

THE MOST COMPREHENSIVE GUIDE TO BUYING HI-FI EVER PUBLISHED

# Best Buy Guide

WINTER 1991/1992 £1.95

**Includes  
over 140  
Best Buy &  
Recommended  
products**

**CD Players**

Loudspeakers

**Amplifiers**

Cassette Decks



**Tuners**

Turntables

**Tonearms**

Cartridges

# HI-FI CHOICE

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

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## SPECIAL EDITION

"...the music it makes has an uncluttered and genuinely unpretentious feel that cannot fail to communicate."

"All this plus good build quality and sensible features at a realistic price make up the necessary ingredients for a Best Buy."

*Hi-Fi Choice August 1991.*



**WE WERE GOING TO WRITE AN AD.  
THE REVIEWERS BEAT US TO IT.**

The KA-3020 amplifier is part of a range of Kenwood Hi-Fi separates made for the audiophile. For further information and details of your local Kenwood Dealer, contact Trio-Kenwood (UK) Limited, Dept. 302, Kenwood House, Dwight Road, Watford, Hertfordshire WD1 8EB or phone 0923 816444.



**KENWOOD**

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*moved by music*



# Best Buy Guide

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**W**elcome to the *Hi-Fi Choice Best Buy Guide*. The magazine you have in your hands is probably the most comprehensive guide to buying hi-fi ever published. It represents the accumulated results of over 400 product reviews, the reviews having originally been published in *Hi-Fi Choice* over the preceding twelve months. The basic idea behind the guide is to collect together all our reviews which received either the Best Buy or Recommended accolade during the past year and put them together in one easy to use reference volume.

The reviews have been carefully updated to take account of any changes in price or distributor that have taken place since the originals were published. If you have seen a good review in the past couple of months which doesn't appear in the Best Buy Guide it is probably because the product has been withdrawn from the market. In the early planning stages we decided to include only those products that would be available in the dealers' at the time of publication. This means that some old favourites will be missing because a product has been withdrawn from the market and *Choice* has yet to review its replacement.

One company that suffered more than most as a result of this decision was Rotel, which decided to withdraw its entire range, which had earned over a dozen Best Buys and Recommendeds, just before the publication of the guide. Thus it is left with just a single Best Buy for its new CD player as time was not available to cover the rest of the range. KEF, Tannoy and Mordaunt Short are just a few of the other famous names who suffered a similar fate, but sorry guys, we had to draw the line somewhere.

Although the vast majority of the guide comprises reviews from the last 12 months, we have included a few of our favourite 'Golden Oldies'; products which were very well reviewed at the time and which still play a very significant role in the market. Space constraints obviously limit the amount of extra reviews we could include, however, and you'll have to turn to *The Directory* in a regular issue for details on the products we had to omit. The one area where these oldies are the norm rather than the exception is in the vinyl section, for the simple reason that in this area of the market things are far slower to change than elsewhere. So alongside reviews from the last couple of years we've given comments on a lot of the decks that have done well over the last ten years or so.

Finally I'd like to express my thanks to the numerous panellists who have given their services over the last 12 months without whose help none of the reviews would have been possible.

Andy Benham



Photography by  
Chris Richardson.

# Best Buy Guide

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



Top: Pioneer's CD turntable was just one of the innovations to be introduced to the CD player market this year.

Above: Just a selection of the over 40 amplifiers which passed through the Hi-Fi Choice test facilities this year.

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*Top: Smaller and smaller, cabinet size was definitely on the decrease with this year's crop of loudspeakers.*

*Middle: Despite the strength of the dread silver disc, vinyl still attracted more than its share of fans and there was no shortage of high-end turntables on which to play it.*

*Bottom: You should feel at home in your dealer's listening room, after all you may have to spend quite some time choosing a decent system.*

*Over the next 200 or so pages you will find a plethora of reviews covering just about every sector of the hi-fi market. But how do you make your final decision as to which piece of equipment best meets your needs?*

# The guide to the guide



**O**n the face of it the massive list of Best Buy and Recommended products contained within this volume may look a little confusing. For if all these products have something to recommend them, how are you meant to sort out which one is the best for you? Surely it would be a lot easier if we just picked the best one in each category, said this is the best loudspeaker in the world and left you to trot off to your local hi-fi emporium and assemble a system comprising the best products from each group.

