the price demanded excellent	Balanced output, remote, display blanking		72
Micromega Logic £500	Good- Good	A rather expensive version of Philips CD624 with new op-amps and CD tray. Still, it does sound rather meatier, better integrated and more purposeful	Remote control, no FTS but switchable digital output, SAA7321		100
NAD 5425 £200	Very Good Very Good	Not much in the way of facilities on offer but a sound that is both wonderfully open, detailed and appealing. This is a very communicative player that sounds positive without being brash	Worthless remote control, track skip/scan, MASH/PWM bitstream DAC	BB	95
NAD 5440 £300	Very Good Good+	The 'no compromise' version of NAD's 5425 but still rather lacking in facilities. Its sound is smoother and richer than the 5425, preferring to seduce with subtlety.	Remote with direct track access, variable output, MASH/PWM	R	95
Nakamichi CD Player 2 £625	Average+ Average+	This may look like a CD Player 4 but features a special transport able to store 7 CD's with one in play. Nevertheless its digital electronics are flawed and its sound powerful but blunt	Music bank, remote, volume control, digital o/p, 18 bit DACs		100
Nakamichi CD Player 4 £300	Average+ Good-	Attractively styled but suffers high-ish distortion for a modern CD player. Best suited to up-beat pop rather than complex classical works which seem to lack focus and secure soundstaging	Remote with track access, coax dig. output, 18bit 8x		95
Nakamichi OMS-5EII £1500	Good + Very Good	"... delivers near state of the art performance and build quality in a deliberately starkly functional package, but at a very high price..."	Skip and scan, simple track programming, hdph		51
Nakamichi OMS-7EII £2000	Good + Good	The only serious criticism here is of the price. And in our opinion you can get better sound quality for less elsewhere in Nakamichi's range	10 digit track entry programming, hdph		51
Philips CD618 £170	Good Good	Cheapest of Philips bitstreamers and quite possibly the best with its excellent definition, punch and sparkle	Remote control, shuffle play, variable headphone, SAA7321 PDM	R	100
Philips CD624 £200	Good Good-	Philips' cheapest Bit Stream machine is still equipped with a vast array of features. Sounds pretty civilised too but lacks the crispness and freedom necessary to set it apart.	Remote, FTS programming, digital output. SAA7321 Bit Stream DAC		95
Philips CD634 £250	Good Good-	The all-singing all-dancing version of Philips' budget Bit Stream player and one that seems better able to cope with the pizzaz and dynamics of a decent recording. Nevertheless it still lacks the lucidity and conviction of the best at this price.	Remote, FTS + Title + personal programming. SAA7321 Bit Stream		95
Philips CD850mkII £400	Very Good Good	This looks just like the original but sounds completely different, trading a little transparency and pizzaz for an altogether smoother but slightly less memorable performance	Remote control, 2 FTS, personal presets. SAA7350 Bit Stream DAC	R	100
Philips CDV185 £350	Average + Average	Hard to value with the video singles facility but it all works well enough for a recommendation	Video singles + CD scart + digital out etc	R	76
Pioneer PD-7700 £250	Good+ Good+	A busy-looking player with an upside-down transport yet one that offers a very tight, confident and dynamic sound. Bubbly and entertaining but still very refined	Remote control, turntable drive mechanism. 1-bit PDM DAC	R	100
Pioneer PD-8700 £300	Good+ Very Good	A pair of PDM DACs builds upon the sound of the '7700, crafting a generous soundstage populated with big-hearted and thoroughly captivating musical images	As 7700 plus index skip, display off and motorised volume. 1-bit	BB	100
Pioneer PD-91 £900	Excellent Excellent	Close to state of the art in nearly all areas - soundstaging, clarity and simple lack of artificiality. A well made and sophisticated player	Track entry remote, calendar display	R	64
Pioneer PD-93 £1430	Very Good Good+	The extremely civil, understated feel of its music contrasts markedly with the over-engineered construction of this unit. It will not offend anyone but then neither will it spark much excitement	Remote with fader and index facilities. Two dig o/p's. 20bit 8x		95
Proton AC-120 £180	Average Average -	Fine styling, low price but barely average performance	15 track memory, simple design, remote, hdph		76
Revox B126 £649	Very Good Good	Made in Switzerland so the build quality and technical performance is high, but then so is the price and the sound quality is only good	Programming, Revox system compatible		70
Revox B226S £840	Good Average	Top quality build and finish for the Revox system enthusiast. For high value sound look elsewhere	Remote vol, hdph, 19 track memory, digital op		76
Rotel RCD-965BX £300	Average+ Excellent	Two years on and the 865's replacement turns out to be an exceptionally refined bitstreamer: transparent, exquisitely detailed and powerfully emotive. A landmark player	Remote control, index skip, digital out. SAA7323 PDM DAC	BB	100
SAE D102 £700	Good Good	Considering the high price of this player, most of the innards seem fairly prosaic. Sound quality and lab performance are both respectable enough, but hardly justify the price premium involved	Remote (inc volume), skip, scan etc.		58
Sansui CD-X311mkII £250	Good+ Good	Sansui's mid-ranked player uses Technics' technology but provides a warm and cuddly sound that's atypical of the breed	Remote control, variable and digital out, MASH/PWM DAC	R	100
Sansui CD-X711 £600	Excellent Very Good	Luxury features, finish and sound from this classy Sansui; no excuses required here	Hdph + vol, remote full programming	R	83
Sharp DX150 £129	Average Average	This is one oversampled player which is rather outclassed for technical and sonic merit by the vast majority of the competition. Pretty enough but would you want to put discs in it?	Programmable, skip, search, repeat		70
Sharp DX750 £179	Average Average	It has a remote control but it's too like the 150 which is rather outclassed for technical and sonic merit by the vast majority of the competition	Remote, programmable, skip, search, repeat		70
Sony CDP-591 £160	Good+ Average+	Tons of features at a highly affordable price but let down by its lacklustre if inoffensive sound quality. The sound of these new Sony players lacks the grip and purpose of the last generation	Remote control, variable and optical digital out. PLM bitstream		100
Sony CDP-991 £230	Good+ Average+	Another well-equipped and well-specified machine and one that can sound very up-beat and detailed with simple material. Tends to loose its way with complex stuff, however	Remote control, Custom File programming, variable out. PLM DAC		100
Sony CDP-X333ES £400	Very Good Good-	This beautifully built player has a very tidy and well-ordered style of music-making, but in the long run it lacks the ability both to excite and involve	Remote control, Custom File programming. Complementary PLM		100
Sony CDP-X77ES £1000	Excellent Good+	Rather like Pioneer's PD-93 this flagship player is beautifully put together but simply lacks the thrill or conviction of cheaper and perhaps more ragged-sounding machines. Still, this sample was well-used from demonstration stock...	Remote, everything but Custom File titling. Complementary PLM DAC		95
Stax Quattro £2995	Very Good Very Good	Now in mkII guise this substantial player recreated exceptionally strong and convincing bass lines together with a beguilingly musical midband	18-bit DACs, 20-track memory, full IR remote, variable o/p	R	72
Technics SL-PG200A £160	Good+ Good+	This season's version of last season's favourite (the SL-P277A) offers extra features and a similarly punchy, dynamic and up-beat sound. All this plus an uncommon poise - Best Buy	Remote control, random play, variable out, MASH/PWM bitstream	BB	100
Technics SL-PS900 £350	Very Good Good-	Just about the quietest transport in existence and a sound that is equally unobtrusive, polite and refined. There's plenty of detail too but the overall result won't set your pulse racing	Huge remote control, function manager MASH/PWM DAC		100
Wadia WT-2000/Digimaster 2000 £5614/£6641	n/a Very Good	Very high grade player which provides state of the art in believable music making from CD, and promises a degree of upgradeability	Transport/multi bit DAC - 32, 44.1, 48kHz o/s	Coll. '90	
Woodside WS2 £1095	Good Good+	Prompted a mixed reaction on audition, responding well to our jazz and classical selection but sounding bright and grainy with the pop CD's. RF emission is very high	Remote control, display defeat, variable and digital outputs, 16bit 4x		95
Yamaha CDX-450 £170	Average+ Good	A contentious player this and one that prompted a range of reactions from enthusiasm to disinterest among our listeners. It could prove too safe-sounding but worth a try at the price.	Remote control, track access, variable out. 18-bit hybrid DAC	R	100
Yamaha CDX-750 £250	Good Average+	A sleek machine that can sound rich and vibrant with simple material but seems to lack expressiveness and subtlety when dealing with busier, more complex passages	Remote control, variable and digital out, LC display. PDM DAC		100

CD TRANSPORTS AND DACS

A CD player can be split into two basic components, the mechanism which reads the information from the disc, known as the transport, and the device which turns the digital numbers contained on the disc into the music that comes out of your speakers, this device being referred to as a digital to analogue convertor or DAC. Although at the lower end of the market both of these are contained in a single box, at the top end of the market two box machines consisting of a CD transport and a separate DAC become more common.

Although many of these units will be purchased as two box machines, which are generally considered to sound better than a one box equivalent, a DAC can also be used to upgrade an existing CD player. A good example is where an early machine with a satisfactory drive unit but a rather dated DAC can be brought up to the latest spec by the addition of a new DAC.

When upgrading an existing player best results are usually obtained using the electrical digital output rather than optical, and obviously

to be upgradeable your CD player must have a digital output in the first place.

The choice of interconnect is crucial in linking drives and DACs and conventional interconnects used for analogue signals should be avoided, a dedicated 75ohm digital cable will give far better results.

Mixing and matching transports and DACs from different manufacturers can be a bit of a lottery and readers are referred to the full reviews where this subject is discussed in more detail.

CD TRANSPORTS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Arcam Delta 170.2 £620	Very Good Good	An upgraded Delta transport, it sounds different but not really better. More research is required here	Transport only, display off, usual programming		88
Kenwood DP-X9010 £500	Average Average +	Compromised by jitter, RF noise and poor clock selection this transport generally encourages a dynamic but bright and edgy sound with most DACs	CD transport, optical + coax outputs, Class 2		96
Marantz CD-95DR £1500	Very Good Good	At its best with Philips-based DACs, this transport sounds confident if not totally pure, sparkling or fresh	CD transport, optical + coax digital, Class 1		96
Meridian 200 £895	Very Good Very Good	Broadly compatible with most DACs and offering a light, fresh and very bubbly sound that is both natural, engaging and unfatiguing	CD transport, optical + coax outputs, Class 1	R	96
Meridian 602 £1,750	Very Good Good	This dedicated CD transport teams-up most successfully with the 606 DAC. Otherwise it lacks the life and pizzaz of the 200	CD transport, optical + coax outputs, Class 1		96
Philips CDD882 £500	Good Good	A butchered CD880 CD player-cum-CD transport that pairs up well with most Philips-based DACs. Dynamic and lively but can also sound a little mechanical	CD transport, optical + coax outputs, Class 1		96
TEAC P-10 £1499	Good Very Good	A chunkier and altogether more successful transport than the P-500 with an especially beely and compelling sound, TEAC's best	CD transport, coax + optical outputs, Class 1	R	96
TEAC P-2 £2849	Very Good Good	TEAC's flagship CD transport is beautifully styled and constructed but its sound is bleached and generally less inspiring than that of the P-10	CD transport, coax + optical outputs, Class 1		96
TEAC P-500 £649	Good Good +	Provides a smooth and very sympathetic sound with most DACs yet is also rather vague, lacking the crispness and resolution of its peers	CD transport, coaxial and optical outputs, Class 2	R	96
Technics SL-PA10 £470	Good + Good	Built to partner the SU-MA10 upmarket integrated amp/DAC, this transport has the unusual limitation of only optical output. Reassuringly solid and more immune to vibration than most	CD transport, optical output only, remote		88
Wadia WT2000 £5614	Very Good Good +	Based on TEAC's P-2 with outboard mains transformers, active digital output and solid alloy casework. Dynamic and crisp sound best realised with Wadia DACs, otherwise less impressive	CD transport, AT&T opt + direct -coupled coax outputs, Class 1		96
Wadia WT3200 £1800	Excellent Very Good	Based on Marantz's CD-95DR with new casework, active digital output and revised grounding. Very clean, clear and authoritative sound with Wadia and Philips-based DACs	CD transport, AT&T opt + direct -coupled coax outputs, Class 1	R	96

DIGITAL TO ANALOGUE CONVERTORS (DACs)

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Arcam Black Box 2 £260	Very Good Very Good	An upgraded version of the old BB1 with more inputs and improved sound quality	Optical and wired inputs	BB	76
Arcam Black Box 3 £360	Good + Very Good	Top of a series of three decoders it can offer a high sonic standard with top class transports	Bitsream, auto input switching,	R	88
Audio Alchemy Digital Decoding Engine V1.0 £376	Good Very Good	A very sweet and seductive sounding unit that gives good results with a wide range of CD players/transports	Coaxial and optical inputs, phase invert, Bit Stream DAC	BB	101
Audio Research DAC1-20 £3898	Very Good Good	This expensive DAC works surprisingly well with Meridian's cheaper 200 transport, an impressively weighty and engaging combo that proved entertaining on audition.	BNC, Toslink and AT&T optical inputs, phase invert, 20-bit DACs		103
Audiolab 8000DAC £695	Very Good Good	Needs to be used with a genuine Class 1 digital drive. At its best with the Wadia WT3200 where it sounds vivid and alive. Otherwise can sound a little antiseptic.	Coax and opt inputs, phase invert, crystal lock, Bit Stream		103
Deltec Bigger Bit £650 + £98	Good Very Good	Partnered with either TEAC P-10 or Meridian 200 transports, the Bigger Bit delivers a very taut and dynamic sound, bathed in an open acoustic. Deltec's RF mains filter is a must.	Coax and opt. inputs, Deltran sync facility, DAC7 Bit Stream	R	103
Deltec Little Bit (Optical) £400	Very Good Good	Our sample suffered from radiated RF interference but new LB's are now cured. Works especially well with Meridian's 200 transport but does require the services of Deltec's 'Power' mains filter.	Coaxial and optical inputs, SAA7350 Bit Stream DAC		101
Deltec PDM1 £500	Average Very Good	A no frills audiophile bitstream converter at an affordable price	Coax-in, special cable and mains filter options	R	83
Deltec PDM1 Series 3 £1195 + £196	Very Good Good +	Hailed as a budget version of the PDM2, it bears technical comparison with both the PDM2 and Bigger Bit but - in terms of sound quality - is no great advance on its cheaper relative.	Coax and opt inputs, two-box construction, DAC7 Bit Stream		103
Deltec PDM2 £2000	Excellent Excellent	State-of-the-art technical performance with a pristine sound to match. Repertoire includes a solid, invert, two-box DAC7	Coaxial and optical inputs, phase invert, DAC7 Bit Stream	R	101
Forte Audio Model 50 £950	Good Very Good	The first American DAC7 design and one that offers a typically big and full-blooded sound, infiltrated by a slightly euphonic quality but never hard or gritty.	2 Coax and 2 optical inputs, DAC7 Bit Stream technology	R	103
Kelvin PDM DAC £200	Average + Average +	Don't disregard this DAC-in-a-matchbox for though it can sound a little unconvincing it is capable of developing a surprisingly lyrical and natural sound with the right transport.	Single coaxial input, low analogue outputs, SAA7320	R	103
Meridian 203 DAC7 £510	Good Very Good	This is another broadly compatible DAC that's free of fatiguing nasties yet remains bubbly and exciting. If you find the 606 too sober then the 203 will undoubtedly suit	Coaxial and optical inputs, single-box DAC7 Bit Stream	R	101
Meridian 606 DAC7 £1220	Very Good Good	Extra cash buys you a better standard of construction and finish over the 203 yet by refining its sound further Meridian have also tempered its vibrancy and 'life'. Fickle with other transports	Two coaxial and optical inputs, phase invert, DAC7 chipset		101
Micromega Duo BSII £500	Average Good	This DAC has a tendency to sound light, airy and 'last' but it can also become a little hard or - fatiguing with some digital outputs. At its best with Meridian's 200	Coaxial and optical inputs, phase invert, SAA7321 Bit Stream		101
PS Audio Superlink £1498	Average Good -	Another transport-fussy DAC that, once again, does the business with Meridian's 200 but can sound bloated, smeared and even vaguely electronic with standard 75ohm digital outputs.	Touch-sensitive coax and optical inputs, phase invert, 18-bit		103
Proceed PDP2 £1595	Average Good -	The PDP2 has a wobbly input impedance that's suited to specific drives, ie Meridian 200, or Proceed's own. At its best expressive and enticing, otherwise it can seem gutless and smeared.	Coax and XLR inputs, balanced outputs, 18-bit DACs		103
Stax DAC-Talent £1400	Excellent Good +	Natural, refined and never over-zealous, the DAC Talent is also capable of sounding very spicy and dynamic. Capable of wielding a maturing influence over a light or bright-sounding system	Coaxial and optical inputs, phase invert, mute, 20-bit DACs		101
TEAC D-500 £399	Good + Good +	An unusual combination of NPC oversampling filter and no less than two Philips' DACs. Its reliable 75ohm input infers broad compatibility. A dynamic and 'interesting' sound	Coax and optical inputs, complementary 16-bit DACs.	R	103

DIGITAL TO ANALOGUE CONVERTORS (DACs)

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Threshold DAC 1/e £3150	Very Good	The DAC 1/e can sound beautifully detailed with a marvellous sense of scale and sharp, solid images. Its unpredictable behaviour with unknown transports precludes recommendation.	Coax and opt inputs, balanced outputs, phase invert, MASH/PWM DA		103
Wadia DigiMaster X-32 £2000	Average - Good -	Wadia's freaky input circuit gives unpredictable results with non-Wadia transports. Otherwise it can sound bold, dynamic and crisp but lacks the warmth to bind its music together	BNC and optical(TosLink and HP) inputs, 18-bit 32x		101
Wadia DigiMaster X-64.4 £5000	Average Good*	The X-64.4 positively buzzed with vibrant, sharply-etched detail. An exciting sound	BNC + Toslink/AT&T optical inputs, phase invert, 18-bit 64x		101
Woodside DAC 1 £895	Good Good	Fine but slightly dated and costly package in performance terms - but flexible, musical and t well built	2 electrical + optical i/p. tape ou		87
Woodside DAC2 £510	Good Good +	Based on Woodside's earlier 16-bit CD player and offering a similarly sharp and dynamic sound, all the more captivating for its lack of graininess and 'tizz'. Should be a reliable upgrade	BNC coaxial input (no optical), 16-bit 4x	R	101

DIGITAL AUDIO TAPE

DAT, or digital audio tape, has been on the market for quite some time now but has never really 'made it' as a consumer medium, probably due to the fact that very little prerecorded software has been made available.

In the last year or so it has begun to carve itself a niche at the top end of the market replacing reel to reel tape recorders as the audiophile's tape based medium.

The DAT standard specifies a 48kHz sampling rate, which is higher than CD, so direct copying in the digital domain is only possible on those machines with dual sampling frequencies, ie 48kHz and 44.1kHz. Some machines also record at 32kHz to give a longer recording time for a given length of tape.

To try and get around the copying problem many machines incorporate SCMS, the Serial

Copy Management System, a device which enables you to record from a CD but not to 'clone' one digital tape from another.