Admittedly that approach would be nice, as would a car that never needed petrol, a beer bottle that constantly refilled itself and a mortgage that never needed paying. Its also an approach to hi-fi that is just about as ridiculous as the other absurdities outlined above.

As anyone who has any real experience of the industry will quickly come to understand there is no such thing as a best

speaker, CD player or anything else for that matter. Hi-fi is a lot more complicated than it at first appears and deserving of rather more thought than the facile 'buy this one' approach so common in the world of microwave ovens and dishwashers.

The reason for this is actually very simple and lies in the fact that different people expect different things from their hi-fi systems. Add in the fact that a system will sound different according to the room in which it is placed and you begin to see the scope of the problem.

The first part of the dilemma is actually very easy to address. If something sounds right to your ears then it is right for you, end of story. Just because Alvin Gold, Paul Miller or whoever didn't happen to like a particular product doesn't matter a damn if the product in question sounds right to you. After all, it will be you rather than Alvin or Paul who will have to live

with the thing.

The big advantage enjoyed by hi-fi reviewers is not that they have some sort of supernatural hearing and are able to hear differences that escape mere mortals, it is the fact that they make their living out of listening to hi-fi and are exposed to a broad selection of products and are thus able to judge a unit in the context of whatever else is on the market.

This is a particular advantage for *Hi-Fi Choice* where our reviews are based on the simultaneous assessment of 25 or more products in a particular category, thus the better designs should stand out from the rest. The problem with one off reviews is that sometimes the reviewer hasn't heard the competing products and reviews something as being the best in his experience for the simple reason that his experience is rather limited.

Sorting out why certain components sound good with certain other components is a rather more complex task and





this is where a dealer comes in. Just taking a number of Best Buy products and slapping them all together to form a system could well prove to be a recipe for disaster. Just because a product deserved a Best Buy doesn't necessarily mean that it will work with other Best Buy products.

A classic example of this can be found in the Pioneer A400 amplifier, which walked a Best Buy rating and has been raved about by just about every reviewer on the planet. Fair enough, it is a very good amplifier. The problem is that the A400 is such a good amplifier that it needs really good components to get the best from it, which is the reason that it has ended up being used with several thousand pounds worth of speakers and front end to produce excellent sounding systems. The problem is that when faced

*JPW Sonata, Celestion 3 and Kef C15, three great little speakers but which is the right one for your system?*

with more mundane surroundings the Pioneer might not necessarily be the best choice. For a system comprising budget speakers and CD players the Pioneer can be too revealing and show up faults that are present in the other components. In this context other amplifiers will actually produce a better sounding overall system.

### Using this guide

The best way to use this guide is to compile a list of products that can then be auditioned at a competent dealer's demonstration room. Indeed a good dealer may have some other suggestions which you certainly shouldn't ignore just because they aren't in the guide. Try and decide what sort of system you require, both in terms of the facilities on the individual units and the sources you will require. Then go through the reviews and



see which units fit the bill and are within your budget.

When it comes to choosing a dealer you will find quite a lot of advice later on in this guide but the number one rule is to find a dealer who can make a good sound - if he can do it in his shop then at least he's got a chance of doing it in your front room. If it sounds dreadful in the shop then go elsewhere.

Those of you who are new to *Hi-Fi Choice* might be a little confused by some of the terms used in the reviews so we've included a glossary on page 214 which sets out to explain some of the basic terms used in the reviews.

### Blind listening

In the reviews the frequent references to 'the panel' refer to the fact that the vast majority of our reviews are carried out by a blind listening panel. This means that the people who are actually listening to the equipment aren't informed what they are listening to until the end of the session. We feel that this helps to get away from any flavour of the month type bias which can occasionally creep into 'one off' reviews. The success of this approach can be seen by the fact that even its most ardent critics are finally coming around to our way of thinking and introducing blind listening to their tests.