Portable machines are now entering the market but make sure the price you are quoted includes an analogue to digital convertor, with some portables these have to be purchased separately and increase the price considerably.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa HD-S100 £450	Average - Average -	Largely bulletproof in non-critical and semi-critical applications. Despite the usual limitations of DAT as a hi-fi medium, the HD-S100 is a practical and well built tool.	Portable, ADC, mic in, phone/line sockets (3.5mm), 70 min battery	R	105
Aiwa XD-S1100 £550	Poor Average -	A muddled fascia detracts from the appeal of this inexpensive deck, but the real no no is a significant loss of the finer virtues: detail, imagery etc	SCMS, analogue, coaxial & optical in/outputs, full subcode editing		99
Aiwa XD-S260 £500	Poor Poor	Unlovely sounding deck lacks weight, clarity and presence. Low pricing and mini dimensions excuse many sins however	SCMS, optical/coaxial and analogue in, optical/analogue out		99
Denon DTR-2000 £800	Good Very Good	Not cheap, but first rate DAT recorder, good to excellent fidelity in all modes, with a slightly cool detached quality when differences are detectable.	Digital LP/digital & analogue SP rec/play, LP analogue play only	R	93
JVC XD-Z505 £620	Good Good	Competent middle market DAT with uncomplicated (but still flawed) user interface, but good basic sound quality. A fine CD dubbing machine.	DAT SP/LP en/decode, low bit conversion, remote control	R	105
Kenwood DX-7 £500/Sony	n/a Average	Sound quality is pretty fair, but a little rougher than the best of the breed. Controls are good, the display however is poor - and most users will require the accessory pack	Mains recorder, LP mode. Optional accessory packs adds battery/ADC		94 Supp.
Kenwood DX-7030 £700	Average Average-	Bland sounding deck that lacks low level clarity and imaging. No analogue LP mode. Build quality is good however and ease of use ranks highly	Remote control, stand-alone DAC facility, optical/coaxial in/out		99
Pioneer D-500 £600	Good - Average	Looks extremely good. Fascia design is complex yet accomplished, and offers very slick tape handling. Musically however it is on the messy side compared to others in this price area.	SP/LP en/decode 1-bit converters, many search/display aids		105
Sony DTC-750 £450	Good Good	Superb value for money: the lowest price full size DAT on the market, fine features, build, measurements and sound approaching the best DAT has to offer at any price.	SP/LP record, real time/date recording	BB	105
Sony DTC-77ES £1000	Excellent Average	Superb engineering, many well implemented features (including off tape monitoring) and technical near perfection (!) don't offset perceptibly slowed, thickened sound	4-head, tape monitor, many search/display options, SP/LP		105
Sony DTC-M100 £799	Very Good Very Good	Only available from professional outlets. Clean clear sounding second generation model with most of the features and sound of the DTC-1000ES	Midi-width, alpha-numeric display, remote, optical/interfaces	R	63
Sony TCD-D3 £500	n/a Very Good	At the time of writing, this model represents the state of the art, and beats all comers.	DAT recorder, detachable rechargeable power pack, LP/SP	BB	94 Supp.

EQUIPMENT SUPPORTS

It's becoming more and more apparent that all the components in a hi-fi system benefit from being placed on the right kind of support. It is already acknowledged that performance of electro-mechanical transducers, such as turntables and loudspeakers, can be greatly improved by using highly rigid supports. This notion has been expanded to include electronics such as amplifiers and compact disc players, and inevitably a broad range of stands and supports have been produced to cater for this requirement.

With loudspeaker stands there seems to be two broad schools of design. The most common

is the open frame type which uses square section steel tubing (usually less than an inch square) made up to form a tripod or quadropod stand usually fitted with spikes top and bottom to ensure good coupling to both floor and cabinet. However, for reasons of domestic harmony this latter option is often not pursued as eagerly as perhaps it should be.

The alternative approach is to use mass. Larger section (approximately 3 inch x 2 inch) tubing is welded between square top and bottom plates and filled with sand and/or lead shot. Again, this type uses spikes at the base but Blu-

lack or the like for coupling with the cabinet.

Equipment supports generally place isolation quite high on the list of priorities and usually use a lightweight steel frame to support an MDF platform. Once again spikes are used to minimise contact with the platform and ensure good coupling to the floor. Minimising weight without compromising rigidity seems to be the aim with turntable supports but those designed for electronics often employ some form of damping to kill vibration, sometimes in the form of mass.

EQUIPMENT SUPPORTS - COMPONENTS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE (H x W x D)	VALUE	ISSUE
Alphason R444 £120	Rack Good	A heavyweight structure with stressed MDF shelves, ideally suited to the Sonata turntable	82 x 60 x 39.5cm	R	83
Audioquest Sorbothane Feet £40 for four	Feet Good	These large gumdrops are very useful for damping vibrations in amplifiers and especially CD players.	6.5 x 2.5cm (circular)	R	57
Cornflake TCS6 £60	Shelf Good	A squat and rigid frame supports a Medite top board with four adjustable spikes, better suited to suspended sub-chassis turntables.	43 x 23 x 33cm		83 Supp.
Foundation Stable Table £100 (with Supe	Table Good	Similar to Stand Design's table though less well finished and certainly less stable	64 x 46.5 x 36cm		58
Origin Live Skyline Super £100	Table Good	An asymmetric table that helps provide a quick, lucid and solid sound with most decks	41 x 50 x 40cm	R	83
Roksan Equipment Table £169	Rack Good	An upgradable/expandable system suited to Roksan's Xerxes if not other competing turntables	65 x 52 x 38cm		58

EQUIPMENT SUPPORTS - COMPONENTS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE (H x W x D)	VALUE	ISSUE
Sound Organisation Table £55	Table Very Good	A deceptively simple structure that just happens to be engineered in a thoughtful, and ultimately successful manner.	37 x 45 x 35cm	BB	57
Sound Organisation Wall Stand £40	Shelf Very Good	The first of its ilk and still amongst the best, this simple framework represents a vast improvement over standard furniture shelves.	27.5 x 43 x 35cm	BB	57
Sound Organisation 2022 £97	Table Excellent	A small but costly table made from thin steel tubing. Suited to the LP12 but not other decks	49 x 45.5 x 36cm		58
Stand Design Duplex £75	Table Very Good	Well made and nicely finished, this table is broadly compatible with most heavy turntables	63.5 x 46.5 x 36cm	R	83
Target TT2 £64	Table Very Good	Standing up to the best in most areas, the TT2's only real foible concerns a slight loss of bass 'slam'. Design was updated in 1990	52 x 46.5 x 35.5cm	BB	57

EQUIPMENT SUPPORTS - LOUSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE (H x W x D)	VALUE	ISSUE
Appolo A10 £52.50	4 leg Average	A robust and lightweight model, it would make an ideal upgrade for those still happy with the big boxes of old.	19 x 19cm 44cm	R	58
Appolo A820 £44	4 leg Average	A light open-framed budget design slightly lacking in rigidity and subjectively superceded by other stands costing £10 more.	19 x 19cm 53cm		58
Foundation Fred £70	2 leg Average	With sand filling the Freds made speakers sound tight and coherent with a more even balance.	19 x 19cm 36/43/59cm		58
Foundation Maggi £159 to order	Plinth Very Good	Made for Magneplanar and other similar panel speakers they seem to have a healthy effect on the sound quality thereof.	50 x 2cm 2cm	R	58
Foundation Pi £269 to order	2 leg Very Good	Overpriced in material terms the Pi nevertheless has a very positive effect on the low frequency performance of conventional speakers.	20 x 20cm 25/38/46/5	R	58
Foundation Sir Fred £80	2 leg Good	Upgraded 'Fred' with special in-fills. Sweet sound but one that also lacks bite and edge	19 x 19 x 46.5cm		83 Supp
Goldring Black Satin £65	1 leg Very Good	Screw together stand tastefully hewn from medite. Some loss of bass but still pleasantly rhythmic	18 x 20 46cm	R	83 Supp
Heybrook HBS1 £109	4 leg Very Good	With its new aluminium base frame the HBS1 fared very well in the listening tests. It allowed much of the speakers own 'sound' to remain intact.	23 x 21cm 47cm	R	58
Heybrook P5S £69	3 leg Very Good	An unusual triangulated open frame stand that can help certain speakers sound more transparent and fluent - a good value stand	23 x 21.5cm 47cm	BB	58
Linn Kan II £101	4 leg Very Good	Built to support Linn's Kan speaker this stand is well suited to the task, but is less successful with other loudspeakers.	19 x 16cm 59cm		58
Linn Sara £112	4 leg Very Good	The Sara exhibits some odd properties so its use other than with the Sara loudspeaker should be viewed with caution.	25 x 21cm 53cm		58
Origin Live Three Leg £89	3 leg Good	An unusual tripod stand devoid of top plate and taking up more floor space than normal, subjective and technical performance was exemplary.	(support area) 22 x 17.5cm 52cm	R	58
QED TS22 Tristand £60	3 leg Very Good	Most tracks sounded uplifted or buoyant, never thick nor coloured. It worked well with most of the speakers tried and encouraged a fluid and revealing midband.	19 x 17cm 45/50/58cm	BB	58
Standesign Z20 £75	1 leg Excellent	Well built and finished with optional sand in-fill. Ideally suited to Wharfedale 505.2's	16.5 x 19 50cm	R	83 Supp
Target HJ15/3 £107	3 leg Very Good	Sound quality was basically very good though without the sand infill some loudspeakers may sound a little unbalanced as both bass and treble regions are subjectively exaggerated.	28 x 28cm 40cm	R	58
Target HS20 £64	1 leg Excellent	This monopod stand can be used either filled or unfilled and encourages different characteristics in the speakers sound accordingly	19 x 16.5cm 53cm		58
Target T-40 £51	2 leg Very Good	Not very stable, tends to infer a slightly forward, ragged sound with diluted pitch	19 x 19 40cm		83 Supp.

HEADPHONES

There are a variety of different approaches to headphone design, and examples of each turn up in this group. Amongst the more expensive esoteric models, electrostatic drivers are used in square open-backed phones such as the Jecklin and Stax models

The majority of these come with some form of transformer which takes the signal initially from the speaker terminals on the amplifier. The actual speaker cables then travel from this unit

bypass switch to the loudspeakers.

The more down to earth models feature dynamic drivers in circular open-backed designs. The advantage of open backs seems to be a correspondingly open sound and a less claustrophobic feel to the music.

One can also of course hear external noises, as well as irritating the hell out of people on public transport.

The third category are closed-back designs,

which are useful in situations where it is necessary to block out background noise. Another means of distinguishing different types is the way they sit on your head.

There are three styles: circumaural models enclose the ear and rest on the side of the head; supra-aural designs press on the outer ear (pinna); and intra-aural types rest inside the ear and are popular amongst users of personal stereos

MODEL PRICE	FIT SOUND	COMMENTS	TYPE	VALUE	ISSUE
Aiwa HP-X30 £31	Good Good -	A flashy personal stereo phone which alternatively could be used at home. A slight LF tonal preference slightly colours the response, but it ain't a bad can	Supra-aural, closed-back, dynamic		75
AKG K1000 £500	Very Good Excellent	One of the best moving coil headphones on the market, hooks directly to speaker outputs and makes much of the competition sound lame. Looks a tad weird	Extra-aural, open-back, dynamic	R	99
AKG K135 £33	Poor Average	Despite a very appealing design the K135s don't live up to the usual AKG standards, though they do have the ability to reproduce rhythm well	Supra-aural, semi-open, dynamic		63
AKG K145/S £60	Good + Good +	Electrostatic tweeters combine with a dynamic mid/bass unit to create very confident sounds in a comfortable headphone. Balance is on the bright side	Supra-aural, semi-open, electrostatic/ dynamic	R	75
AKG K240 Monitor £60	Very Good Good	Something of a classic, these AKGs are very user friendly in all respects; sonically on the warm side of neutral	Circumaural, semi-open, dynamic	R	63
AKG K280 Parabolic £90	Good Very Good	A very revealing and unusual twin driver design that uses the same principle as a satellite dish to beam sound into the ear	Circumaural, open-backed, dynamic	R	63
AKG K340 £140	Good Excellent	Heavyweight cans in most respects, the K340 with its electrostatic tweeter is a very revealing headphone. Gives the total electrostatics a good run for their money	Circumaural, closed-back, electrostatic/dynamic	R	75
AKG K44 £40	Good+ Average	Good quality personal oriented phone, could have a better sense of space but is musically quite communicative	Supra-aural, open-back, dynamic		99
Audio-Technica ATH-609 £31	Average Average-	Warm feeling and sounding with impressive physical substance for the price, could be more relaxed and open	Circumaural, open-back, dynamic	R	99

HEADPHONES

■ MODEL ■ PRICE	■ FIT ■ SOUND	■ COMMENTS	■ TYPE	■ VALUE	■ ISSUE
Audio-Technica ATH-611 £51	Average Good	Same basic design as 609 but bigger thinner diaphragm makes this a more relaxed and informative headphone	Circumaural, open-back, dynamic		99
Audio-Technica ATH-909 £60	Average Average	Quite impressive in the treble though a bit bass shy, the 909s worked well at highish levels	Circumaural, semi-open, dynamic		55
Audio-Technica ATH-910 £70	Average Good	The closed-back 910s are an improvement on the 909s with a nice rhythmic quality rarely found with headphones	Circumaural, closed-back, dynamic	R	55
Audio-Technica ATH-911 £80	Very Good Very Good	Nicely finished dynamic headphones with all the trimmings, plus a very clean and subtle sound	Circumaural, open-backed, dynamic	R	63
Beyer DT 325 £32	Very Good Average	Lightweight in more ways than one, the 325s may be a little bright for some systems and tastes but will suit duller sources	Supra-aural, open-back, dynamic	R	63
Beyer DT330 Mk II £50	Good Poor	Not the most revealing 'phones encountered, the 330s were nevertheless enjoyable and rarely offended	Circumaural, semi-open, dynamic		55
Beyer DT550 £61	Good Good	On their own the 550s sound articulate with a slightly 'gritty' treble and 'keen' midrange; not suitable for headbangers!	Circumaural, semi-open, dynamic		55
Beyer DT880 £80	Good Good	Well made cans with a warmish sound but fairly solid midrange, though they're not that informative for the price	Circumaural, semi-open, dynamic		63
Beyer DT990 £102	Very Good Very Good	The 990s are definitely a significant pair of dynamic headphones; they have a smooth and yet revealing neutral sound that is hard to criticise	Circumaural, open-back, dynamic	R	55
Beyer IRS690 £203	Good + Very Good	High quality infra-red headphones with soft comfy earpads and mellow but informative sound quality which is hard to dislike	Circumaural, open-back, dynamic	R	75
Jacklin 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
Jacklin 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
Jacklin Float Model Two £99	Very Good Very Good	Helmet shaped and pretty unflattering but open sounding and comfortable in the long term. Note lack of adjustment means you should try before you buy	Circumaural-ish, open-backed, dynamic	R	63
JVC HA-D990 £65	Good + Good +	Good looking well made cans that offer good sound quality for the money. Sonic nature is of the easy-going, laid-back variety	Supra-aural, closed-back, dynamic	R	75
Koss K/6X Plus £30	Average Poor	'Sixties-style' phones from the good ole US of A, their sonic style is unique and can make a system sound quite different	Supra-aural, closed-backed, dynamic		63
Koss TD/60 £20	Good Average	Although they're devoid of channel identification and have a decidedly Stateside approach to sound, these are very listenable phones for the price	Supra-aural, closed-back, dynamic		75
Pioneer SE-72 £30	Good + Average -	Neat, very nicely made personal stereo phones along the lines of Sony V3s. Sound is on the veiled side, good for aggressive sources	Supra-aural, closed-back dynamic		75
Quart Phone 30 X £40	Good Average	Slightly dark character makes these more suitable for some sources/material than others, specifically music that needs bass weight	Supra-aural, open-back, dynamic		99
Quart Phone 70 £70	Good Good	Competent performers that were hard to criticise but lacked the life and sparkle of which some of the competition are capable	Circumaural, closed-back, dynamic		63
Quart Phone 95 X £100	Good+ Good+	Can sound even handed, relaxed and open with a good drive system but may be a bit too transparent for lesser headphone outputs	Circumaural, open back, dynamic	R	99
Ross RE2530 CD £20	Average Average	Rather an 'average' £20 phone that some found uncomfortable due to high pressure on the ears. Sonic balance is on the bright side	Supra-aural, closed-back, dynamic		75
Ross RE2560 CD £25	Good Average +	If you're not too fussy about quality of finish and don't have an elfin head then these British phones warrant attention. Sound could be smoother	Supra-aural, semi-open, dynamic		75
Sennheiser HD40 £20	Very Good Good -	Very light and comfortable headphones with an even sonic balance that will suit most sources, but jack is 6.3mm and not suited to personals	Supra-aural, semi-open, dynamic	BB	75
Sennheiser HD450II £40	Good+ Good-	A neat looking supra that makes quite acceptable noises with a variety of outputs, could sound more spacious but is pleasantly relaxed	Supra-aural, open-back, dynamic		99
Sennheiser HD480 Classic II £60	Good+ Good	The same basic design as the 450 but improved sound quality as a result of aluminium coil and extra damping, natural with good bass	Supra-aural, open-back, dynamic	R	99
Sennheiser HD520 £65	Good + Good +	A very comfortable and musically capable headphone. If you've got this sort of bread to blow on cans, give 'em a blast	Circumaural, semi-open, dynamic	R	75
Sennheiser HD530 £75	Very Good Good +	One of the better dynamics in its group, the 530s create a sense of space that eludes most sub £100 cans, and they're dead comfy to boot	Circumaural, semi-open, dynamic	R	75
Sennheiser HD540 Ref Gold £160	Good Very Good	The 540 Golds prove that dynamic headphones can be subtle, informative and capable of creating a remarkable sense of space	Circumaural, open-back, dynamic	R	55
Sennheiser HD560 Ovation II £120	Very Good Good+	A comfortable and nicely styled headphone that could be more natural sounding at HF, but is detailed and open with good power	Circumaural, open-back, dynamic		99
Sony A21EX £20	Good - Good -	Forward facing in-ear drivers on a folding plastic band provide exceptional clarity for such an inexpensive phone. However, no bass, and fit isn't to everyone's taste	Intra-aural, semi-open, dynamic	BB	75
Sony MDR-CD3000 £300	Very Good Very Good	Better than most of the headphone outputs around so hard to make the most of, potentially up there with the electrostatics	Circumaural, closed-back, dynamic	R	99
Sony MDR-CD350 £32	Good+ Good	Very impressive for the price the 350 is possibly the most open sounding cheap closed back can around, lightweight in balance but transparent	Circumaural, closed-back, dynamic	BB	99
Sony MDR-CD550 £50	Good+ Good+	A very competent headphone for the price, creates a remarkable sense of space for a closed-back design and sounds natural to boot	Circumaural, closed-back, dynamic	BB	99
Sony MDR-R10 £2500	Excellent Excellent	Costly state of the art sealed moving coil design built to the highest standards using the finest materials. Sound quality reflects this care, being big, clear, sweet and refined	Circumaural, closed-back, dynamic	R	72
Stax Gamma pro/SRD-X pro £296/£230	Very Good Excellent	The Gamma pros are like a stethoscope for your hi-fi, revealing subtleties that many loudspeakers fail to resolve	Circumaural, open-backed, electrostatic	R	63
Stax Lambda Signature/SRM-T1 £470/£895	Very Good Excellent	The Signature when combined with the SRM-T1 valve driver must be the most transparent headphone available	Circumaural, open-backed, electrostatic	R	72
Stax SR Gamma £299 (inc. SRD-6 Adaptorat £100)	Very Good Very Good	The next model down the Stax range from the Lambda, the Gamma is an excellent headphone with little to criticise but the price	Circumaural, open back, electrostatic	R	55
Stax SR Lambda Pro/SRD-7SB Mk 2 Adaptor £360/£185	Very Good Very Good	A bit of an industry reference, the Pros are frighteningly revealing, bringing across more information than loudspeakers costing twice as much	Circumaural, open-back, electrostatic	R	55
Stax SR Lambda Pro/SRM-1 Energisier £360/£635	Very Good Excellent	This combination extracts layers of information that other headphones only hint at. The SRM-1 has more edge than the SRM-T1, but it's good	Circumaural, open-back, electrostatic	R	75
Stax SR34 £140	Average Very Good	The least expensive Stax headphones around, the SR34s are lively and rhythmic with good tight bass and a sweet midrange	Supra-aural, open-back, electret		55
Stax SR84 £210	Very Good Very Good	The stepping stone between dynamics and full electrostatics, these electret phones are revealing, open and highly enjoyable	Supra-aural, open-backed, electret	R	63
Yamaha YHL-006 £30	Average Average	Unusual personal stereo oriented phones that curl up when not in use. Earphones are like golf balls and balance is well suited to Walkmans	Supra-aural, open-back, dynamic		75

LOUDSPEAKERS

Last item in the hi-fi chain, to some extent the loudspeaker is merely the slave of what has gone before, capable only of reproducing a signal as good as it is fed. Nevertheless the distortions (colorations and stereo effects) introduced by loudspeakers (and rooms) tend to be more immediately obvious than those anywhere else in the chain, so careful choosing according to taste is very important.