At the end of the day the thing to remember is that hi-fi is all about making music sound as the musicians intended. It doesn't matter if you don't understand some of the terms used or find the whole thing completely confusing, all you need is your own pair of ears to tell you what sounds good and what doesn't. The good news is that a decent separates system needn't be too expensive, indeed you can often put together a really good separates system for less than the price of a middle of the road rack system, and the difference in sound quality can be quite astonishing.



# Revealed. The me Wide Imaging S

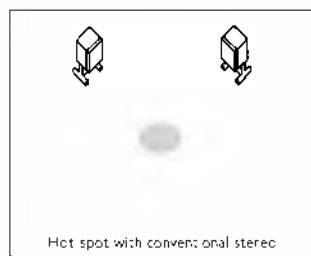
Meet our Mr Negishi and Mr Boothroyd. A bit of an unconventional pair, on the face of it.

But nowhere near as unconventional as the pair of Canon S-50's they are offering up for your scrutiny.

For the thing that's truly remarkable about these speakers is not so much the way they look, but the way they sound.

Connect a pair of S-50's to any existing hi-fi system, and they'll create stereo sound images in a way no speaker has achieved before.

Canon have called this new process 'Wide Imaging Stereo'.



And it's arguably the first real solution to a problem that has plagued stereo reproduction since its inception well over



half a century ago.

Most loudspeakers create a stereo image by beaming two highly directional streams of sound towards the listener.



The point at which these two streams intersect is known in hi-fi circles as the 'hot-spot'.

But it's only within this tightly defined area that the best stereo effect is created.

As the listener moves out

of the hot-spot (sometimes by a matter of a few inches) the stereo image is thrown dramatically off balance.

Move even further, and the sound progressively 'collapses' into the left or right hand speaker.

It was this problem that Hiro Negishi, Head of Canon Research Europe, set about tackling in the late 1980's.

Why, he mused, should speakers deliver stereo that effectively only one listener in the room could fully enjoy?

Would it not be possible to create lifelike stereo images over a far greater area of the room?

Producing a more 'sociable' hi-fi experience, in other words?

Mr Negishi literally shed light on this problem by bringing a little of Canon's unrivalled optical expertise into play.

Instead of a speaker firing outwards, he designed one that aimed downwards onto a cone



# n behind Canon's tereo speakers.

shaped 'acoustic mirror'.

The sound was then bounced through ninety degrees and so dispersed far more evenly throughout the room.

(The difference, as it were, between a garden hose and a sprinkler.)

It was true that a very similar principle had been attempted before.

But what was new was the idea of off-setting the acoustic mirror from the exact centre of the speakers by a carefully calculated amount.

The results were dramatic. Even in crude prototype form, balanced stereo images were produced over a far wider area than ever before achieved.

Wide Imaging Stereo wasn't far-fetched theory any more.

It was suddenly fact.

It was at this point that Canon Audio contacted Allen Boothroyd, one of Britain's most respected hi-fi designers.



Mr Allen Boothroyd.

Together, he and a team of acoustic engineers set about perfecting the final design of this remarkable new speaker.

Highly advanced composite materials were researched for the domed enclosure.

A special full range single drive unit was developed, capable of handling up to 50 watts power.

Whilst a massive zinc chassis was constructed, rigid enough to avoid sound colorations even at high volume levels.

Finally, in June this year, the Canon S-50 was ready to be unveiled.

Rapidly attracting more interest from the hi-fi press than any loudspeaker had a right to expect.

The S-50 is Canon's first foray into the British audio market. But by no means its last.

Already a larger S-70 model is being developed, incorporating a separate sub-woofer enclosure.

And at Canon's Research Centre in Guildford, Surrey, even more ambitious applications for the W.I.S. system are currently being investigated.

What sort of applications, exactly? And just how ambitious?

Well, that would be telling.

But if Mr Negishi and Mr Boothroyd have got anything to do with it, **Canon** we're all in **WIDE IMAGING STEREO** for a few surprises. LOUDSPEAKERS

**P**re-packaged one-make systems have been commercially very successful, with advantages like cosmetic consistency, competitive pricing, and (assumed) technical compatibility. However, despite the mass market clout of the consumer electronics giants, the hi-fi tradition of specialised separate components seems as strong, if not stronger, than ever, and certainly represents the route taken by those who place sound quality ahead of other criteria.

Indeed, many of the very same manufacturers who a couple of years ago were telling you that a rack system was the only answer are now investing in separates systems of their own and trying to promote these separates as an upgrade to the very people who bought their racks in first place.

Yet those who choose the separates route still have lingering doubts—usually completely unjustified—over the compatibility of components from different manufacturers. Gross incompatibilities are very rare nowadays and are only really likely to rear their heads amongst the most exotic components such as valve gear and panel loudspeakers.

The big advantage of choosing a separates system is that you can cherry pick from each manufacturer's range, choosing only the best from each brand. In addition you only have to fork out for those facilities you really need, rather than those features that the advertisers copy writers tell you you've got to have.

Superficially the pre-packaged system offers better value, purely in terms of the facilities available for the price. But the buyer who takes the trouble to ana-



lyse his or her needs and preferences will often come to the conclusion that step-by-step building of a separates system will provide greater long-term satisfaction, giving flexibility for future upgrading if so desired, and a chance to optimise total system performance towards personal taste.

The key advantage of separates is the opportunity to choose one's own priorities. But establishing these isn't obvious and leads most people to give up, assuming that they don't know enough even to start.

But the process needn't be that difficult.

Begin by establishing whether you like to choose your own music, or have it chosen by someone else. This helps sort out what priority should be given to radio, but bear in mind that the best sound you can get

*System synergy becomes increasingly important as you reach that exclusive area of the market known as 'The High End'.*

from radio is with live broadcasts which are rare and often quite esoteric: when radio is merely an alternative source of pre-recorded material, the results will inevitably be inferior to those obtainable directly from the same source in the home, given a reasonably decent system.

### Choosing a format

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

There will always be controversy over the relative qualities of LP, CD and cassette, with each protagonists often trying to advance their prejudices by rubbing rivals. LP is still the choice for ultimate



# System building

*Taking your first, hesitant steps into the world of hi-fi can be a daunting process, but if you follow the hints and tips in our system building guide it should be as easy as falling off a log.*



sound quality—particularly for those prepared to spend a substantial sum on a good quality turntable system. However there can be no doubt that CD has won the marketing war and vinyl is becoming more expensive and harder to find as the years go by, although there is a substantial second-hand market. In addition LPs remain tied to the home, are prey to warps and surface noise even when purchased new, and do not survive rigorous physical abuse very happily.

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

As a hi-fi medium cassette suffers from pre-recorded material which has been improving but is still patchy in quality, and can usually be bettered by a home recording, while any such home recording is inevitably poorer than the original. There is also the worry that a tape made on a specific machine usually replays best on that machine, which may cause aggravation when upgrading a few years hence.

## The silver disc

Despite being a relative newcomer the Compact Disc format has taken off in a big way and last year accounted for some 40 per cent of the separates market. The sound quality remains controversial, hailed as near perfect by its fans but derided by vinyl freaks, so it is probably fairest to say that CD is fine for the majority of listeners, but may not suit everyone; certainly the lack of background noise, defects and deterioration over time 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 remain extortionate.

A major influence over signal source priority will be how many LPs, tapes and CDs a person already owns. To replace even the key items of even a moderately large LP collection with CDs will cost a fortune and might pose problems of availability besides.

While there will always be arguments

about the different music storage and transmission formats available to the hi-fi listener, there is also controversy over the relative importance of the different components which make up the system chain—by which is meant the source, the amplification, and the loudspeakers.

For many years the 'weakest link' theory proposed that the loudspeakers needed the most attention, that amplifiers merely had to have sufficient power, and that turntables were pretty well perfect. This perspective gradually changed to an alternative 'theory of precedence', which stressed that no subsequent component can make up for the inadequacies of its predecessors—all it can do is supply its own additional degradations.



*Proper support is an essential part of getting the best out of your system.*

In such a context it was not uncommon to find more than half the system budget allocated to the record player, with scrimping and saving made on amplifiers and loudspeakers, even though these are used all the time whatever the source.