The average loudspeaker consists of a smallish enclosure, much of which may have begun life as part of a tree, plus a couple of drive

units hidden behind a removable grille. Inside the box lurks a simple electrical circuit known as a crossover, which divides the incoming (full range) signal into the right bits for the drivers to handle. Variations on the above formula are specifically identified in the entries. The designer's primary task is to balance the sensitivity of the loudspeaker (how loud it goes for a given electrical input) against the bass extension (how low does it go) for the given box size. After that such subtleties as coloration and dispersion come into the equation.

Careful placement of the loudspeakers within the room is as important as the initial choice of model.

For good stereo they need to be more or less the same distance from nearby walls, and preferably on rigid stands. The listener should be about the same distance from and listening angle to each loudspeaker. The ideal placement depends on the way a particular model has been balanced (not to mention a number of other factors), and our recommendation is given in the entries.

■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ SIZE ■ PLACEMENT	■ SENSITIVITY ■ BASS FROM	■ VALUE	■ ISSUE
Acoustic Energy AE1 £767	Good Good	Amongst the best miniatures around, this metal driver pioneer shows exceptional mid focus and coherence, but is pricey and could be faster and more agile.	29.5x18x25cm stands clear of walls	84dB 48Hz (in room)		102
Acoustic Energy AE2 £916	Good Very Good	Dynamic, solid and lively, a great allrounder if a bit small considering the price. AE proves that metal cone/dome drivers really work	39 x 23.5 x 29.5cm heavy stands, free	88.5dB/w 45Hz	R	66
Acoustic Energy AE3 £1650	Very Good Very Good	Solid, authoritative and impressively accurate – if a shade ponderous and slow – AE's latest 'big one' is a much better bet than the earlier '4, combining	63 x 26.5 x 37cm low stands in free space	85dB/w 23Hz (in room)	R	86
Acoustic Research AR-112 £125	Average Average -	Nicely presented and engineered, but sounds a bit small and boxy without true coherence	36 x 19 x 18.5cm stands near rear wall	87dB/w 75Hz		66
Acoustic Research AR-122 £150	Average Average	Despite a promising enough list of ingredients, the 122 failed to excite real enthusiasm amongst the listening panel	38.5 x 19 x 22cm stands near rear wall	87dB/w 68Hz		68
Acoustic Research AR-132 £200	Average + Average -	Good presentation and detail engineering was not sufficient to counter bass heavy balance problems on auditioning	44.5 x 23 x 25.5cm stands 1ft from rear	87dB/w 50Hz		66
Acoustic Research AR-152 £373	Good Good-	Large bookshelf size model with luxury finish has a slightly thin overall balance, but fine coherence and agility makes it well worth considering	44 x 23.5 x 28cm stand 1-2ft wall	87dB 25Hz in room		98
Acoustic Research Red Box £100	Average Average	Lively and balanced if a bit crude and uneven, this econobox succeeds partly because of its simplicity, and works well with some rear wall assistance	32 x 19.5 x 17cm close to rear wall	87dB/w 85Hz	R	74
Alexander SE11 £299 (stands £69)	Good Good	Clearly better than its cheaper stablemates, the metal jacket delivers a different – and in some respects superior – sound than the wood-based	52 x 14 x 17.5cm stands close to wall	86dB/w 25Hz (in room)	R	82
Alexander SE5 £199	Average Average	Particularly well suited to surround sound A/V applications, the SE5 can give any miniature a run for its money on bass performance; hardness and coloration	40.5 x 12 x 15cm ALS stands near wall	82dB/w 50Hz (in room)		78
Allison AL100 £120	Average- Average	Loud and lively budget wall-mount is bigger and beefier than most of the competition, if lacking some subtlety and refinement	33.5 x 24 x 21.5cm stands against wall	87dB/W 30Hz (in room)	BB	94
Allison AL105 £150	Average Average -	Pretty enough in appearance, sonically the AL105 doesn't really make the grade at the £150 asking price	37 x 24 x 21cm high stands against wall	87dB/w 45Hz (in room)		78
Allison AL110 £220	Good+ Good-	Compact bookshelf model is a little dry and mid forward, but bass is extended and solid. Free space balance is good, though build quality could be improved.	40x24.5x22.5cm stands 1-2ft from wall	86dB 28Hz (in room)	R	102
Allison AL120 £429	Good Average	Cleverly engineered compact floorstander is pretty well balanced if slightly mid forward, but sound quality is a little disappointing for the price	63 x 28 x 27cm floor, clear of walls	88dB 30Hz (in room)		98
Allison CD6 £290	Average Good -	An unusual cube-shaped model designed for wall mounting gives exceptional bass extension from a small box, though it's also a bit heavy, coloured and slow	28.5 x 28.5 x 28.5cm stands against rear	88dB/w 45Hz	R	71
Alphason Amphion £680	Good Good	This fine-sounding, nicely finished compact wall-mount is just a little too expensive for formal Recommendation, but is a good performer for all that	44 x 23 x 27.5cm high stands against wall	88dB/w 47Hz (in room)		78
Alphason Artemis £299	Average Average+	Pretty little miniature sounds nicely unboxy but is also a bit short of punch and balanced rather too bright.	27 x 17.5 x 22cm stands 1ft from wall	86dB/W 50Hz (in room)		94
Alphason Orpheus £1000	Good Good +	Large hi-tech two-way features unusual, sweet-sounding isodynamic tweeter; well engineered and balanced if a shade odd in appearance	65.5 x 28 x 34cm stands near rear wall	87dB/w 43Hz	R	71
Apogee Caliper Signature £3350	Good + Very Good	Pretty but power hungry full range panels have remarkable transparency and delicacy, though loudness and bass 'grunt' are both a bit lacking	122 x 59-70 x 6.5-28cm floor, free space	81dB/w 30Hz (in room)	R	81
Arcam Alpha £200	Good Good	It has its own colorations to be sure, but delivers a fine room balance with unusually good dynamics, timing and 'life', and is fine material value	46 x 26.5 x 26cm stands close to wall	89dB/w 30Hz (in room)	BB	82
Arcam Delta Two £340	Average+ Good	Pretty luxury compact sounds a shade forward and coloured but has dynamic and lively bass for its size	37.5 x 22.5 x 27.5cm stands 1-2ft from wall	87dB/W 40Hz (in room)	R	94
Ariston Image £180	Average - Average -	Despite a sweet treble character, the Image fails to impress with a 'lumpy' over-rich balance that has room integration problems	42 x 22 x 27.5cm stands in free space	89dB/w 28Hz (in room)		82
Ariston Q £395	Average + Average	The prettily shaped Q delivers a good impression of scale from a small box, but a rather laid back, ponderous and over-rich overall sound	35 x 16.5-25 x 20-27cm high stands in free	85dB/w 30Hz (in room)		86
ATC SCM20 £1320	Very Good Good +	Massively built to no-compromise Pro monitoring standards, the SCM20 is invariably informative but the rather forward presentation can be uncomfortable	44 x 24 x 31cm stands close to rear wall	82dB/w 28Hz (in room)		86
Audio Electronics TC10 II £599	Good - Good +	Oddball appearance is rescued by a respectable technical performance, interesting and impressive engineering and fine sound quality	70 x 33.5 x 33.5cm low stands in free space	87.5dB/w 40Hz	R	68
Audioplan Kontrapunkt £799	Good Good +	Cute little German miniature sounds as sweet as it looks, dressed expensively in real wood with matching stands. Not for bass or loudness freaks	31 x 24 x 13cm free space, matching stands	83dB/w 48Hz (in room)	R	86
B&W 610 £200	Good Average	Fine presentation and good perceived value, with good in-room bass extension and impressive loudness credentials too, but rather indifferent integration and coherence.	49x23.5x30cm stands clear of walls	89dB/W 25Hz(in room)		102
B&W 620 £299	Good Good	Good value floorstander has well balanced, laid back and slightly lazy sound that is pleasantly easy on the ears; could do with its own spikes	74 x 23.5 x 30cm floor, free space	89dB/W 25Hz (in room)	BB	94
B&W CM1 £400	Good Average	Cleverly thought out luxury design package is also fundamentally well engineered, if a shade pricey on 'sound for pound' basis	24.5 x 16 x 22cm close to rear wall	84dB/w 90Hz		74
B&W DM550 £149	Good + Average -	Beautifully presented, well engineered near-miniature with precise sound but a distinct lack of 'wellie'. Ideal for considerate flat dwellers	35 x 20.5 x 22.5cm stands in free space	86dB/w 70Hz		71
B&W DM560 £199	Average + Average -	Fine cosmetic presentation and good engineering for the price; overload protection may be handy but listening panel was underwhelmed	49 x 23.5 x 30cm stands in free space	88dB/w 55Hz		66
B&W DM600 £150	Good+ Average+	Attractive hi-tech appearance and clever engineering makes for an impressively smooth overall balance, but sound is a touch bland with it	35 x 20.5 x 25cm stands 1-2ft from wall	85dB 30Hz (in room)	R	98
B&W Matrix 801 £3295	Good + Good +	Lacks the transparency of the best panels, and the drama of the best dynamics, but is something of an acoustic tour de force, with low coloration and fine imaging	77/99 x 56 x 43cm floor or stands, free	86dB/w <20Hz (in room)	R	81
B&W Matrix 805 £915	Very Good Good	A genuine compact monitor, stylish, with remarkable imaging properties, good balance and low coloration, though less successful at communicating musical	42(max) x 26 x 22.5cm Slate stands in free	87dB 30Hz (in room)		98

LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
B&W Vision DS1 £120	Average Average -	Although significantly hampered by upper bass cabinet coloration, the DS1 cleverly combines high sensitivity with a rich and generous soundstage	36 x 21 x 19cm stands quite close to wall	91dB/w 40Hz (in room)	R	82
B&W Vision DS2 £180	Average Average -	Although the box is generous for the price, the DS2 is a rather uneven performer, both on the measurement and listening	50 x 24 x 25cm stands in free space	89dB/w 43Hz (in room)		86
Bose 305 £350	Average Good -	A bit of an oddball, fine dynamic liveliness and a good room match more than make up for the strange stereo imaging and treble	28 x 45 x 23cm high stands near wall	88dB/w 40Hz (in room)	R	78
Bose 901 MK6 £1600	Good Average	Still controversial after all these years, the pre-equalised multi-driver 901 is cleverly engineered to deliver exceptional loudness	33 x 54 x 32cm rigid stands in free space	(92dB/w midband) 28Hz (in room)		86
Bose Interaudio 3000XL £150	Average Average -	Lots of perceived value and well enough balanced, but low cost cabinet and driver engineering results in a crude and unsubtle sound	46.5 x 29 x 23cm stands in free space	89dB/w 45Hz		71
Boston A120 £349	Average + Good -	Ugly but cleverly engineered, the 120 combines a tiny main driver with much larger ABR to give a generous, bighearted and lively sound despite little bass	62.5 x 31.5 x 25cm stands in free space	89dB/w 48Hz	R	86
Boston A40II £120	Average Average -	Competent performance for size and price but below average relative to the UK competition	34 X 21 x 20cm on stands near wall	88.5dB/w 63Hz		41
Boston Acoustics T830 £399	Good Good	A lot of speaker for the money, the T830 is a smooth and accomplished performer with a big and easy - or alternatively a lazy and laid back - sound	82.5 x 25.5 x 24cm floor, away from walls	87dB/w 30Hz (in room)	R	82
Cambridge SoundWorks Ambiance £179 (mail order only)	Average Poor	Attractively styled sub-miniature sacrifices sensitivity in the interests of bass extension, but manages to lose dynamics along the way too	28 x 18 x 14cm close to wall	83dB/w 45Hz (in room)		94
Canon S-50 £349	Average Average+	Though only a small cone miniature at heart, the fascinating styling and extended stereo listening area feature make it utterly original and unique	30x24(diam)cm stands in free space	84dB 48Hz (in room)	R	102
Castle SG Trent £129	Average Average	The grey paint finish looks much more modern than black vinyl woodprint, and this miniature wall-mount sounds lively and engaging, if a bit rough at the top	33.5x18x20cm stands close to wall	88dB 50Hz (in room)	R	102
Castle Chester £599	Good Very Good	A brilliant throwback, using horn-type approach to provide startling midrange dynamics and coherence	94 x 23 x 27cm floor, experiment	87dB 45Hz	BB	98
Castle Durham £259	Average + Average	Listening results were encouraging, well engineered and finished, but lean on treble and a bit weak on bass; still recommended	41 x 21.5 x 25cm near rear wall	89dB/w 67Hz	R	46
Castle Pembroke £379	Good Average +	Comfortably recommended, a sweet smooth sound with good overall balance of engineering-based performance	55 x 37.5 x 30.5cm open space on stands	88dB/w 46Hz	R	31
Castle Warwick £229	Good Average -	Excellent presentation and fine engineering with overload protection, but a sonic disappointment in bass and dynamic qualities	46.5 x 25 x 23cm stands 1ft from rear	88dB/w 50Hz		66
Castle Winchester £1400	Very Good Very Good	This unconventional and beautifully crafted model is physically large for its bass extension but is engagingly agile and sounds attractively open and airy	114 x 24 x 47cm in free space	87dB/w 25Hz	R	90
Celef CF2 Nimbus £230	Good - Good -	Nicely balanced overall but a little uneven with it, this lively and dynamic largebookshelf model came close recommendation	46 x 25.5 x 24cm stands in free space	88dB/w 55Hz		71
Celef Cirrus £180	Average Good	It's nice to see Celef back in the UK, with this decent sounding small reflex box that seems unusually tolerant of siting	39 x 20.5 x 23cm stands in free space	84dB/w 60Hz	R	66
Celestion 3 £109	Average + Average	This attractive little wall-mount gives good balance and stereo imagery, with a character which leans more towards inoffensiveness than excitement	31 x 18.5 x 21cm high stands against wall	86dB/w 55Hz (in room)	R	78
Celestion 5 £149	Good Average	Cunningly conceived and balanced, the 5 may be a little slow for some tastes, but is well suited to CD-oriented budget systems	35 x 20.5 x 26cm heavy stands close to wall	89dB/w 30Hz		90
Celestion 6000 £1470	Very Good Very Good	A genuine fullrange audiophile quality speaker system - with Star Wars styling to suit a high tech environment	Complex, on floor in free space	82.5dB/w	R	60
Celestion 7 £200	Average Average+	Good value, good looking large bookshelf size wall-mount has lively up front presentation. Can sound a bit coarse and stand selection is critical	45 x 24.5 x 32cm heavy stands close to wall	87dB 30Hz (in room)	R	98
Celestion 9 £249	Good Average	Nicely presented and fair material value, with impressively flat bass-to-mid balance, the 9 doesn't really make a convincing case for the return of the three-way	49.5x20.5x24cm stands clear of walls	89dB 30Hz (in room)		102
Celestion DL6 Series II £179	Good Average	Good tonal colouring and plenty of bass for the enclosure size; the metal dome tweeter is excellent, but bass and mid lack clarity and 'bite'	45.4 x 24.5 x 26.2cm near wall, on stands	87dB/w 65Hz		59
Celestion DL8 Series II £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open, stands	87.5dB/w 60Hz	R	59
Celestion SL12Si £599	Average Average	Careful setting up does reveal elements of fine sound quality, but this 'grown up' SL6 variation has a lumpy response alongside its improved power handling	53 x 20 x 27cm matching stands clear	85dB/w 50Hz		66
Celestion SL600Si £799	Good + Good	This Aerolam high tech miniature has certain remarkable qualities that some will find irresistible, but needs careful system and room matching	27 x 20 x 23cm free air on tall stands	82dB/w 52Hz		68
Celestion SL6Si £399	Average+ Average+	This stereotype luxury compact can sound a bit dull and congested, but really opens up on Slate Audio stands; favours CD	37.5 x 20 x 25cm stands 1-2ft from wall	86dB/W 30Hz (in room)		94
Creek CLS20 £200	Good Average -	Looks good material value, but sound is distinctly over-rich and thick in the mid-bass region; maybe the box is a little too large	49 x 24.5 x 24cm open frame stands, free	88dB/W 30Hz		90
Dali 700 £600	Very Good Average	Good material value and fine bass extension for size and price, but overall sound is disappointing, perhaps due to complexity of driver array	110 x 28 x 35cm clear of walls	88dB/w 20Hz		90
DCM Timeframe TF250 £350	Average + Average	Neat and unusual floorstanding presentation, marred by indifferent build and cuddly but rather coloured sound, especially on spoken word	86 x 32 x 16cm close to rear wall	88dB/w 45Hz		90
Duntech PCL1000 Crown Prince £6120	n/a Excellent	Immensely 'listenable', refined sounding speaker capable of creating lifesize musical images. Not overly transparent to source, but very civilised	180 x 30.5 x 43.5 free standing away from	90dB/w 42Hz	R	72
Duntech PCL500 Marquis £3998	n/a Very Good	Better value for money than the Crown Prince - and arguably more dynamic, with real bass 'slam' but a little less refined in the higher registers	147.5 x 27 x 40cm free standing away from	92dB/w 48Hz	R	65
Eitax Linear Response 8 £399	Average- Average+	Good material value Danish floorstander suffers from 'loudness contour' balance due to twin main drivers, but nevertheless has pleasing coherence	97 x 21 x 33cm floor, free space	88dB 22Hz		98
Epos ES11 £300	Good Good+	Pretty luxury compact uses integral baffle/driver to give a remarkable combination of low coloration, transparency and speed; bass is a bit shy	37.5 x 20 x 25cm stands 1ft from wall	86dB/W 45Hz (in room)	BB	94
Epos ES14 £449	Good Very Good	Substantial stand mount model delivers delightful midrange focus and delicacy with good bass control. Tends to be system sensitive	49 x 22.5 x 29cm own stands 1-2ft from wall	85dB 25Hz (in room)	R	98
Equation 0 £1290	Average + Very Good	Expensive but most attractive floorstanding miniature. Bass is limited and mid tends to shout but sound is fast and lively with fine dynamics and timing	85 x 20 x 35.5cm floor, c1ft from wall	85dB/w 45Hz	R	90
Faraday Siren £330 (direct sale)	Average- Average-	Interesting if ugly high mass concrete cabinet is let down by imbalance of ageing driver combination	46 x 27 x 27cm stands, free space	87dB/W 48Hz (in room)		94
Faraday FS5 £589	Good Good	Pricey and ugly, but with its own sonic charm nonetheless, thanks to the substantial (largely positive) influence of the concrete enclosure has upon the sound	46x27x26cm stands in free space	90dB 28Hz (in room)		102
Goodmans B-Max/Maxim 2 £100/£90	Poor Average -	Stick with the Maxims on their own until you can afford some real grown up loudspeakers	60 x 21 x 26 see above, suck and see	89dB/w 55Hz (in room)		78
Goodmans HIM 440 £350	Good Average -	Amazing perceived value, sensitivity and good bass extension, marred by serious cabinet coloration, a nasty tweeter and a difficult amplifier load	87 x 38 x 40cm low stands clear of walls	94dB/w 24Hz		90