Nowadays most people look for a balanced system and the days of outrageously priced turntables feeding budget amps and speakers are fortunately a thing of the past. Splitting your budget almost equally between sources makes a lot of sense, particularly with a CD based system, and is the route that most people will end up taking.

Choosing the components is only part of the task of getting the system as a whole working as well as possible. Good source equipment, particularly turntables, and loudspeakers both benefit to a surprising

degree from proper support—from stands that enable them to give their best performance, whether floor-standing or wall-mounted. Just lining the components up along a shelf or sideboard is a recipe for mediocrity, however much has been spent on the individual components.

When it comes to the actual task of connecting it all together quite appreciable differences can be created depending upon your choice of interconnect and loudspeaker cables. In general interconnects should have good quality phono plugs and gold plated designs are more resistant to oxidation and thus less likely to deteriorate with time.

The exact brand, and how much you are prepared to spend, is something that will have to be sorted out by careful auditioning. Although it is quite possible to get a good sound with only a few tens of pounds worth of interconnect cables, it is equally possible to spend several thousand pounds looking to fine tune a system in search of the ultimate sound quality.

When it comes to speaker cables both solid core and multi strand cables have their supporters, and again the choice is best decided by means of experimentation with your own equipment.

## The final link

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, without trying to cram his own particular prejudices down your throat.

To some extent the customer's task must be to discover for himself whether the dealer in question is competent or not. The bottom line is whether he can create a good sound in the shop. If he can't, there is precious little chance of him doing so in your home.

The best dealers should lay on demonstrations so you can hear the differences between components for yourself, and hear the sort of improvements which can be had at different price strata. You can then establish the sort of performance you are prepared to accept within whatever budgetary constraints you have set.



# The Pioneer A400 amplifier.

As recommended  
by these  
speakers.

WHAT HI-FI?  
MAGAZINE AWARDS 1990

Best Amplifier.

Best Buy Overall.

HI-FI CHOICE MAGAZINE

Best Buy Amplifier.



 **PIONEER**  
The Art of Entertainment



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

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

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

# Improve your hi-fi system by becoming a **Hi-Fi CHOICE Gold Subscriber** and receive gifts and savings valued at over £200

This month sees the introduction of our Gold Subscriber Scheme - an extension of our standard subscription service which features exclusive introductory offers of exceptional value to improve and enhance your listening pleasure. As the only hi-fi magazine to run large scale comparative lab and listening tests Hi-Fi-Choice already offers better value than any other hi-fi magazine and we feel sure that our Gold Subscription package makes Hi-Fi Choice the best value on the market!

## OPTION ONE

If you take out a subscription to Hi-Fi Choice for 24 issues, you will receive:

- a set of Furukawa FS2T14 Speaker Cables worth £56
- PLUS
- a set of Furukawa FD1010 Interconnects worth £85
- PLUS
- Hi-Fi Choice discount vouchers saving you up to £50 on CDs and cassettes
- PLUS
- Hi-Fi Choice Special Collection issue worth £3.95
- PLUS
- 12 vouchers offering 10% discount on any mail order item on offer in Hi-Fi Choice

All for the price of £69.95

## OPTION TWO

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12 issues - £39.95

## OPTION THREE

Alternatively, you can simply take out a standard subscription and miss out on all the free gifts for only £22.95.



**ABSOLUTELY FREE!**

## GOOD CONNECTIONS

It is an accepted fact that good cables and interconnects can dramatically improve the performance of your hi-fi system. This is why we are so pleased to be able to offer our subscribers the chance to improve their systems by using Furukawa speaker cable and interconnects. The leading Japanese cable specialist Furukawa is considered to be at the forefront in the development of conductive materials. All Furukawa cables, interconnects and plugs are manufactured using PCOCC (Pure Copper by Ohno Continuous Casting - Ohno being the name of the original inventor of the casting method). Patented by Furukawa, this continuous casting method results in a grain free, single crystal conductor ensuring minimal transmission loss, extremely low distortion and wide band resolution.