LOUDSPEAKERS

■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ SIZE ■ PLACEMENT	■ SENSITIVITY ■ BASS FROM	■ VALUE	■ ISSUE
Goodmans M100 £80	Average + Average -	Effectively a Maxim on the cheap, the M100 measures more smoothly but sounds somehow less involving than its more famous stablemate.	20 x 17 x 26cm close to rear wall	85dB/w 50Hz (in room)	R	86
Goodmans M300 £100	Average Average -	Conveying much of the charm and life which has made the Maxim 2 so popular, the M300 is sensitive, but hampered by upper bass cabinet coloration	38.5 x 21.5 x 17cm stands close to rear	89dB/w 50Hz (in room)	R	82
Goodmans M500 £130	Average Average-	Large 'bookshelf' size means plenty of speaker for the money plus good sensitivity, let down by unruly mid/bass performance and indifferent build	47 x 24.5 x 21.5cm stands, free space	89dB/W 50Hz (in room)		94
Harbeth HL Compact From £539	Very Good Average	The clean and neutral sound lacks resolution and gives rather unsubtle though well differentiated stereo. Can be bi-wired to advantage	52 x 27.2 x 28.1cm open space, on high	87.5dB/w 65Hz		59
Harbeth LS3/5A £343	Good Average	Still a classic miniature, though not to every taste, and none the better for the recent update under our listening conditions. Limited dynamic range	30.5 x 19 x 16cm stands in free space	81dB/w 60Hz		66
Heco Interior 120 £169	Good Average	Drab appearance belies a lively enough character, though the balance is altogether a bit bright for UK tastes	32 x 23 x 23cm high stands against wall	88dB/w 50Hz (in room)		78
Heco Interior 430 £429	Good Good -	This tall floorstanding enclosure delivers an impressively even sound balance with good bass extension, if not the lively dynamics to satisfy enthusiasts	85 x 24 x 27.5cm free space	88dB/w 43Hz	R	71
Heco Interior 90 £159	Good Average -	Neatly finished and engineered miniature, but the disappointingly 'lifeless' sound left the listening panel decidedly underwhelmed	27 x 18 x 16cm on high	87.5dB/w 90Hz		74
Heco Interior Plus 404 £400	Average+ Average+	Odd shape and size; twin main driver arrangement creates a slight 'boom'n'tizz' effect, but mid focuses well and bass extension is impressive	58 x 26 x 31cm low stands free space	88dB/W 25Hz (in room)		94
Heco Reflex 10 £160	Average+ Average	This nicely balanced and well mannered small bookshelf wall-mount is a competent rather than exceptional package for the price, thanks to indifferent build.	32x21x23cm stands up to 1ft from wall	90dB 30Hz (in room)		102
Heco Superior 740 £599	Good Good -	A similar sonic package to the cheaper Interior 530, these Superior clothes are very pretty indeed, though spikes are still awaited	84.5 x 22 x 25cm on floor in free space	88dB/w 30Hz (in room)		78
Heco Superior 940 £999	Good Good	This large and beautifully finished floorstander has an impressively smooth and transparent midband. Bass is well extended but follows rather than drives the music	110 x 26 x 31.5cm free space	88dB/w 20Hz		86
Heybrook HB1 S3 £250	Average+ Good	Latest version of long established favourite delivers good liveliness and fine coherence for the price, even though the shape looks a bit dated	47 x 29 x 24cm HBS1 stands close(ish) to	88dB 30Hz (in room)	BB	98
Heybrook HB100 £279	Average + Good	Well matched for wall siting, the HB100 is a lively and informative performer in the tradition of the popular HB1	47 x 26 x 28cm stands near rear wall	86dB/w 50Hz	BB	66
Heybrook HB150 £369	Average Good	Convincingly communicative but a bit coloured and congested, this lively compact wall-mount is nicely finished but a little costly for the content	40.5 x 23 x 22cm stands close to rear	89dB/w 42Hz (in room)		82
Heybrook HB200 £429	Average Average	This luxury successor to the HB2 is lively and informative, but sounded insufficiently balanced to convince our listening panel	46 x 23 x 26cm stands against rear wall	87dB/w 55Hz		66
Heybrook Point 5 S2 £179	Good Good	Lively, revealing and enjoyable wall-mount can sound unruly with multi-strand but comes dramatically into focus with solid core cable.	37.5 x 23 x 24.5cm HBS1s against wall	85dB/W 28Hz (in room)	BB	94
Heybrook Point 7 £185	Average Average	Physically an attractive package, but not entirely convincing in lab or listening panel test; interesting for all that	40.5 x 23 x 23cm stands against rear	85dB/w 60Hz		68
Heybrook Solo £159	Average + Average +	Discreetly styled wallmount sounds a little untidy in both bass and treble but handles complex rhythmic material much better than most	36 x 23 x 22cm HBS1 stands close to wall	87dB/w 28Hz	R	90
Heybrook Sextet £949 (inc frame)	Good Very Good	Elegant floorstanding three-way wall-mount is engagingly coherent and a highly analytical, partly due to distinct and not always comfortable upper-mid forwardness.	96x27x20cm close to wall	85dB 25Hz (in room)	R	102
Infinity Kappa 6 £795	Good Good	Interestingly styled US loudspeaker has unusual high tech drivers and good neutrality, but the sound seriously lacks excitement	63 x 38 x 24cm stands, free space	85dB/w 35Hz		66
Infinity Kappa 8 £1850	n/a Very Good	Very nicely made and unobtrusive but large four-way speakers which have a tendency to sound bass heavy unless used with solid core cables	118 x 51.5 x 17.5cm floor standing, open	89dB/w 33Hz		72
Infinity Modulus £695	Good Average +	Luxury high-tech miniature, carefully conceived and beautifully built. Undeniably attractive in the mid and treble, it failed to handle the bass as successfully	30 x 18 x 26cm high stands 1ft from wall	84dB/w 45Hz (in room)		86
Infinity Reference 10 £149	Average Average	Follows the Infinity tradition in providing an engaging and lively sound from a prettily finished and substantial small bookshelf size model	36 x 23 x 23cm stands in free space	87dB 50Hz (in room)	R	98
Infinity Reference 20 £220	Good Average	Large bookshelf size model is well presented and balanced with good bass control, but somehow lacks convincing cohesion and agility; build was slightly suspect too.	46x27x24cm stands 1-2ft from wall	88dB 27Hz (in room)		102
Infinity Reference 50 £499	Average Average-	Despite hi-tech drivers, attractive presentation, good bass extension and sensitivity, this three-way floorstander suffers from a forward, coloured sound	86 x 26.5 x 25cm floor in free space	89dB 25Hz (in room)		98
Infinity RS2001 £180	Average Average +	A little coloured and unruly in the treble, the 2001 nevertheless retains the lively dynamic bounce of its predecessor; pity the price has gone up	36.5 x 22.5 x 20cm lightweight stands	87dB/w 50Hz (in room)	R	78
Jamo Concert II £250	Good Average -	A thoroughly respectable 'bookshelf' performer that needs free space siting but includes attractive cabinetwork and a neat grille	41 x 24 x 25cm stands in free space	85dB/w 48Hz		66
Jamo Concert V £500	Average Average	Compact, solid, nicely finished floorstander delivers unusually extended bass at the expense of lowish sensitivity; midband is smooth but laid back.	86x24x28cm well clear of walls	85dB below 20Hz (in room)		102
Jamo Concert VII £650	Average+ Average	Beautifully built large floorstander uses unusual double reflex bass system, unsuccessfully as far as low frequency resolution is concerned	96 x 28 x 31.5cm floor, free standing	87dB/W 25Hz (in room)		94
Jamo Cornet 40 £100	Average- Average	Pretty little Danish-built miniature with respectable rather than exceptional sound quality for the price	32 x 20 x 22cm stands 1-2ft from wall	86dB 48Hz (in room)		98
JBL Control 1 Plus £229	Average Average	Sub-miniature with forward midrange and no real bass; highish price partly justified by cute, near-indestructible Pro styling and build	23 x 15.5 x 14cm close to rear wall	89dB/w 50Hz		90
JBL L20T3 £249	Average- Average-	Compact bookshelf model delivers bouncy miniature-type sound when free space mounted; pleasant enough but uneven and undistinguished	39 x 23 x 20.5cm stands free space	87dB/W 48Hz (in room)		94
JBL LX33 £259	Average + Good	A bit of a cheat, but a lot of speaker for the money, which manages a better room balance than many 'large bookshelf' rivals, and delivers a fine acoustic	80 x 25 x 21cm floor, 1ft from wall	89dB/w 48Hz	R	82
JBL LX44 £339	Good - Average	This generously built model offers good power handling, bass extension and dynamic range, but suffers from the 'three-way syndrome', with middle muddle	58.5 x 30 x 29cm stands in free space	89dB/w 40Hz		71
JBL LX55 £350	Good Average	This big bluff three-way provides lots of speaker, bandwidth and loudness for the asking price, but is ultimately a bit of a dinosaur	66x34.5x29cm stands clear of walls	91dB below 20Hz (in room)		102
JBL XE2 £149	Average- Average-	Budget Danish-built 'bookshelf' model has anomalous 'laid back' balance and lacks the genuine JBL spirit	38 x 23 x 23cm stands in free space	88dB 48Hz (in room)		98
JBL XPL 90 £699	Good Average +	Though undoubtedly pretty and very expensively engineered, this elaborate near-miniature didn't really convince our listeners.	39.5 x 24 x 24cm stands in free space	85dB/w 45Hz (in room)		86
JPW AP2 £175	Good Good	Few grounds for criticism but purchasers should check out the treble qualities to avoid hammering the ear anvils	46 x 26 x 25cm 40cm from wall on 45cm	89dB/w 65Hz	R	53
JPW AP3 £225	Good Average +	Pretty good stereo and well balanced overall it had its own character which is well suited to vinyl replay	52 x 25 x 29.5cm near wall on stands	90dB/w 57Hz	R	46
JPW Minim £85	Average + Average -	Very civilised but dynamically limited, the Minim is well suited to the smaller room and where limited loudness is acceptable	27.5 x 18 x 19.5cm stands against wall	85dB/w 28Hz (in room)	R	82

LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
JPW P1 £145	Good Average +	Honest and basically articulate if not very sophisticated, resolution is good but it can sound a little wearing in bright systems or with rough sounding material	44 x 25.9 x 26.1cm free space on stands	89dB/w 60Hz	R	59
JPW P1 Vinyl £135	Good Average	Not particularly pretty, this is still a lot of highly competent loudspeaker for the price, with a safe and middle-of-the-road sound that's unlikely to disappoint.	43.5x25.5x26cm stands 1-2ft from wall	87dB 32Hz (in room)	BB	102
JPW Sonata £115	Good Average +	Well balanced and integrated, this near-miniature offers fine sound if limited bass and dynamic range, plus real tree wood at a nearly silly price	32 x 23 x 20cm stands near rear wall	86dB/w 55Hz	BB	71
JPW Sonata Plus £135	Average Average -	This luxury variation on the redoubtable Sonata theme features a metal dome tweeter, and is not the better for it	32 x 23 x 21cm about 1ft from wall	87dB/w 30Hz		90
JRT AD1 £500 (stands £100)	Average + Good +	A most auspicious Choice debut for relative newcomers JRT. A fair share of cosmetic deficiencies do little to spoil the impressive coherence and timing	59.5 x 28 x 36cm own stands close to rear	86dB/w 28Hz (in room)	R	86
JRT AD1 Micro £389	Average Good	Beautiful bijou miniature has delightful life and coherence and gives surprising impression of scale; some aggressive tendencies but very open to system tuning	28 x 17 x 21cm stands against wall	87dB/W 50Hz (in room)	R	94
Kammerzelt Reference Mini Monitor £545	Average+ Good	Lovely miniature has a beguilingly sweet sound with good pace and drive, but scale is restricted and presence a little dulled considering the high price	stands 1-2ft from wall 85dB/W	50Hz (in room)		94
KEF 104/2 £1,295	Very Good Very Good	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound level	90 x 28 x 41.5cm floor standing in free space	92dB/w 50Hz	R	60
KEF Q60 £349	Good Good	Uni-Q co-axial driver provides fine imaging and mid coherence, while magnet decoupling reduces cabinet coloration. Goes loud, bass not entirely convincing	48x25x27cm stands close to wall	90dB 25Hz (in room)	R	102
Lindley New Age £1100	Average - Average +	Attractively different presentation with classy finish, this tall cylindrical floorstander has fine bass extension but a rather uneven overall balance	105 x 23 x 23cm clear of walls	86dB/w 25Hz		90
Linn Index II/KuStone £235/£109	Good Good	Combination of stand and speaker looks and sounds very good for the price, with good bass extension and control, fine dynamic range. Clean, clear if a shade slow	44 x 21 x 23.5cm (box only) close to rear	86dB/w 28Hz	BB	90
Linn Helix II £357 (stands £109)	Good Good+	Ku-Stone supported, this is one of the best 'large bookshelf' size models around. Dry, controlled bass and very open, if slightly aggressive balance.	57x24x30cm KuStones 1-2ft from wall	88dB 33Hz (in room)	R	102
Linn Kaber LS500 £1098	Average Good +	Discreet wall-mount package trades sensitivity for fine bass extension and midbass performance; can be a little relentless but has prodigious dynamic capabilities	93 x 19 x 28cm floor against rear wall	86dB/w 28Hz (in room)	R	82
Linn Kan II £439	Average + Average +	A niche product for those prepared to tolerate its strong character for the sake of its fine bass performance and near invisibility	30.5 x 18.5 x 16.5cm Kan stands against	82dB/W 35Hz (in room)		78
Linn Nexus LS250 £458	Good Average	Good features include a solid, meaty bass plus good imagery and tonal balance. The catch is that Nexus lacks resolution and timing	49 x 23.5 x 30.4cm near rear wall	89dB/w 60Hz		59
Magneplanar MG1.4 £1190	Good + Good +	Replaces the stalwart MG1c with a revised panel layout. Offers a very crisp and articulate sound, particularly revealing of upper mid vocal details	155 x 8 x 57cm open space	88dB/w 40Hz	R	72
Magneplanar MG2.5R £1998	Good Good	Offers the low coloration and profound musical insight of better electrostatic loudspeakers but without loss of low frequency extension	183 x 56 x 4.5cm Open space	83-85dB/w 35Hz	R	60
Magneplanar MGIIIa £2700	Good Very Good	Another excellent true-audiophile loudspeaker this American panel speaker helps to convey much of the original character of the music	180 x 62 x 38cm well clear of walls	84-86dB/w 35Hz	R	46
Magneplanar SMGa £675	Average - Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB/w 56Hz		46
Marantz LD-50DMS £230	Very Good Good	Well behaved larger two-way has fine balance, stereo and integration with good bass extension, albeit with mild boxy, chesty and fizzy effects	106 x 22 x 32cm floor, free space	88dB/w 30Hz (in room)	R	71
Martin Logan CLS II £3998	n/a Very Good	Much improved high resolution design, fussy about system set-up and demanding of ancillaries and software alike. It rewards the efforts though	60 x 28 x 7.5cm open space	86dB/w 45Hz	R	72
Meridian Argent 1 £1,200	Good+ Good+	Beautifully built, finished and shaped but pricey compact has fine bass extension and virtual absence of 'boxiness'; needs a big amplifier	33 x 27(max) x 27(max)cm Slate stands	83dB 28Hz (in room)		98
Meridian Argent 2 £995	Good+ Good	This beautiful but pricey high-tech 'large compact' delivers an extended, smooth and neutral sound with fair speed. Slate Audio stands are almost essential	48.5 x 21 x 29.5cm stands free space	85dB/W 23Hz (in room)		94
Meridian M30 £895	Average + Average	Pricey but easy on the ears and worth considering especially where space is at a premium	38.5 x 18 x 32cm free space on stands	Active 40Hz		46
Mission 760 £100	Good Average +	Smart presentation and an engaging sound, this sensitive budget miniature sounds notably more lively and less boxy than most of its peers	29 x 18 x 20cm stands close to wall	88dB/w 50Hz	BB	90
Mission 761i £150	Good Average	Variation on 760 theme adds an extra main driver for easier amp loading and power handling. Sound was judged slightly inferior to its simpler, cheaper stablemate.	38x19x24cm stands close to wall	88dB 48Hz (in room)		102
Mission 762 £200	Average Average -	Mission's 'bookshelf middleweight' offers high sensitivity and loudness capability, but at the expense of a somewhat untidy and rather 'heavy' sound	50 x 25 x 27cm stand, experiment advised	91dB/w 55Hz		66
Mission 763 £300	Average + Average +	A very artful combination of generous volume and good bass extension at a modest price. Works well in the listening room despite a few rough edges	77 x 25 x 32cm near rear wall	86dB/w 40Hz	BB	68
Mission 764i £480	Good Average	Despite improvements, this large floorstander still lacks low frequency authority, which is probably a function of its comparatively modest price	1ft from wall, freestanding 87dB/W	below 20Hz		94
Mission 767 £2500	Very Good Very Good	Magnificent and massive part-active monoliths have fine acoustic subtlety and impressive loudness capability, ultimately limited by partnering (Cyrus) electronics	138 x 29 x 43cm floor, flexible	91dB/w <20Hz (in room)	R	81
Mission Cyrus 780 £180	Good Average +	Pricey but very pretty miniature based on Mission 760 but with beefed up box and crossover network to enhance sound quality still further	29 x 18 x 26cm light stands close to wall	88dB/w 50Hz	R	90
Mission Cyrus 781 £250	Average + Good	Properly run in, the pretty little 781 delivers a fast, dynamic and informative sound which more than justifies its price.	43 x 22.5 x 28cm matching stands 1ft	88dB/w 28Hz (in room)	R	86
Mission Cyrus 782 £350 (stands £80)	Good - Good -	Lively, articulate and beautifully finished, this compact wall-mount model with twin main drivers has good integration but a rather rich, 'Loudness' balance	50 x 25 x 32.5cm Cyrus stands near wall	90dB/W 50Hz		71
Monitor Audio MA1200 £900	Average Average +	This smooth and civilised slimline floorstanding loudspeaker is well built and nicely presented. But it is also expensive	94 x 20 x 26cm in free space	85dB/w 48Hz		68
Monitor Audio MA1800 £1400	Good Average +	Attractive and beautifully finished, even when ballasted with lead shot the 1800 inclines towards upper bass richness and lacks genuine extension	106 x 22 x 32cm floor, free space	88dB/w 30Hz (in room)		81
Monitor Audio Monitor 11 £330	Average Good	This tall and slim and attractive free space compact has an extra driver to help out in the bass, giving extra urge at some price in delicacy	52 x 20 x 24cm stands free space	87dB/W 48Hz (in room)	R	94
Monitor Audio Monitor 14 £400	Average Average	Floorstanding version of M11 suffers from excess upper bass, giving a thick, chesty coloration beneath a quite lively and well focused mid and treble	78 x 20 x 24cm floor well clear of walls	86dB 30Hz (in room)		98
Monitor Audio Monitor 7 £180	Average - Average	This lively and punchy near-miniature looks pretty enough and is good value but is let down by an unruly and indifferently integrated tweeter	34 x 16.5 x 17cm stands 1ft from wall	84dB/w 70Hz		74
Monitor Audio Monitor 9 £220	Good Average	Despite a much better treble balance than the 7, the Monitor 9 is less engaging and lively at low frequencies than its smaller sibling	37 x 20 x 21cm high stands near wall	85dB/w 30Hz		78
Monitor Audio Studio 10 £1200	Average Average +	Expensive, luxury build/finish and all-metal driver diaphragms provide engagingly transparent midrange and treble, spoiled by over-strong mid-bass.	40 x 20 x 25cm heavy stands clear of walls	87dB/w 45Hz		90
Monitor Audio Studio 5 £500	Average+ Average+	All metal diaphragm luxury miniature has splendid presence coherence but sound can be aggressive and lacks welly.	32 x 18 x 20cm stands close to wall	83dB 28Hz (in room)		98