## FURUKAWA FS-2T14 SPEAKER CABLE

Your free FS-2T14 PCOCC speaker cables from Furukawa is a stranded 1.4mm square cable with polypropylene insulation to the conductors and cotton yarn to insulate from mechanical energy. The speaker cables come complete with a choice of terminations and will be supplied in three metre lengths. All terminations are gold plated and attached using a solderless connection to the cable.

## FURUKAWA FD1010 INTERCONNECT

The FD1010 PCOCC is an unbalanced 75 ohm co-axial interconnect supplied complete with hermetically sealed gold plated RCA plugs. The FD101 has been designed specifically for use between the analogue output of a CD (or DAT) player and the pre-amp or between a pre and power amp and will be supplied in one metre lengths.

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B & B Hi-Fi, Bracknell	C344424556		
B & B Hi-Fi, Maidenhead	C628734220		
B & B Hi-Fi, Newbury	C63532474		
B & B Hi-Fi, Reading	C734583730		
Fraser's Hi-Fi & Video, Slough	C755520244		
Fraser's Hi-Fi & Video, Wokingham	C734794996		
<b>BUCKINGHAMSHIRE</b>			
B & B Hi-Fi, High Wycombe	C494535910		
<b>CAMBRIDGESHIRE</b>			
The Hi-Fi Company, Peterborough	0739 341755		
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Gilson Audio, Middlesbrough	C642248793		
<b>CORNWALL</b>			
ETS Electronic Centres, Helston	0326573255		
ETS Electronic Centres, Penzance	073664274		
H.B.H. Woolcotts, Bude	0286352269		
True Hi-Fi, Turo	087279809		
<b>CUMBERIA</b>			
Kenneth Gardner, Barrow-in-Furness	0223820308		
Peter Tyson, Carlisle	C22846756		
<b>DERBYSHIRE</b>			
Active Audio, Derby	0332381085		
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Roy Smith Electrical, Chesterfield	0332367546		
<b>DEVON</b>			
Bernard Smith, Barnstaple	027-43503		
Radford Hi-Fi, Exeter	0392218895		
Radford Hi-Fi, Plymouth	075226011		
Upton Electronics, Paignton	0803551329		
<b>DORSET</b>			
Movement Audio, Bournemouth	0202529988		
Movement Audio, Poole	0202730664		
<b>ESSEX</b>			
A.C.L. Radio Services, Greys	0375374666		
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Chew & Osborne, Epping	037974242		
Chew & Osborne, Saffron Walden	0799263726		
Peter Foulkes, Chelmsford	0245431479		
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Waters & Stanton, Hoxley	0702236635		
Waters & Stanton, Hornchurch	0702234965		
Woolmans, Basildon	0402444765		
	0268285922		
<b>GLOUCESTERSHIRE</b>			
Hutchinsons, Cheltenham	0242573012		
<b>GREATER MANCHESTER</b>			
Clearstone Hi-Fi, Manchester	061-8351156		
Hamlets Audio Visual, Ashton-u-Lyne	061-3435127		
<b>HAMPSHIRE</b>			
Bryants Hi-Fi, Aldershot	C25220728		
Cristalvision, Farnham	0323288660		
Now That's Hi-Fi, Portsmouth	0705611230		
Now That's Hi-Fi, Portsmouth	0705864756		
R. Upfields Radio & TV, Borey	0489757559		
R. Upfields Radio & TV, Looe Heath	0489655122		
Sinclair Youngs, Basingstoke	025621307		
Southampton Hi-Fi Centre, Southampton	C703226434		
<b>HERTFORDSHIRE</b>			
Chew & Osborne, Bishops Cleeve	0273656401		
Herts Hi-Fi, Hemel Hempstead	0442234755		
Hi-Way Hi-Fi, Hemel Hempstead	0442234755		
RadioLux, Welford	0923229734		
<b>HUMBERSIDE</b>			
Superfi, Hull	048224061		
<b>ISLE OF WIGHT</b>			