The Directory

LOUDSPEAKERS

■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ SIZE ■ PLACEMENT	■ SENSITIVITY ■ BASS FROM	■ VALUE	■ ISSUE
Monitor Audio Studio 15 £1,600	Average+ Good	A little slow and lazy but better balanced than the smaller <i>Studio</i> models, the midband coherence and focus is superb, but it ain't cheap	51x20x26cm free space	87dB 45Hz (in room)	R	102
Mordaunt-Short Classic 20 £395	Average+ Average+	Luxuriously finished compact delivers beguiling mid transparency but bass is altogether less convincing — one for the carpet slippers generation perhaps	37x22x27cm stands in free space	86dB 45Hz (in room)		102
Mordaunt-Short MS3.10 £110	Average Average+	Probably the liveliest and most communicative miniature around, this beautifully presented design is probably better suited to budget 'real hi-fi'	28.5x17.5x20cm stands in free space	88.5dB 48Hz (in room)		78
Mordaunt-Short MS3.20 £140	Average Average+	All the charm of its BB rated £99 baby 3.10 brother, plus a smidgeon more bass for those in a suggestible frame of mind	35.5x18x20cm stands against wall	85dB 50Hz (in room)	R	82
Mordaunt-Short MS3.30 £200	Average Average+	A little too mid-forward for neutrality or formal recommendation this attractive, good sized model nevertheless has more than enough appealing qualities	46x23.5x27cm stands 1-2ft from wall	87dB 38Hz (in room)		78
Mordaunt-Short MS3.40 £260	Average+ Average	It looks pretty and sound civilised but the 3.40 failed to ignite any degree of enthusiasm amongst our listeners. LF room matching is critical	57x23.5x27.5cm stands in free space	87dB 30Hz (in room)		86
NAD 8100 £269	Average+ Average+	Floorstanding variation on attractive 8225 miniature adds some half convincing extra bass thump and saves the price of stands — very cost effective	75 x 20 x 25cm floor clear of walls	88dB 25Hz (in room)	R	98
NAD 8225 £150	Good Average +	Notwithstanding lacklustre styling and an unprepossessing appearance, this NAD miniature has a smooth and even midband plus an appealing overall jauntiness.	34 x 20 x 18cm stands close to wall	87dB/w 45Hz (in room)	R	86
Naim NA IBL £798	Average+ Good	This tiny and elaborately engineered floorstanding wall mount delivers outstanding dynamics, speed and detail, marred by pronounced upper mid forwardness	wall, freestanding 84dB/W	30Hz (in room)		94
Naim SBL £1,527	Good Very Good	Impressive scale and full bandwidth coherence from an attractively discrete floor standing wall-mount — coloured midband but very well balanced and agile with it.	88x26.5x17-27cm close to wall	86dB 25Hz (in room)	R	102
Neat Petite £525	Average Good+	Pricy and far from perfect, this near miniature is nevertheless one of the most entertaining and enjoyable speakers around, colorations notwithstanding.	30.5x20x18cm stands close to wall	86dB 33Hz (in room)	R	102
NVA Cube 1 £600 (stands £200)	Good - Good +	Attractive, cube-shaped semi-omni is very sturdily built, and gives an idiosyncratic but unusually open, spacious and informative sound	33 x 32 x 32cm own stands c0.5m from wall	85dB/w 52Hz	R	71
NVA Cube 2 £380	Average Good	A rude but exciting miniature, with unusually accomplished bass capabilities for its size	28.5 x 27 x 28.5cm NVA stands against wall	85dB/w 48Hz (in room)	R	82
NVA Cubix £1100	Average Good	Too idiosyncratic for formal recommendation, the Cubix possesses remarkable bass extension for its size, but is tricky to optimise	60 x 32.5 x 32.5cm	84dB/w 28Hz (in room)		78
Opus 3 Capella £599	Good Good	The sound of this Scandinavian curiosity certainly benefits from the crushed marble enclosure, though presentation is strictly DIY	32 x 40.5 x 26(ave)cm amongst books in	86.5dB/w 45Hz		66
Opus 3 Credo £399	Average Average	Credo's odd-shaped silicate-based cabinet confers good box and bass performance, but the sound could be more neutral for the price	32 x 28 x 32cm stands in free space	88dB/w 65Hz		74
Pearl & Oakley Victoria 200 £1099	Average - Average -	Extraordinary — and to many very attractive — 'ginger jar' presentation in Staffordshire ceramics, but let down by need for further acoustic development	93 x 33 x 33cm on floor in free space	87dB/w 30Hz (in room)		78
Philips FB815 £250	Average Average	An impressively — indeed imposing — physical package for the price, clever engineering gives a very competent if slightly hard and brittle sound quality	63 x 27 x 27cm low stands in free space	85dB/w 30Hz		86
Philips FB820 £450	Good Average	Big-but-less-than-beautiful three-way is well enough balanced but lacks communication skills in the time domain	86 x 27 x 35cm floor clear of walls	87dB 28Hz (in room)		98
Philips FB825 £650	Good Good	Generous sounding and impressively uncongested for the type, loudness and bass extension don't quite match the large and rather plasticky box	110 x 29 x 41cm on cones clear of walls	88dB/w 25Hz	R	90
QLN Model One £700	Good Average	Similar to Signature at two thirds the price, Model One exaggerates the latter's rich and heavy midbass and lacks its velvet smoothness	35 x (16-25) x (21-27)cm pillar	85dB/w 28Hz (in room)		82
QLN Signature £1100	Good Good	Beautiful but expensive luxury compact has a rather laid back and 'heavy' sound, but coloration is low and stereo imaging very good	37 x 18 x 36cm heavy stands in free space	83dB/w 30Hz (in room)		78
Quad ESL-63 £2072	Good + Very Good	With its unusual but subtle characteristics this classic electrostatic may not be punchy in the bass, but has strengths that some cannot live without	92 x 66 x 27cm open stand well clear of	84dB/w 34Hz	R	60
RAM Hermes £425	Average- Average+	Slim small floorstander is a bit tall for its footprint. Good sensitivity is combined with an attractively lively sound, but it's uneven and not truly coherent	70 x 21.5 x 23cm floor, freestanding	91dB/W 45Hz (in room)		94
RCF Mytho 3 £1,395	Average Average+	Undoubtedly very attractive and well built, incorporating a number of unusual and interesting ideas, the highish price isn't really justified by the performance.	100x21.5x30cm away from walls	88dB 25Hz (in room)		102
Richard Allan CD5 £184	Average - Average -	This neatly presented small reflex design can sound engagingly communicative, but is flawed sonically and technically and quite expensive too	38 x 19 x 23cm on rigid stands	88dB/w 80Hz		68
Rogers LS2a £193	Average Average	Provides very good engineering and stereo performance for the price, alongside some 'boxiness' and certain dynamic constraints	36 x 23 x 21cm low stands 1ft from wall	88dB/w 50Hz (in room)		82
Rogers LS4a £255	Good Good -	This artfully voiced and well balanced compact gives a fair flavour of the classical 'BBC sound' at a very reasonable price	43 x 25.5 x 24.5cm stands 1ft from wall	87dB/w 32Hz (in room)	R	78
Rogers LS6a £316	Good Good	Stereotypical model with impressively even balance, prospective purchasers will have to weigh the midband naturalness against slightly lazy dynamics and timing	51 x 27.5 x 28cm stands in free space	86dB/w 25Hz (in room)	R	86
Rogers LS7t £449	Good + Good +	A fine combination of classic qualities at reasonable price produces the "R" tag, but try to get a pair home on approval to check for bass 'heaviness'	56 x 27 x 28cm free space on 40cm stands	88.5dB/w 48Hz	R	59
Rogers LS8a £425	Average + Average +	This modestly priced floorstander is a bit of a mixed bag, with plenty of scale and welly but lacking the subtlety, clarity and agility delivered by some rivals	89x25.5x25cm clear of walls	91dB 48Hz (in room)		102
Rogers Studio 1a £612	Very Good Good -	The classic BBC monitor style sound sensitively updated — transparent and natural with fine stereo, but a touch 'heavy' in balance	63.5 x 30.5 x 30.5cm stands in free space	87dB/w 36Hz	R	66
Roksan Darius £1569 (£389 integral stand)	Good Very Good	Now totally realigned, the current Darius provides an exceptionally impressive combination of transparency and delicacy with fine information retrieval and speed	47 x 27 x 40cm own stands angled in space	82dB/w 20Hz	R	86
Royd A14 II £199	Average Good	Not the smoothest or prettiest around, this is still an informative if sometimes aggressive large bookshelf model, with plenty of welly for the price	40 x 26 x 23cm stands 1ft from wall	87dB/W 30Hz (in room)	R	94
Royd A7 Series 11 £115	Average + Average	Lively clear sound; good upper bass and dynamics, but treble "ramp" made vocals sound shut in. Try before you buy	31 x 20 x 17cm shelf or 50cm stands near	86dB/w 75Hz	R	53
Royd Apex £485	Average + Good	Not the smoothest sound around, it more than compensates with an impressively communicative and informative musical presentation	85.5 x 20 x 30cm on floor close to wall	87dB/w 33Hz (in room)	R	78
Royd Eden £235	Average Average +	Delightful mid/treble speed and transparency but determinedly bass light, this oddball miniature threatens cult status but could use a sweeter tweeter	31 x 20.5 x 18.5cm stands close to wall	87dB/w 85Hz	R	66
Royd Sapphire £200	Average+ Good-	Neat little miniature sounds a touch cold and thin but unusual main driver delivers remarkable speed and coherence for such a reasonably priced model	30.5 x 20.5 x 21cm frame stands 1ft from	88dB 28Hz (in room)	R	98
Royd Sintra £330	Average + Good	Balance is bass light and a little bright, but superb dynamics, speed and timing make this luxury miniature musically very informative and satisfying	30.5 x 20.5 x 19cm stands close to wall	88dB/w 50Hz	R	90
Ruark Swordsman £219	Good Average	Very attractively styled and finished, the Swordsman is a well built 'small bookshelf' model that delivered better test than listening results	38.5 x 20 x 27.5cm stands 0.5m from wall	84dB/w 50Hz		71
Ruark Swordsman Plus £269	Good Average	This real wood variation on the established Swordsman theme looks and measures rather better than it sounds, probably due to rather prosaic drivers	38 x 20 x 28cm stands 1-2ft from wall	84dB 27Hz (in room)		98

The Directory

LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
Ruark Talisman £629	Average Good	Clever and beautifully finished compact floorstander has some coloration but is impressively informative and communicative, with fine pace and timing	83.5 x 21.5 x 31 (max) cm close to rear wall	86dB/w 30Hz	R	90
SD Acoustics OBS £845	Average Good	Recent changes have added some refinement to a seductive midrange, good timing and fine sensitivity, though bass extension is limited and coloration obvious	102 x 35 x 25cm floor, angled, away from	92dB/w 30Hz (in room)	R	82
SD Acoustics Ribbon £2150	Average Good +	Entertaining but a little underdeveloped and rather amplifier sensitive, the Ribbon is a lively and loud hybrid marred by some colorations; some like it, others don't	152 x 30 x (15-30)cm floor, angled, away	91dB/w 30Hz (in room)		81
SD Acoustics SD1 £1350	Average Very Good	A large scale, airy and unusually detailed system with excellent dynamics Current model has more civilised top-end and warmer balance than original model	123.5 x 38.2 x 31.9cm free space	90dB/w 50Hz	R	60
SD Acoustics SD3 £379	Average Good	Neither cheap nor perfect, this near miniature sounds unusually lively and dynamic within inevitable physical constraints. Both engaging and entertaining!	38 x 19 x 29cm stands 10cm from wall	83dB/w	R	86
Seventh Veil System IV £1290 (£340 integral stand)	Average Good +	Lacks welly and loudness but delivers astonishing results with female vocals in particular. Antithesis of the 'good allrounder'	72 x 44 x 21 x 29cm own-stands close to	84dB/w 28Hz (in room)	R	86
Shan Shinna £315	Average+ Good-	Pretty little miniature with resin-based enclosure has a bright, thin but sweet and communicative sound; loudness and welly are both limited	31 x 21 x 17cm own stands 1ft from wall	84dB 48Hz (in room)	R	98
Sony APM-101ES £100	Good Average	Big hearted sound from small bookshelf successor to BB '10ES, sounds a little untidy at frequency extremes, so suits CD better than vinyl	39.5 x 22.5 x 23.5cm stands, free space	86dB/w 52Hz		71
Sony APM-121ES £150	Average Average -	Good perceived high tech value, but the balance has an artificial 'loudness' character, too rich in the bass and too strong in the treble	43 x 25 x 28cm stands, free space	86dB/w 25Hz (in room)		86
Sony APM-141ES £200	Average Average	A great deal of loudspeaker for the money, the rich sounding '141 needs a big room and still shows significant 'loudness' (boom'n'tizz) tendencies	61.5 x 26 x 32cm stands in plenty of	88dB/w 30Hz (in room)	R	78
Sony APM-181ES £300	Very Good Average	Big and beefy but equally fat and bass heavy, this well engineered 3-way has notable strengths but lacks transparency and sounds better at lower levels	57.5 x 29 x 36cm low stands, free space	87dB/w 40Hz		71
Spendor SP1 £800	Very Good Good	A very subtle and musical performer that works particularly well with digital material. An exceptional allrounder	63.5 x 29.5 x 30.5cm stands, free space	87dB/w 41Hz	R	60
Spendor SP2/2* £500	Very Good Good +	Conceding little to the SP1, this 30 litre model displayed good tonal balance with a highly articulate midrange, only slightly marred at frequency extremes	50 x 25 x 30cm stands, free space	87dB/w 45Hz	R	59
Spendor S20 £510	Very Good Good	This solid and elegant luxury compact maintains Spendor's tradition for peerless mid-to-treble coherence and perspectives. Bass is rather unconvincing.	38x22x26cm stands 1-2ft from wall	83dB 25Hz (in room)	R	102
Spica Angelus £1295	Good Average	A little bass shy and soft in the bass and lower mid, the free standing Angelus is otherwise tidy, extremely lively and fluid, if uneven overall	116.8 x 53.3 x 26cm away from walls	86.5dB/w 50Hz		60
Spica TC50 £599	Good - Good	This triangular-profile 'grown up' miniature is a shade boxy and laid back but has good rhythmic and musical integrity	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
Spica TC50SE £799	Good - Good	A heavily UK-modified TC50, the SE sounds less boxy and more spacious, but lacks some of the urgency of the standard model	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
Studio Power DMS100 £249	Average + Average +	Close to a BB rating, and in many respects remarkable value for money. Delivers an impressively smooth and large sound, but sheer ugliness will limit its appeal	51 x 26 x 32cm open stands 1ft from wall	86dB/w 25Hz (in room)	R	82
Tannoy Westminster £3600	n/a Good +	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few pockets and rooms	Huge, flat against rear wall, away from	96dB/w (manuf.)	R	Coll '87
Tannoy 603 £120	Average+ Average+	Pretty hexagonal cabinet miniature is optimised for free space siting and delivers fine imaging with little boxiness, but little in the way of welly and power either.	33.5x22(max)x16cm high stands in free space	85dB 45Hz (in room)	R	102
Tannoy 609 £250	Good Good	Distinctive hexagonal cabinet reduces box colorations, and new dual concentric driver is sweeter than its predecessors, making this one very superior speaker	50x32(max)x22cm stands clear of walls	90dB 25Hz (in room)	BB	102
TDL Monitor £1799	Very Good Very Good	Fine solidity and good accuracy, with enough bass extension to satisfy even organ freaks. Needs a big room and can sound a bit lazy and a shade tinkly	118.5 x 30 x 47cm 0.5m from walls	85dB/w 28Hz	R	66
TDL Studio 0.5 £399	Average Good	This tiny floorstanding transmission line has good agility but doesn't provide the coherence or even balance of the slightly bigger Studio 1	55 x 20 x 30cm own stand, free space	85dB/W 40Hz (in room)		94
TDL Studio 1 £599	Average + Good	Delivering genuinely extended bass from a compact floorstanding enclosure, the Studio is very detailed but a shade clinical and detached in presentation	76 x 23 x 33cm	84dB/w 25Hz (in room)	R	78
Technics SB-CS5 £70	Average Average	Clearly fine material value for money, the CS5 nevertheless betrays its midi system heritage.	42.5 x 25 x 24cm Stands in free space	86dB/w 48Hz	R	86
Technics SB-EX2 £179	Average- Average	Nicely presented, well built and decent size enclosure sounds solid but somewhat dull, thanks presumably to rather ordinary, low cost drivers	48 x 23.5 x 27cm stands clear of walls	86dB 20Hz (in room)		98
Technics SB-RX50 £600	Very Good Average +	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass	48 x 30 x 26cm free space on 40cm stands	86dB/w 40Hz	R	46
Technics SBC 250 £140	Average + Average -	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character	36.5 x 23.5 x 20.5cm free space, stands	86dB/w 60Hz		46
Townshend Glastonbury IIS* £1700	n/a Very Good	What? No bass? Actually, like the KEF 107, Glastonbury II goes down so low you might not notice how good it is. A truly remarkable performer. Superb	91.5 x 28 x 4.6 free standing in room	88dB 27Hz	R	65
Townshend Glastonbury Tor £1495	Average - Very Good	Prodigious bass extension, stunning stereo focus and low cabinet coloration, but limited loudness from low sensitivity and power handling	99 x 26.5 x 33cm well clear of walls	82dB/w below 20Hz	R	90
Vandersteen Model One £1000	Average + Average +	This compact American floorstander's elegant staggered baffle arrangement contributes to a refreshing freedom from boxiness, but the price is quite high	100 x 30.7 x 25.6cm floor clear of walls	87dB/w 23Hz (in room)		86
Vecteur Premiere £695	Average Good	Expensive for its material content, this pretty French compact nevertheless has a beguiling sound quality that indicates painstaking development	34 x 19.5 x 25cm light stands clear of walls	88dB 48Hz (in room)		98
Videotone Minimax 2 £80	Poor Average -	Cheap in build and QC as well as price, but cheerful (if coarse) with it - if a little too cheerful after extended listening	27.5 x 17 x 20cm near rear wall	84dB/w 90Hz	R	74
Visonik David 6001 £173	Average - Poor	Sharp styling a classy looking miniature makes, but the complex grillework worsens a sound which starts off with too much top and not enough bottom	20 x 12 x 13cm against rear wall	87dB/w 130Hz		74
Wharfedale 410 £130	Good Average-	One step up from the Diamond, this attractive and sensitive small bookshelf model sounds smoother but is also rather bland and uninvolving	34.5 x 22 x 22.5cm stand against wall	89dB/W 45Hz (in room)		94
Wharfedale 505.2M £260	Average+ Good-	Luxury red mahogany finish version of 505.2, confirms that this well balanced design remains fully competitive nearly three years after the original	44 x 25.5 x 25.5cm stands in free space	87dB 45Hz (in room)	R	98
Wharfedale 505/2 £190	Average Good	This lively Wharfedale provides plenty of speaker with unusual refinement for the money, and should be fairly tolerant of room siting	44 x 25.5 x 24cm stands 1ft from wall	86dB/w 55Hz	BB	66
Wharfedale Coleridge C £600	Good Good	Very prettily dressed and sounds pretty good as well, though whether enough to justify the £600 pricetag is open to debate. Well balanced, smooth and a little dull.	48x25.5x25.5cm stands clear of walls	86dB 30Hz (in room)		102
Wharfedale Delta 30.2 £100	Average- Average	This hundred pounder has a bigger main driver than many of its rivals, and so packs a bit more welly and loudness. Coloration is rather obvious, but timing is good	38 x 22 x 17cm stands close to wall	88dB 48Hz (in room)	BB	98
Wharfedale Diamond IV £109	Good Average +	Thanks to a new metal dome tweeter, the new Diamond is much more civilised than its predecessors, with an attractive lively bounce but some boxiness	27 x 18 x 18.5cm stands close to wall	86dB/w 48Hz	R	90
Yamaha NS 1000M £900	Good Good +	Living up to its monitor label, and tonally well suited to digital material, the NS 1000M is superbly crafted and capable of high levels	67.5 x 37.5 x 32.5cm 30cm from wall, stands	90dB/w 40Hz	R	46

LOUDSPEAKERS - SATELLITE AND SUBWOOFER SYSTEMS

Satellite and subwoofer systems, sometimes referred to as three way systems, consist of a small pair of speakers (the satellites) and an extra box (or two) to handle the low frequencies.

Most systems use a single sub-woofer to supply low bass output, although stereo sub-woofer systems are available. By freeing the main speakers of the necessity of generating deep bass they can be made much smaller than a standard design and as a result satellite

and subwoofer systems are usually visually unobtrusive.

Positioning of the sub-woofer is usually not as critical as the positioning of a conventional speaker and as a result the largest part of the system can be hidden away entirely, although please refer to the placement notes below as this does not apply to every system.

In general the sonic performance of these systems will fall below the performance of a good, comparably priced, conventional speaker

The value ratings given below are judged in the context of sat and sub woofer systems only and are not judged by the same criteria as the main loudspeakers, thus a Recommended sat and sub system probably won't sound as good as a Recommended traditional speaker.

If you are prepared to compromise slightly in terms of sound quality then a satellite and sub-woofer system might represent a good solution for those situations where the loudspeaker should be heard but not seen.

LOUDSPEAKERS - SATELLITE AND SUBWOOFER SYSTEMS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE (cm) PLACEMENT	SENSITIVITY BASS FROM	VALUE	ISSUE
Allison MS 205 £420	Average Good -	Tasty high quality satellites give this quite pricey 3-box system a touch of class. Subwoofer is very compact and only slightly boomy.	25.5x14.5x15 + 29x 29x36 stands close to wall	86dB 30Hz	R	104
Bose Acoustimass AM3 £289	Average Average	Ultra compact 3-box is well balanced though limited in loudness and bass. Tiny satellites are a bit fierce, and grilles unhelpful	9x11x11 + 20x37x19 close to wall	85dB 48Hz		104
Bose Acoustimass AM5 £569	Average + Average +	Pricy but cleverly engineered 3-box system is well balanced and uses tiny twin-driver satellites to good effect	16x7.7x12 + 36x19x48 sats at wall, sub 2ft from wall	85dB 40Hz	R	104
Heco Libero £375	Average Average	Attractive 3-box package uses neat metal satellites with versatile mounting accessories, but subwoofer is boomy in the midbass	18x11x12 + 21x55x 31.5 uncritical	85dB 45Hz		104
Jamo SW/SAT300 £300	Average Average	Attractively finished 3-box package has 'tunable' subwoofer that allows boom to be minimised and a good balance achieved	21x15x8 + 21x48x34.5 uncritical	85dB 40Hz	R	104
RSS Solid/Bass Station £550	Average Average	Multi-driver macho subwoofer adds mucho muscle to Solid satellites, but it's much more midbass than serious extension	24x12x12 + 47x 4& x 20 sub at wall, sats in free space	91dB 45Hz		104
Wharfedale 2130 £300	Average Average +	3-box system marred by indifferent boomy subwoofer but rescued by novel wide-dispersion satellites that give an open sound	14x24x11 + 19x32x 50 sub away from wall	86dB 48Hz	R	104

PERSONAL STEREOS

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than all manner of domestic systems and as such demand some attention.

Now that personal CD players have joined the ubiquitous Walkman in the market, the variety and standard of sound quality is huge, with obscurely named cassette players practically falling out of your cornflakes packet and the top Discmen going for £300 or more.

Despite their diminutive size personals attempt to incorporate as many gimmicks and features as possible, cassette players often incorporating tuners, Dolby noise reduction or even graphic equalisers.

CD players are still relatively expensive, although prices have come down a lot, and don't tend to vary that much on the features front, rather the amount and quality of accessories differs. Rechargeable batteries are extremely useful and increasingly popular, some can now be recharged within the unit and charge capacities are also being increased.

Most models come with a mains adaptor, which in some cases doubles as a battery charger and some include a wired remote control. A few are now appearing with infra-red remote control although this is more applicable to CD players.

Sound quality on the cassette front seems to

have a proportional relationship to price and integrity of construction – wow and flutter being quite obvious on the cheaper models.

CD players become less noisy as they get dearer and also reduce in size; one drawback of the latter seems to be that immunity to shock suffers as a consequence, although newer models are starting to buck this trend. Cassette players do, on the whole, seem better suited to the outdoor life than their digital counterparts, as does the software. Bear in mind that the sound and lab ratings given below cannot realistically be compared to those in other categories or between cassette and CD personals.

PERSONAL CASSETTES

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa HS P505MkII £70	Good	Very good clutch of features and accessories plus good sound at a reasonable price. Could be more user friendly	Remote control, rechargeable battery and charger	BB	102
Aiwa HS-PL707 £135	Very Good-	Has a precise, attractive sound, if a little clinical and cold. This player might be ideal for the user who will listen to mostly classical music. Somewhat fiddly to use	Remote control, BBE sound enhancer, charger & battery	R	102
Aiwa HS-JX705 £220	Good	Rather expensive radio-equipped player. Sound quality on tape playback didn't match up to the Aiwa HS-PL707	FM/AM tuner, recording mic remote control, charger		102
Panasonic RQS15 £85	Good	Considerable power and immediacy to the music though with some raggedness. Good features and accessories. Well designed and easy to use	Remote control, rechargeable battery and charger	R	102
Panasonic RQV520 £100	Good	Features an onboard radio without sacrificing sound quality on tape playback. You lose out on accessories, though (no battery charger)	Radio, remote control, bass enhancer		102
Panasonic RQS65 £130	Good+	Solid, warm sound plus a good selection of features and accessories all combined in a stylish and very user friendly package. Comes with one of the better remote controls	Remote control, rechargeable battery and charger	R	102
Sanyo MGR401D £40	Average-	Easy to use budget model with a radio and some useful features (including a simplified remote control). Sound quality on tape isn't great but is helped by the bass enhancer	Radio, remote control, bass enhancer with graphic equaliser		102
Sanyo MGR580 £50	Poor	A more sophisticated radio than on Sanyo's 401D but the feature count is low and the tape playback unexceptional	Radio 'digital tuner', auto reverse		102
Sanyo SPT1000 £40	Average	Despite outlandish colourful trim and features completely unrelated to audio enjoyment (a 'Pedometer' for monitoring jogging) this has a better basic sound than the other Sanyos	Bass enhancer		102
Sharp JC-510 £30	Average	Serviceable sound quality and some decent features at a low price	Radio, bass enhancer, auto reverse		102
Sharp JC-K99 £160	Good-	Sharp's 'extremely lightweight' model. Well made, elegant and it certainly doesn't weigh a lot. Pleasant sound, marred on the test sample by some distortion	Remote, rechargeable battery and charger, bass enhancer		102
Sony WM DD33 £90	Good-	Well built and resistant to vibration on the move but comes with very limited features and accessories for the price	Bass enhancer		102
Sony WM EX80 £150	Good	User friendly Sony with a good remote control and high quality, accurate sound. Comes with all the extras	Remote control, rechargeable battery and charger	R	102

PERSONAL CASSETTES

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Sony WM DD99 £240	Good-	Mixed bag of accessories (nice headphone storage system, but no remote control) with variable sound quality at a steep price. But it does have Dolby B&C, good build quality and ergonomics	Dolby B&C, rechargeable battery and charger, auto reverse		102
Sony Walkman Pro £249	Very Good	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, it takes other personals to the cleaners (except on weight and power consumption)	Dolby B, C, types I, II & IV, record, line in/out, varispeed	BB	52/56

PERSONAL CDS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa DX-P50 £155	n/a Average -	A tad aggressive both through earphones and domestic systems, not very walkable but it has got two stage bass enhancement	Digital output, mains adaptor, remote		94 Supp
Denon DCP-100 £250	n/a Good	Solidly constructed and nicely finished in the slightly impractical Velvex, almost walkable, competent if uninspiring sound quality	Remote, mains adaptor, no earphones, rechargeable batts		94 Supp.
Denon DCP-50 £180	n/a Average +	Not very walkable, but lightweight and nicely finished in a nextel like grey. Sound through a system is a tad unexciting but not too bad	No headphones, remote, mains adaptor		94 Supp.
Goodmans GCD-10 £120	Average - Poor	Cheap, flashy and not short on accessories, the GCD-10 is a rather noisy player that left a lot to be desired on the sound quality front	13.5 x 3.7 x 18cm, 478g, mains adaptor		66
Kenwood DPC-41 £130	n/a Average -	Lightweight, not very walkable but nice control layout. Sound through the phones is on the thin side, through the line output it's pretty average for a portable	Mains adaptor, rechargeable batts		94 Supp.
Kenwood DPC-81 £200	n/a Good +	Chunky metal cased player that makes pretty confident sounds through a system but sounds dry via earphones and ain't exactly walkable	Remote control, mains adaptor/charger and batts, digital output		94 Supp.
Philips AZ6897 £200	n/a Good +	Unusually designed and equipped with a radio the Philips is almost joggable, it sounds remarkably good via a system and a little cautious through the phones	Mains adaptor with built in plug, wired remote, clock and carrying case	BB	94 Supp.
Sanyo CP-12 £260	Average Good +	Sonically amongst the more enjoyable personal CD players and capable of revealing the musical aspects of a disc in an interesting and entertaining fashion	12.5 x 2 x 12.7cm, 380g, wired remote, mains adaptor	R	66
Sony D-350 £300	n/a Good	More buttons and widgets than any of the others but not the sound quality or walkability to go with it	Mains adaptor, clock, comprehensive facilities, rechargeable batteries		94 Supp.
Sony D-66 £180	n/a Average +	One of the few walkable CD players on the market, sound quality is a little muddled but not offensive	Mains adaptor, rechargeable battery pack	R	94 Supp
Technics SL-XP1 £140	n/a Good +	Remarkably competent and enjoyable player that you can actually use on the move and sounds enthusiastic through a domestic system	Rechargeable batts, mains adaptor/charger	BB	94 Supp.

TUNERS

The radio medium operates at a much lower profile than TV, but in areas outside pop music the BBC service is the envy of the world. Live Prom concerts can rival all other sources from a hi-fi perspective. Only the FM (VHF) bands give stereo hi-fi sound, though AM (MW & LW) are useful for certain transmissions in the UK.

Something of a hi-fi afterthought, tuners are often selected merely to match a chosen amplifier

cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is well spent.

Tuners come in two basic types. Analogue models tune gradually (and usually manually)

acrossthe bands, and can have analogue or digital displays; they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories. (The Lab and Sound results for models tested in issue No. 65 refer to FM only. For AM results see under Comments.)

TUNERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Aiwa XT-003 £105	Average Average-	Economically designed and built in the UK, but trade-offs have a marked influence on FM and AM sound quality.	FM/AM digital, 30 presets, no signal strength meters.		93 Supp.
Akai AT-52L £150	Very Good Very Good	Holds its own on FM against many much more expensive tuners, but AM is very poor	All bands	BB	65
Akai AT-93L £250	Good + Good +	By AM standards presentable (good) while FM delivers the goods	All bands, aerial switch	R	65
Arcam Alpha 2 £185	Good Average+	Re-styled to blend in with the Alpha system, Arcam's cheapest tuner makes up for its lack of features with a sensitive front-end and mellow sound.	FM/AM analogue, no presets, manual tuning + AFC	R	93 Supp.
Arcam Delta 80 £340	Very Good Very Good	Hi-fi sound on FM, good on AM, a dependable British all-rounder	6AM, 6FM presets. FM/MW/ LW display, manual tune	BB	55
Creek T40s3 £220	Average+ Average	Creek's FM-only analogue tuner is now in series 3 form, though the aesthetics remain unchanged. Our sample was hampered by an obvious bass 'hump' though production units are said to be cured	FM-only analogue, no presets, manual tuning + AFC		93 Supp.
Denon TU-260L £100	Very Good Good+	A new cheapie from Denon with the bare minimum of features. Careful designwork promises a surprisingly open and vivacious sound, so don't overlook it!	FM/AM digital, 20 presets, manual and auto tuning.	BB	93 Supp.
Harman Kardon Citation 23 £600	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
Harman Kardon TU9400 £250	Good Very Good	Striking in appearance and with a sound to match, this new digital tuner comfortably exceeded our expectations. On stereo FM it's HK's best yet.	FM/AM digital, 24 presets, auto-tuning, signal strength meter	R	93 Supp.
Linx Theta £475	Good Very Good	A Magnum Dynalab on the cheap with the hallmark styling of this small British newcomer. Some of the best midrange from any tuner	Manual analogue tuning, no presets, signal strength meter	R	72
Magnum Dynalab FT101 £599	Good Very Good	Although expensive for its fairly minimum set of facilities, its excellent sound makes up for what it lacks elsewhere	Analogue manual tuning, no presets, signal strength meter	R	72
Marantz ST-40L £140	Average + Good	A little slow to tune but once accomplished it provides a meaty and dynamic sound on FM. AM too has a little extra bite to its performance	FM/AM digital, 30 presets, manual/auto tuning	R	93 Supp.

TUNERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Meridian 204 £660	Good + Good	Pleasant sounding with a fine finish but does not make the grade at this price	FM only, auto scan, digital, remote, timer		55
Naim NAT 01 £1377	Very Good Excellent	There may be better sounding tuners in the world, but we have yet to hear one	No presets, Two box, flywheel tuning, FM only, Analogue	R	50
Nakamichi ST-7E £750	Good + Good +	Exceptionally good for weak-signal areas, and good all round	16 AM/FM presets, auto time digital		55
Pioneer F91 £360	Excellent Good +	Easy to use, this model has excellent RF performance and scored very high ratings on the listening tests	FM/AM 24 presets	R	60
Proton AT-300 £199	Good Good	The AT-300 is pretty on the outside, orthodox on the inside and rather dear. AM - poor	FM/MW only	R	65
Quad FM4 £399	Very Good Good +	Fine sound, excellent ease of use, good build and finish and a more than satisfactory technical performance	7 presets, Digital	R	50
Revox B260 £1120	Excellent Very Good	Sophisticated and expensive, the B260 is ideally suited to the rest of the Revox range and should also work well in other systems	FM - virtually everything	R	60
SAE T-102 £449	Good + Good +	Expensive for all the radio you get, but sounds interesting. AM - poor	FM/MW only	R	65
Sony ST-S530ES £200	Good+ Good	The cheaper version of Sony's revered '730 certainly looks and feels the part but its sound is, well, less startling. Civilised, yes, but lacks much enthusiasm.	FM/AM digital, 30 presets, hi-blend + Cal tone + manual/auto tuning.		93 Supp.
Technics ST-G70L £200	Good+ Good+	Another very polite and refined-sounding tuner but one that does retain just enough sparkle to keep your interest. Plenty of widgets to play with too..	FM/AM digital, 39 presets, selectable RF/IF + fine tuning, signal. str. mtr.	R	93 Supp.

TURNABLES - 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.

TURNABLES - CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFFECTIVE MASS OUTPUT/TYPE	VALUE	ISSUE
Arcam C77 £22	Average + Average +	A sensible moving magnet package with good bounce at a competitive price	6-16g Normal, MM	BB	48
Arcam C77Mg £30	Average - Average	Punchy sound quality with plenty of extra energy to liven things up. The solid body seems well worth the extra £10	4-8g Normal, MM	BB	67
Arcam E77Mg £50	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laid back sound, with good 'scale'	3-8gN Normal, MM	R	48
Arcam P77Mg £60	Average + Average +	Cautiously recommended, the P77Mg was preferred to its cheaper partner by virtue of a better tip. Channel balance could have been better	4-9g Normal, MM	R	48
Arcam PMX10 £100	Good + Very Good	Not the very clearest in complex high-frequency sounds, but lively and exciting, good transients	5-11g Low, MC	R	85
Audio Note I02VDH £1295	Good Very Good	One of the best, giving 'an extraordinarily relaxing midrange clarity', needs a transformer	8-18g Very low, MC	R	43
Audio-Technica ART1 £800	Good + Very Good	This is a delicate and very fluid-sounding MC that tracks well, offers very low distortion and exceptionally good stereo separation	9-18g Low, MC	R	72
Audio-Technica AT-420E £35	Average Average	Better suited to pop recordings, this MM bears some of the sonic hallmarks of the Linn K5	7-14g (damp) Normal, MM	R	67
Audio-Technica AT-95E £19	Average - Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48
Audio-Technica OC-10 £307	Good + Good +	Good treble and good detail too, but some congestion and coloration reduces its informativeness.	4-12g Low/MC	R	103
Audio-Technica OC-5 £123	Good + Good	For the price, it's unusually effortless and detailed, but it tends to become rather relentless and tiring after a while.	5-14g Low/MC	R	103
Audioquest AQ 404i-L £400	Very Good Good +	Slight harshness detracted from the performance of this otherwise clear-sounding and detailed cartridge	8-16g Low, MC		84
Audioquest AQ 7000 £1200	Good Good +	Stunning stereo imaging and good detail at low levels are spoiled by less-than-perfect tracking and high sensitivity to arms.	6-20g Low, MC		91
Audio quest MC5 £220	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal, MC		54
Cello Chorale £750	Average + Good	Now available through a new distributor at a saving of some £300, the Chorale is still blessed with a delicate but highly detailed treble. Arm matching is a problem	3-9g Low, MC		72
Denon DL103 £99	Good Average +	An oldie but in many ways a goodie, the 103's good performance in bass and general 'life' is seriously let down by its spherical stylus which kills subtle details.	9-22g Low/MC		103
Denon DL110 £69	Good Good	Firmly recommended as a fine all-rounder, this high-output moving coil model is likely to perform well in nearly all circumstances	6-16g Normal, MC	BB	48
Denon DL160 £89	Average + Good	Although listeners just preferred the 110, its brother here proved a twin in lab tests and is still "thoroughly competent"	6-16g Normal, MC		43
Denon DL304 £200	Very Good Excellent	Uncoloured, detailed, neutral, superb tracking; top notch altogether, and a top notch bargain too.	4-12g Low/MC	R	103
Dynavector 17D2 £280	Very Good Very Good	Clear, detailed, neutral and generally very informative - excellent .	6-18g Low, MC	R	91
Dynavector DV-50X £99	Good Average	A high-output MC model with impressive lab performance, but whose tip and sound quality both disappointed	6-14g Normal, MC	R	48

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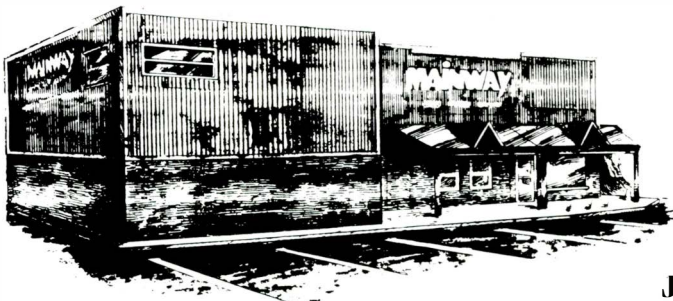
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TURNTABLES - CARTRIDGES

■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ ARM EFFECTIVE MASS ■ OUTPUT/TYPE	■ VALUE	■ ISSUE
Dynavector DV10X IV £125	Average Average +	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g (damping) Normal, MC	R	48
Dynavector DV23RS £230	Average + Good	Sound quality was described as "shut-in", lacking energy and sparkle but with some "edginess" in high frequencies	10-22g Low, MC		28
Dynavector XX-1 £680	Very Good Good +	Good, but not immensely competitive at the price, and not helped by comparison with the low output version	7-15g Normal, MC		84
Dynavector XX-1L £680	Very Good Very Good	Very clear, very detailed, no troubles with tracking; response lift around 20kHz seems to do no harm	7-13g Low, MC	R	84
Empire Benz Micro MC-Gold £130	Good + Good	Nothing is obviously wrong, but nothing is stunningly right either and tracking isn't perfect. Safe, but perhaps a little too safe	7-17g Low/MC		103
Empire Benz Micro MC-Silver £130	Good Good	High output MC that though ultimately not the peer of the MCGold is more appropriate to the sort of equipment it's likely to be partnered with	8-18g Normal/MC	R	103
Empire Benz-Micro MC-2 £699	Average Good +	Similar to both the Empire MC1000 and vdH MC2 in design, the Benz offers a warmer and very transparent account of the music. Its tracking prowess is slightly limited	5-12g Low, MC	R	72
Glanz GMC-10EH £50	Good Good	The rising HF trend of this high o/p MC may cause problems in certain systems but with a favourable wind its seductive qualities will win out	8-14g Normal, MC	R	67
Glanz GMC-10LX £80	Average + Average +	Bearing some of the hallmarks of the '10EH, the '10LX is still less competitive in the sonic stakes	7-15g Low, MC		67
Glanz GMC-20E £129	Good + Good +	Very good tracking, smooth sound and good detail. Very slight surface noise enhancement	5-10g Low, MC	R	91
Glanz MFG-110EX £25	Average Average	A little bright but giving detailed bass and clear treble, this was competitive at the price	6-16g Normal, MM	R	43
Glanz MFG-31OLX £50	Good + Very Good	Detail and treble outstanding for sub-£100 cartridge. Slight coloration may be due to body resonance	6-10g Normal, MF	BB	85
Glanz MFG-61OLX £90	Good + Good +	Similar to cheaper '310 but slightly clearer transients and bass. Benefits from lowish impedance loading	3-10g Normal, MF	R	85
Goldmund Clearaudio £1500	Average + Very Good	Something of a mixed bag overall, its sonic character bears a strong resemblance to the Pradikat though it shares some of the hallmarks of the more expensive Accurate	5-12g Low, MC		60
Goldring 1012 £50	Good + Good	Slightly harsh sound but plenty of life and quite good detail. Some very high frequency coloration apparent	6-12g Normal, MM	R	85
Goldring 1022 £70	Good + Good	As with 1012, a touch harsh; detail and transient purity improved, though, and it goes well with electric guitar!	5-11g Normal, MM	R	85
Goldring 1042 £90	Good + Good	Not terribly subtle, and not such good value alongside 1012 and 1022. Quite lively, though	7-12g Normal, MM		91
Goldring Elan £20	Average + Average	A lightweight and frisky-sounding MM that appears to be based upon the same body as the Nagaoka mm4	7-15g Normal, MM	R	67
Goldring Elite £200	Good + Good	The basics are right, and the Elite will cheerfully tackle any source material, but its sound possesses a certain dirtiness which can irritate.	8-18g Low/MC		103
Goldring Epic II £32	Average Average +	An excellent budget choice though the limitations of the stylus are rather obvious at higher frequencies	5-12g Normal, MM	R	67
Goldring Eroica H £105	Good Good -	More confused and coloured than its low-output sibling - high output less of an issue in these days of cheap MC-compatible amplifiers	8-15g Normal, MC		84
Goldring Eroica LX £120	Good + Good	Not the most subtle cartridge in the world; can sound edgy at times, but lively and informative	8-14g Low, MC	R	84
Goldring Excel £549	Average + Good	Goldring's most expensive cartridge to date errs on the warm and heavy side of neutral. Strong bass lines are its forte though its ability to resolve subtle treble details is weaker	6-13g Low, MC		72
Goldring Excel GS £600	Very Good Good +	The Excel has some true high end quality in its lack of annoying colorations, but tracking seems indifferent and high levels tend to sound rough and edgy.	9-20g Low/MC		103
Grado ZF3E + * £47.50	Average - Average	Downtilting balance disguises the brightness of this cartridge; bit of a mixed bag at this price	9-20g (damping) Normal, MM		54
Grado ZTE +1 £26.50	Average - Average	Bass and treble are a trifle coloured but the midband proved highly enjoyable. Ideal for budget systems	6-13g (damping) Normal, MM	R	54
Kiseki Blackheart £1795	Good Good	This cartridge demonstrated refined poise and a delicate but at once potent security, however, the price did seem a little on the high side compared to other Kisekis	6-16g Low, MC		60
Kiseki Blue Goldspot £450	Very Good Good +	Good bass and imaging, but hints of spit and coloration let the side down slightly	8-15g Low, MC		84
Kiseki Lapis Lazuli £4000	Good Very Good	Combining very sensible design concepts at a silly price, the Lapis Lazuli is best thought of as combining the detail of the MC3000 and the fluidity of the Clearaudios	4-12g Low, MC		60
Kiseki Purpleheart Sapphire £799	Good + Good +	Rare, beautiful to look at and sweet to listen to, our review of this high-flyer conjured up images of Japanese art	5-14g Low, MC		48
Koetsu Black S £612	Average Good +	The S is an OEM design built to Koetsu's blueprint. It features a sturdier fixing plate and offers a brighter, faster and more tactile sound than the earlier K	8-15g Low, MC	R	72
Linn Asaka £373	Good + Good +	Disciples of Linn who are trying to realise their true "Karma" may find that saving money is not a short cut to heaven	9-18g Low, MC	R	Coll. '86
Linn K5 £39	Average Average +	Not as crisply focused as the costlier Linn magnetics, the K5 offers a smoother presentation	7-16g Normal, MM	R	67
Linn K9 £89	Average Good	Linn threw this model into the leading pack by beefing up the Basik's bodywork, adding a super stylus, and keeping the price fair	6-15g Normal, MM	BB	Coll. '86
Linn Karma £564	Very Good Very Good	A specialist which is strongly recommended for Linn-based systems, results may be less predictable in more general application	9-18g Low, MC	R	Coll. '86
Linn Troika £798	Very Good Good +	Good all-rounder, but still some hint of unhappiness at very high levels. Good imaging and bass.	6-18g Low, MC		91
London Maroon £149	Average Average +	Now manufactured under the London brandname this Decca cartridge is as iconoclastic as ever	9-20g (damping) Normal, MM		67
London Super Gold £300	Poor Average -	Immediate and (in the midrange at least) detailed, but very coloured, very nonlinear and questionable effect on records. Devotees swear by it	9-15g (damping) Normal, fixed stylus MM		84
Milltek Aurora £249	Good + Good +	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	Coll. '86
Milltek Olympia £349	Average + Good +	Warm and detailed sound - packs the punch of the best MCs with high output as a bonus	12-20g (damping) Normal, MC	R	54
Nagaoka 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

The Directory

TURNTABLES - CARTRIDGES

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFFECTIVE MASS OUTPUT/TYPE	VALUE	ISSUE
Nagaoka MP11 Boron £40	Average Average +	Responding well overall in PM's equipment and listening room, this model was mildly criticised for low level and dynamic limitations	5-13g Normal, MM	BB	48
Nagaoka MP11 Gold £47	Average - Average +	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal, MM	R	48
Ortofon 510 £30	Good Good +	For the price, a good blend of virtues - weight, clarity and neutrality.	3-11g Normal, MM	BB	85
Ortofon 520 £50	Average Average +	Very sensitive to load capacitance this new Ortofon maintains the company tradition for a lively, effervescent SQ	7-16g Normal, MM	R	67
Ortofon 530 £80	Good + Good +	Very clean and assured sound; transients not quite perfectly pure but plenty of detail.	4-11g Normal, MM	R	85
Ortofon 540 £100	Average - Average	Graced with an advanced FGII stylus our sample possessed too high a compliance for broad arm matching. It could also sound a little unforgiving	3-8g Normal, MM		67
Ortofon MC10 Super £70	Average Good	"What a delightfully sweet-sounding cartridge this is . . ." we said	5-15g Low, MC	BB	48
Ortofon MC15 Super £100	Good + Very Good	A good all-rounder, with outstanding performance in detail retrieval, even if it can be very slightly bright and close-up at times.	10-24g Low/MC	BB	103
Ortofon MC20 Super £200	Average + Good +	An "inviting" sound quality; polite rather than exciting it approaches much more expensive models, but does not better them	6-15g Low, MC	R	Coll. '86
Ortofon MC3 Turbo £100	Average + Good	Not terribly subtle, but it obviously doesn't aim at that. The 3 Turbo is bright, cheerful and bouncy - take it as it comes!	10-24g Normal/MC	R	103
Ortofon MC30 Super £270	Very Good Good +	Beautifully engineered and well-balanced, it was slightly criticised as bland, though some may appreciate the lack of rough edges	5-14g Low, MC		Coll. '87
Ortofon MC3000 MkII £850	Very Good Excellent	Low levels of body resonance are a real ear-opener. Nothing to criticise elsewhere; one of the very best	9-16g Low, MC	R	84
Ortofon MC5000 £1500	Good + Good	Review sample could not be fully run-in, which might explain limited tracking ability and bright and forward sound, though imaging is excellent. Fussy about s.	12-20g Low, MC		91
Ortofon Quartz £120	Good + Good	Lively, quite detailed, and a touch bright, the Quartz has many qualities of the much dearer Quasar	3-12g Low, MC	R	91
Ortofon Quasar £300	Very Good Very Good	Many of the qualities of the MC3000, although a touch bright. Good detail and delicacy	8-15g Low, MC	R	84
Ortofon Quattro £200	Good + Good +	Undoubtedly a competent performer, the Quattro however seems a less obvious choice than the other Qs. Generally neutral, but can be edgy and bright in loud passages.	6-18g Low/MC		103
RATA RP20 £22	Average - Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g Normal, MM	R	48
RATA RP40 £44	Average Average +	The '40 did a good job of sorting out the layers and complexity of the mix, with good focus, excellent stereo spread and fine scale	6-15g Normal, MM	R	48
RATA RP70 £77*	Average Average +	Clearer and sweeter than the '40 this also seemed heavier and less lively. For £99 you can have a van den Hul stylus	6-14g Normal, MM		43
Rega Bias £34	Average Average +	Difficult to mount in some arms due to its shallow build, the bias offers a 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 comparison. A firm budget buy	8-16g Normal, MM	BB	67
Roksan Corus Black £110	Good + Good	Recognisably related to Corus Blue, but distinctly more civilised and smoother.	7-12g Normal, MM	R	91
Roksan Corus Blue £65	Good + Good	Roksan-specified modified Goldring 1012; slight harshness detracts from otherwise good sound.	7-11g Normal, MM		91
Shure M104E £36	Average - Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal, MM		38
Shure M105E £49	Average Average -	A slightly 'spitty' sound lacking deep bass and dynamic contrast, but can be used in virtually every system where it will perform "unobtrusively"	5-12g Normal, MM		38 Summ
Shure M110NE £60	Average Average	Sound quality was thought eminently presentable, but not exciting; smooth clear high frequencies, but a loss of bass definition	5-10g Normal, MM		38 Summ
Shure M111NE £72	Average Average	Early reviews of this cartridge complained principally of the price - which has since come down	5-10g Normal, MM		38 Summ
Shure M92E £17	Average - Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal, MM		43
Shure M99E £29	Average - Average -	Sister to the 92E this is a solid but not particularly exciting cartridge	5-10g Normal, MM		38 Summ
Shure ME75ED £26.50	Average Average -	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal, MM		38
Shure ME97NE £49	Average Average +	It won't turn a sow's ear of a turntable into a silk purse, but will at least keep going and produce an acceptable result	8-20g Normal, MM	R	48
Shure ML120HE £95	Average + Average +	Quite decent sound quality and a generally fine balanced performance	6-18g Normal, MM		48
Shure ML140HE £120	Average + Good	Qualitatively the treble of this well-balanced moving magnet model was a match for many moving coil cartridges	6-16g Normal, MM		43
Shure Ultra 500 £499	Good Good	There was no doubting the accomplishments of what could well be the finest moving magnet cartridge around	6-14g Normal, MM		48
Shure V15 VMR £215	Good Average +	Initial listening gave promising results, but extended familiarity gave the feeling of a lack of energy and a "shut-in" sound	5-12g Normal, MM		38
Shure VST V £173	Very Good Very Good	Quite exceptional assurance with difficult material; very stable and clear sound. One of the best. Dynamic Stabilizer actually works!	4-11g Normal, MM	R	85
van den Hul MC One £699	Good Very Good	This extended all the positive qualities of the '10 but added greater authority and scale - worth it for the extra money	6-12g Low, MC	R	60
van den Hul MC Two £899	Good Very Good	Connected directly to any standard MM input the vdH MC Two rewards with a highly detailed yet fluid and musically convincing portrayal	6-13g Normal, MC	R	72
van den Hul MC1 Super £799	Very Good Very Good	Slight softening effect on transients was the only real flaw, but it didn't quite seem to have that special touch one expects for the money	8-15g Low, MC		84
van den Hul MC10 £599	Good Good +	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass. Gosh!	5-10g Low, MC	R	60
van den Hul MM1 £200	Good + Very Good	If its wooden-sounding midrange coloration could be tamed, the excellent imaging and admirable all-round security of the MM1 would make it an excellent performer.	7-15g Low/MC	R	103

TURNTABLES

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

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

Listed separately as integrated players and as turntable motor units and tonearms, our sound quality rating is based on results achieved using a high quality system – but in point of fact the turntable is usually the limiting factor soundwise in any system. Lab performance summarises the speed stability, vibration generation and environmental isolation of turntables, along with the friction, alignment and adjustment of tonearms. The tonearm's physical characteristics also define a range of compatible cartridges

TURNTABLES - INTEGRATED

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	ISSUE
Acoustic Research EB-101 £230	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Alphason Sonata/HR-100S MCS/Atlas £835/£550/£400	Very Good Very Good	Good sound in all areas - bass, clarity and neutrality all in the top class and bettered by very few decks. Atlas PSU expensive but worthwhile	Belt drive, suspended, optional PSU, 13g	R	79
Ariston Pro £160	Good Good	Remarkably clear and detailed for the price, very neutral. Benefits from cartridge upgrade	Manual, belt drive, 12g, cart.	BB	91
Ariston Pro Maxim/RB250 £210	Average Fair	Warm, full sound with a deep bass and solidity is partly offset by lack of fine detail in mid and top. On a suitable surface, with a crisp sounding cartridge, it easily qualifies for shortlisting	Solid plinth, belt drive, manual, 11.5g		103
Ariston Q-Deck £180	Good Average +	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid, inc. cart	BB	67
Dual CS-505-4 £170	Average Average	Easy to set up and to use, this is a consistent sounding and well isolated turntable with a long pedigree. It is slightly lacking in balls, but compensates with a consistently unmuddled presentation and good stereo focus perspectives.	Auto-armlift, interlocked cueing, 2 speed, pitch control	R	103
Dual CS-750 £300	Average- Average-	Attractive but lazy performance from a deck with many good ideas and which is a pleasure to use. Cartridge is past it's sell by date. Has 78rpm facility	Solid plinth, belt drive, cart. 3-speed, quartz referenced, auto lift		103
Dual CS430 £100	Average Average -	Ragged, sometimes unpleasant cartridge mixes with a modest pleasing player in a very sharply priced package	Belt drive, with cartridge, auto return, 5g	R	67
Dual CS5000 £230	Average Average +	The rare 78 facility may give grandma's collection a new lease of life but the player did not merit recommendation on price vs sound	Electronic, belt drive, subchassis, 10g		48
Dual CS-503-2 £145	Good - Average	Not wholly inspiring; generally coarse and woolly sound is at least not offensive, but easily bettered by the CS505-4. Good value in material terms	Semi auto, belt drive, 10g	R	91
Goldmund ST4 £4589	Very Good Excellent	The Studio turntable takes on a cheaper tonearm than the T3F, yet provides a similar reference standard performance at £2,000 less, in a neatly integrated though bulky package	Solid subchassis, direct drive, parallel arm, detachable h/shell	R	60
Goldring Excelda 1 £160	Poor Poor	Untidy, resonant sound, narrow effective dynamic range and lack of tracking security. The cartridge (the only authentic Goldring part) is quite nice	Manual integrated arm, synchronous motor, auto-start/stop		103
Heybrook TT2 turntable & arm £469/£269	Average Good +	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, R belt drive, 14g	R	67
JVC AL-FQ555 £170	Average - Poor	Clear midband sound but woolly bass and crude treble. Ease of use however ranks highly, and there's little to go out of adjustment	Auto, direct drive, 5.5g		67
Kuzma Stabi/Stogi Reference £995/£899	Very Good Very Good	Beautifully made in a solid oak plinth, the Stabi also sounds very clear, detailed and extended. Stogi Reference is also most capable.	Manual, belt drive, subchassis, 12g	R	91
Linn Axis/Akito £443	Good - Average +	A neat, attractive and well-made package which delivers a rather harsh sound with a 'one-note' effect in the bass, but it's well suited to mid market systems	Belt drive, semi-suspended, electronic PSU, 10g		79
Linn Basik £250	Good Average+	Strong midband analysis and imagery, clean if sharp treble is matched to a good if occasionally wooden bass. Good at the price, and requires no complex setting up or fine tuning in service	Solid plinth, inc cartridge, manual speed change	R	103
Linn LP12 Basik/Akito £599/£137	Very Good Good	Familiar Linn virtues and vices - plenty of the former though and few of the latter. Trails the full LP12 significantly, but pace, rhythm, timing etc. still in top class, and bass tauter than of old	Suspended subchassis, belt drive, R single speed, 45rpm adaptor	R	103
Linn LP12-Lingo/Ekos/Troika £1168/£1097/£798	Good + Good +	The classic reference is improved (at a price) by the Lingo but character remains the same - not as detailed or neutral as the best. Ekos arm, though pricey, is well made and suited to many decks	Manual, subchassis, belt drive, 9g	R	91
Manticore Mantra/Musician £340/£170	Good + Good +	Well engineered deck with satisfying sound. The arm is particularly fine and very good value	Belt drive, suspended, 15g	R	79
Marantz TT400 £160	Average - Poor	Everything one hopes a budget deck won't be; coarse, confused, muddled and woolly. Construction isn't wonderful, either	Manual, belt drive 16g		91
NAD 5120 £90	Average Average	A number of running improvements have given this player a range and tautness denied its lazier sounding antecedents.	Semi-auto belt drive, detachable armtube/weight, 9g	BB	67
Opus 3 Continuo/Decca London International (Revise) £599/£99	Poor Good	Heavyweight motor unit with many fine properties, but which needs further development. The idiosyncratic arm is a suitable (though not ideal) platform for the Decca cartridge. For all its faults though, the whole transcends the sum of the parts	Belt-drive manual, damped unipivot arm, 12g		67
Rational Audio Aura 01 £189	Poor Good	Poor lab results reflect bad rumble, but midrange and treble are very pure and clean; idiosyncratic sound and styling should be tried!	Manual, belt drive, linear tracking arm 10g	R	91
Rega Planar 2 £185	Average + Good	A remarkable product at the price, surprisingly articulate and confident	Manual, 11.5g	BB	48
Rega Planar 3 £250	Good Good	A long time leader in its price category, the '3 (with its excellent RB300 arm) sounded nicely 'musical' in a balanced and coherent manner	Manual, 11.5g	BB	48
Revolver Rebel £185	Average Good -	Quite lively and detailed but not the strongest on subtlety, with slightly lumpy bass. Motor breakthrough audible, and watch for bent motor shaft on delivery!	Manual, belt drive, semi-suspended 12g	R	91
Revox B291* £892	Average - Average -	Sound quality ranks as below average. Subjective bandwidth is narrow and the music lacks grace and energy. Ease of use however is unrivalled	Automatic, remote controllable, direct drive parallel arm, cart		55
Roksan Radius/Tabriz zi £635	Good Good	Truly modern turntable in appearance. The design is subtle, refined and easy on the eye. Musically it offers exceptional performance with a minimum of setting up and operational fuss	Semi-suspended, belt drive, mains plug PSU.	R	103
Roksan Xerxes 33/Tabriz zi £550/£255	Good Good	Good but not exceptional sound quality from expensive package. At its optimum with a relatively inexpensive arm/cartridge unless upgrade to full Xerxes is contemplated. XPSII PSU adds 45rpm and much to sound quality	Semi-suspended, belt drive, 33rpm only, mains plug PSU, one piece arm tube, 'intelligent' counterweight		103
Roksan Xerxes/Artemiz /Artaxerxes £785/£655/£559	Excellent Excellent	Superb though costly record playing hardware, highly integrated and synergistic in nature, but suitable for use with any good MC cartridge. Will not suit all tastes, however	Semi-suspended, belt drive, quartz locked 2 speed PSU	R	103

TURNTABLES - INTEGRATED

■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ FEATURES ARM EFF. MASS	■ VALUE	■ ISSUE
Rotel RP-855 £200	Good Good	Great sound for the money - detailed and clear with good bass and no irritating nasties	Belt drive, solid, speed adjust, 9g	BB	79
Systemdek 1/900 £188	Poor Average-	The motor unit is derivative of the Rega Planar 2, but sounds inferior by virtue of insufficient structural integrity. Pitch stability is also far from acceptable	Solid plinth, manual speed change, no cartridge		103
Technics SL-DD33 £120	Average Average	As with the QD33 though better value	Automatic, direct drive, solid plinth, 7.5g, P-mount	BB	48
Technics SL-L20 £120	Poor Average -	A rather lightweight parallel tracker achieving a poor overall rating, with little to recommend it unless you dig facilities	Electronic, solid plinth, 5g, P-mount		48
Technics SL-QD33 £150	Average Average	The quartz speed controlled version of the DD is short on sound quality but not features. But it did have fair focus and some depth	Automatic, Quartz, direct drive, solid plinth, 7.5g, P-mount	R	48
Technics SLBD-22 £100	Average - Average -	Not bad for the price and a great improvement on the L20, it performs reasonably when not stretched	Semi automatic, solid plinth, electronic, 6g P-mount	R	48
Thorens TD 166 Mk V £240	Good Good	Classic suspended-subchassis deck with clear, stable sound of no particular character. Unlikely to make enemies	Belt drive, suspended, 12g	BB	79
Thorens TD 280 Mk II £190	Good - Good -	Legendary Thorens build quality on the cheap - slightly unobtrusive sound but eminently liveable-with and very good value	Belt drive, solid, electronic PSU, 12g	BB	79
Thorens TD 316 Mk II £250	Good Good -	Very solid deck with neat split-chassis construction. Sound is a bit insecure in the bass, but it could suit classical music lovers well	Belt drive, suspended, electronic PSU, 12g	R	79
Thorens TD-3001/TP90SF £850	Very Good Good	Excellent middle ranking esoterica, with strong all round abilities rather than excellence in particular areas. Engineering content is particularly high	Suspended subchassis, belt drive, available w/o arm	R	103
Thorens TD166 VI/UK/RB250 £270	Good Average-	Refined and articulate sound with well focused imagery, suitable for use with good MM and budget MC cartridges. The Rega arm is the best at its price, a good purist deck	Manual, belt drive, suspended, 11.5g	BB	103
Thorens TD2001 £650	Good Good -	Similar to TD320 but much dearer - why? Sound is comfortable but not very detailed	Semi-auto, belt drive, subchassis 15g		91
Thorens TD280 II/UK £189	Average Average	Excellent value for money from a built to last player which is also easy to use. Will benefit from a cartridge upgrade in due course, but has an energetic and detailed sound	Solid plinth 2-speed player, inc cartridge	BB	103
Thorens TD320 Mk II £400	Good Good	Good, consistent sounding deck with much improved (but not ideal) arm. A little expensive for performance offered	Semi-auto two speed belt drive, 14g		67
Townshend Rock Reference/Excalibur £2295/£745	Excellent Excellent	Overall the closest reproduction to master tape we've yet heard, with stunning real bass and excellent neutrality. Front end damping improves LF detail significantly	Belt drive, suspended, electronic PSU, front-end damping, 12g	R	79
Voyd Reference/Helios Cyalene £5414/£1350	n/a Excellent	Voyd's flagship is equipped with three of the biggest motors in the business, a Lexan platter and a real brute of a power supply (it dwarfs most power amps!). A strong contender for best turntable in the known universe	Belt drive, 3 motors, subchassis, outboard PSU, 12/14g	R	Coll. '90
Well Tempered WTAT £1690	Average Very Good	Intriguing and challenging design. Musically it is not ideal, but it has a limpid quality and a lack of artificiality that sets standards as well as turning the ear, though it's not completely uncoloured. A charmer yet mainstream enough in its virtues to be viable	Manual 2-speed, damped, suspended arm, 7.5g	R	67
Zarathustra S4/Pluto 5A Prestige/PSU £1500/£2500/£500	n/a Excellent	The very well made and finished heavy platter S4 with the superb Pluto arm make a devastating combination ranking up there with the very best	Subchassis, manual, available without PSU	R	72

MOTOR UNITS

■ MODEL ■ PRICE	■ LAB ■ SOUND	■ COMMENTS	■ FEATURES	■ VALUE	■ ISSUE
CEC ST930 £599	Good Very Good	A rarity - a serious hi-fi product that loses nothing to budget rivals in finish or convenience. Good clean sound, very stable and assured	Belt drive, external PSU, 78 speed inc.	R	79
CS Audio Resan kit for Rega £90	Good - Good	After-market kit to convert Rega 2 or 3 to semi-suspended subchassis style. Looks good and sounds tidier than original. Feedback is much reduced	Conversion kit, all work reversible	R	79
Michell Gyrodec £595	Good Good	Sweet and natural sounding player, well exploited by the Rega RB300 arm. Aesthetics, and the acres of acrylic, are unique	Manual, belt drive, suspended motor unit		55
Michell Synchro £265	Good Good	A happy blend of qualities endows the Synchro with a blend of subtlety and force - the mailed fist in the velvet glove. Easy on the ear in the best sense.	Manual, belt drive, suspended motor unit	R	67
NVA Senior £450	Good - Average	Very high sensitivity to low-frequency vibration, especially on NVA stand, gives strange subjective bass response and confused sound. Looks are unusual but pleasing	Belt drive, electronic PSU, two-part plinth		79
Oracle Paris £695	Good - Average	Looks good but sounds coarse, confused and uneven, with bass liable to thump	Belt drive, semi-suspended, electronic		91
Origin Live Oasis A £495	Good - Average	Rather coarse sound with lack of detail resolution - but lively presentation may appeal. Appearance is industrial	Belt drive, external mains filter, 33rpm only, suspended		79
Origin Live Oasis B £199	Average Average +	Aesthetics are not its strong point, but its lively and articulate - if idiosyncratic - sound will please some tastes. Highly resonant construction is very sensitive to feedback	Belt drive, 33Gy1/3Gyrpm only, solid plinth/subchassis		79
Oxford Acoustics Crystal Reference £2495	Very Good Excellent	This big, open and powerful sounding turntable works beautifully with Airtangent arm to give superb 3-D imagery. Recently updated to mk.II form	Manual, belt drive, subchassis, stand	R	60
Pink Triangle Anniversary £1175	Excellent Excellent	Possibly the most detailed, clear, neutral and therefore accurate deck around. Likeness to master tape is almost uncanny	Suspended, belt drive, electronic, motor on subchassis	R	91
Pink Triangle Export £676	Very Good Excellent	Basically a PT T00 with built-in power supply. Retains features of great transparency and neutrality. Review sample had highish motor noise - presumed untypical	Suspended, belt drive, electronic	R	91
Pink Triangle Little Pink Thing £392	Good + Very Good	Leads the field for clarity and neutrality at this price or a good bit more. It also looks very smart! Excellent value. Arm cut-out suits Rega or Linn style	Belt drive, semi-suspended, electronic PSU	R	79
Revolver £150	Average Average	Nicely balanced, but unimpressive timing and lightweight bass made this deck rather average for the price. Manufacturer has since made several changes, but not re-submitted for review	Manual, belt drive, solid plinth		48
Systemdek IIX/900 £200	Good Good	The Systemdek IIX is a high performance, low cost turntable which is particularly strong in the areas of fine detail resolution and imagery. Tested with Rega RB250	Suspended subchassis, metal armboard, glass platter, 2 speed	BB	103
Systemdek IIXE/900AP £358	Good Good+	A development of the IIXE/900, with a comparably detailed sound reinforced by better frequency extremes, timing etc. Needs careful setting up.	Suspended subchassis, metal armboard, acrylic platter, PSU	R	103
Systemdek IV £495	Good Very Good	The level of wow is a theoretical concern at least, but elsewhere this player shines, combining euphony, information and imaging in a polished, untemperamental package	Two-speed manual belt drive	R	67
Voyd 0.5 £3062	n/a Excellent	Based on the standard 3-motor Voyd but with upgrade options (better bearing, platter, etc) which take it half way to a Voyd Reference. Superb build and finish; colourful, dramatic performance.	Belt drive, 3 motors, subchassis, outboard PSU	R	72
Voyd Valdi £868	Good - Very Good	Recent power supply upgrade has resulted in around improvements. This Perspex plattered, two motor deck is remarkably competent, revealing and neutral	Belt drive, suspended subchassis, electronic PSU		79
VPI HW-19Mk3 £1600	Very Good Very Good	Built to accommodate parallel tracking arms, this large but elegant deck produced clean, smooth sound when fitted with an SME arm. Good bass	Belt drive, suspended subchassis	R	79

The Directory

TONEARMS

MODEL PRICE	LAB SOUND	COMMENTS	ARM EFF, MAS	VALUE	ISSUE
Airtangent 1B £1990	n/a Excellent	A complex but superbly built arm for high quality systems, giving excellent stereo and resolution	7.5g (vertical)	R	60
Alphason Delta £230	Good Average +	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason HR100S £490	Very Good Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	Coll. '86
Alphason Xenon £286	Good Good +	A trimmed down HR100S, the Xenon has inferior bearings and a simpler finish, but sounds crisp and coherent. Fits any Linn cutout	12.75g	R	55
Audio-Technica AT-1130 £186	Good Good	Well suited to most cartridges including high compliance ones, the AT is smooth and tonally neutral, if slightly lacking in 'balls'	8.5g	R	67
Decca London International £49	Average + Average +	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48 Summ
Eminent Technology £1000	Good + Very Good	One of the best sounding tonearms around, the linear tracking Eminent delivers impressive stereo imagery, focus and transparent sound	9g (vertical)	R	Coll. '86
Goldmund T3F arm £4400	Excellent Excellent	This complex parallel tracker created an "ear-opening" experience when tested with a (since updated) Goldmund Studio turntable	16.5g	R	Coll. '87
Kuzma Stogi Reference £899	Very Good Very Good	A large, solid and well-made arm that holds the cartridge firmly, giving exceptionally clear sound with just a hint of brightness	12g	R	79
Linn Ekos £1097	Very Good Very Good	Superb, state of the art design which builds significantly on Ittok's strengths	9g	R	67
Moth Arm £95	Good Good +	The ultimate budget arm? Refined, detailed, sweet and natural - performance improves in line with the rest of the system	12g	BB	60
Naim Aro £752	Good Good -	Designed for use on the Linn LP12 turntable and Troika cartridge, the Aro is a little bright and congested	10.5g		91
Rega RB300 £139	Very Good Very Good	Despite its modest price this sets exceptional performance standards and could be used on a number of high-quality turntables	10-11g	BB	60
Roksan Artemiz £655	Average Good	Interesting design which works a treat on the Xerxes deck. Fits Rega cut-out.	8g		67
Roksan Tabriz £165	Good Good +	Though obviously targetted at Roksan's own Xerxes, it is also a good alternative to the Rega arms in many applications. A trifle bright.	9g	R	91
SME 3009 Series III £253	Good Average +	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009 Series IIIS £182	Good Average +	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009R £335	Average + Average +	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME 309 £568	Very Good Very Good	Beautifully made, finished and presented, this arm is fully and easily adjustable and a highly neutral performer	10g	R	79
SME Series IV £828	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	60
SME Series V £1232	Excellent Very Good	Excellent in terms of design engineering and sound quality, this arm arguably sets a new reference standard regardless of price	10.5g	R	60

VIDEO RECORDERS

For some time there's been a move to improve both the video and the audio quality of video recorders and TV sets alike as a necessary prelude to a proper integration between the two. Hi-fi video is obviously an important element in the story, and so is Dolby Stereo, the ambient 'surround sound' system

The weak link of course is on the broadcast side. Although TV sound is well up to normal hi-fi standards, it has always been in mono and unjustly or otherwise has rarely attracted much audiophile interest. But TV sound is - or shortly will be - freed of the shackles of mono by the introduction of NICAM stereo. NICAM - an

acronym for Near Instantaneous Companding and Modulating - is the missing link that will help facilitate the much feted integration of video with audio. And then we have S-VHS, a system which does for picture quality what the other developments promise to do for the sound

VIDEO RECORDERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	ISSUE
Akai VS-75EK £550	Average Good	Excellent performance and a slick set of controls make this recorder a pleasure to use. Good price is a bonus	Hi-fi, NICAM, programmable remote	BB	71
Akai VS-967EK £500	Average Good	Many well implemented facilities, but unsuitable for dedicated audio use due to lack of LP mode, manual record levels or audio input	Hi-fi, NICAM, on-screen programming	R	86 Supp.
Grundig VS680 £1250	Very Good Average	State of the art technology gives top notch sound with tremendous flexibility but somewhat disappointing picture quality. It's also very hard to drive	Hi-fi, NICAM, LP/SP, teletext programming, on-screen graphics		86 Supp.
Nordmende V4405K £549	Good Good	Fine basic sound and picture quality, but the RF converter introduced significant losses. An excellent model, but configured for German home market. The recorder lacks NICAM	Hi-fi, transmitter handset, digital FX	BB	71
Panasonic NV-F65 £500	Good Average	Uninspired but competent and well made deck. Plenty of features, decent sound and reasonable video ensure recommendation	Hi-fi, NICAM, LP audio only, bar code programming	R	86 Supp.
Sanyo VHR-D4890E £1000	Poor Excellent	High grade S-VHS recorder with digital effects which gives first rate screen-based results but relatively poor sound recording	Hi-fi, NICAM, S-VHS, PIP etc		86 Supp.
Sharp VC-S1000H £1000	Good Poor	Clean, accurate and stable off air and from tape, and LP modes are satisfactory - but on-screen S-VHS results are well below par	Hi-fi, NICAM, LP, S-VHS, titling		86 Supp.

**TO ORDER BACK ISSUES PLEASE
TURN TO PAGE 43**

Personal Messages

Over the past year or two the wasting disease that's been steadily wiping out the vinyl browsers down at my local record store, alongside the apparent (though possibly superficial) rude health of inferior carriers like cassette and CD, has been making me increasingly gloomy and pessimistic about the long term future of specialist or 'real' hi-fi.

'Hi-fi' will continue of course, but the meaning and public perception of the term has long since been thoroughly and comprehensively debased through frequent over-exposure on equipment like TVs, VCRs, portables and midi systems.

Ever had trouble matching components? Don't despair. Even hi-fi demi-gods encounter problems like this on occasion, as Paul Messenger reports.

The really worrying aspect of this devaluation of sources and semantics is that the whole business of hi-fi could become de-skilled. The proper installation of a high quality vinyl record player is a far more demanding task than the removal of transit screws and supplying of appropriate support furniture and cables which is all that's usually required for a CD player.

A philosophical clash

Happily, events of the past couple of months have served as a sobering reminder that there's much more to the whole business of putting together a hi-fi system than simply getting the best out of a turntable. To put it bluntly, I've been having a thoroughly confusing and mostly disappointing time trying — and largely failing — to blend together top quality equipment from two deservedly popular but quite different hi-fi philosophies.

On the one side there's my own decidedly upmarket and well dug in Naim/Linn system; on the other there's something of a mishmash of bits and pieces from Audio Innovations, Audio Note and Voyd, which hasn't yet amounted to a comparably well balanced system, but whose components still offer tantalising glimpses of stunning dynamics, delicacy and transparency.

Filling (amply) the role of neutral referee, a pair of monstrous Tannoy *Westminster Royals* occupy the other end of the room, instantly and effortlessly revealing the inadequacies of everything further up the chain. (You'll be reading a full report on these anachronistic paragons in the pages of *Choice* soon.)

I can't even offer any comfortable explanations for why this crossbreeding programme didn't work. The results were never what one would call bad, but there was no denying that the magic which distinguishes the great from the merely good had an exasperating tendency to evaporate whenever an 'inappropriate' component was substituted.

It all started with the Audio Innovations *First Audio* power amplifier that gave me such a pleasant surprise a couple of months back, and made a follow up session with the *Second Audio* monoblocks obligatory.

Guy from AI was anxious that I sampled a Voyd turntable in place of a Linn at the front end. I'd tried one before, with a lack of success which I attributed mostly to the different arm and cartridge that were fitted. But given a little advance preparation, the Naim *ARO* tonearm I normally use is a very convenient tool for substituting and comparing turntables. A spare *ARO* arm base/pivot was set up in advance on the Voyd, so that one could simply remove the arm itself complete with (*Troika*) cartridge from the Linn and place it on the Voyd.

And of course it didn't work; not particularly well in any case. I liked the midband drive and dynamics with the Voyd, but found the bandwidth rather curtailed at low and high frequencies compared with my familiar Lingoed Linn.

The *Second Audio* provided a clear improvement over the *First*, though Guy made a tactical error in hooking up some massive prototype *Third Audio* monoblock power amps. We played out the evening with these (seven grand the pair when they get into production) magnificent monsters delivering the best CD either of us had ever heard, from a Naim *CDS* player via the passive pot in AI's relatively cheap pre-amp and into the *Westminster Royals*.

However, just before I had to return the Voyd, I had the chance to borrow an Audio Note *IO* cartridge — comfortably the most expensive cartridge made in the UK. It's a lousy match for the *ARO* geometrically and mechanically, but I put it in a spare arm tube and tried it on the Linn, with pretty equivocal results — good in parts, but then so's the *Troika*.

Symbiosis, synergy or whatever

An hour or so before loading up the Voyd for its return trip, I tried it with the *IO*. Call it symbiosis, synergy or whatever you like, but I spent most of that hour wondering if I dared hang onto it for further listening. (However, it doesn't do to deprive a man of his turntable for too long, if you want to stay on friendly terms.) *ARO* interface notwithstanding, the Voyd/*IO* combination did magical things in the midband that certainly required further investigation.

Several subsequent episodes have each provided more clues, without yet managing to come anywhere near a final solution. Audio Note *Silver* loudspeaker cables have been a real ear-opener, and are currently demanding my closest attention, and I'm increasingly conscious of the very impressive strengths of (another) Voyd, though its silver-wired cartridge and arm lead-out wiring currently acts as a splendid radio aerial for my *NAC52* phono stage, adding a large chunk of Europe's shortwave radio band with or without *Choice's* neat little *Purifier* RFI suppressors.

First things first: I must get the front-end and cartridge/pre-amplifier sorted out before getting stuck back into the power amp question.

Ready for the best



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