Russells, Newport	0983523664		
<b>KENT</b>			
Hawes of Southborough,	0962528682		
Tunbridge Wells	0962537288		
Kimberley Hi-Fi, Bexleyheath	061-3043272		
Panatic Sound & Vision, Gillingham	0634573141		
Panatic Sound & Vision, Maidstone	0622661488		
V.J. Hi-Fi, Faversham	0303568660		
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Whitstable Tele-Radio, Whitstable	0227272028		
<b>LANCASHIRE</b>			
Clearstone Hi-Fi, Bolton	020431423		
Kenneth Gardner, Lancaster	052464328		
Norman Audio, Blackpool	0253235661		
Norman Audio, Preston	077253357		
Romers Hi-Fi, Blackburn	077255769		
Wigan Hi-Fi Centre, Wigan	054887799		
	094237977		
<b>LEICESTERSHIRE</b>			
Mays Hi-Fi, Leicester	0533625625		
Parker High Fidelity, Loughborough	0509269888		
Stuart Westmoreland, Melton Mowbray	0664411511		
<b>LINCOLNSHIRE</b>			
Superfi, Lincoln	0524230265		
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Brians Hi-Fi, W1	071-6311109		
Covent Garden Records, WC2	071-3797427		
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Kamla Electronics, W	071-3232747		
Light & Sound, E6	081-4721573		
Myers Audio, E7	081-5207277		
Spatial Audio, W1	071-6375702		
Stereo Regent Street, W	071-2872458		
Superfi, W1	071-3881300		
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Heathrow Hi-Fi, Hounslow	081-5721135		
Musical Images, Hounslow	021-5693802		
<b>NORFOLK</b>			
Adcock & Sons, Wadon	0953821242		
Martins Hi-Fi, King's Lynn	0553721683		
Martins Hi-Fi, Norwich	0603827010		
<b>NORTHAMPTONSHIRE</b>			
H.G. Rapkin, Northampton	060437515		
<b>NOTTINGHAMSHIRE</b>			
F.L. Smith Electrical, Marshfield	0623656624		
F.L. Smith Electrical, Worksop	0909479770		
Forum Hi-Fi, Nottingham	0602622160		
Nottingham Hi-Fi Centre, Nottingham	0602786919		
Parker High Fidelity, Nottingham	0602476077		
Superfi, Nottingham	0202412137		
<b>OXFORDSHIRE</b>			
Sound'n Vision, Bicester	C669246491		
Winey Audio Centre, Witney	C993702414		
<b>SHROPSHIRE</b>			
Shropshire Hi-Fi, Shrewsbury	0743232065		
W. Owen, Telford	0743232117		
	0552613818		
<b>SOMERSET</b>			
Paul Roberts, Taunton	0823270000		
Telefringe, Frome	037362598		
<b>STAFFORDSHIRE</b>			
Active Audio, Hanley	0782214994		
Active Audio, Tamworth	082753355		
Purkiss Hi-Fi, Hanley	0782266100		
<b>SUFFOLK</b>			
Avon Audio Vision, Ipswich	C473221922		
Peter Watts, Bury St Edmunds	0284703045		
System Sound, Sudbury	C8772348		
<b>SURREY</b>			
Audiolife, Thornton Heath	081-6533657		
Cosmic, Addlestone	0932854522		
Tru-Fi, Leatherhead	0932851753		
Tru-Fi, Redhill	0372076720		
	0737766128		
	0737767404		
<b>SUSSEX EAST</b>			
Smythe & Barrie, Eastbourne	023235192		
Sunderland Electronics, Brighton	C273774113		
<b>SUSSEX WEST</b>			
Cristalvision, Chichester	C243775444		
Sunderland Electronics, Worthing	C503201167		
Sussex Audio, Burgess Hill	0444242336		
<b>TYNE AND WEAR</b>			
Bill Hutchinson, Newcastle-upon-Tyne	091-2303600		
<b>WARWICKSHIRE</b>			
Carrells of Rugby, Rugby	0788541341		
The Hi-Fi Company, Leamington Spa	C526888644		
<b>WEST MIDLANDS</b>			
Bridge Hi-Fi, Walsall	0522640456		
Coventry Hi-Fi, Coventry	0203440329		
Naam Hi-Fi Vision, Birmingham	021-4334944		
Naam Hi-Fi Vision, Coventry	0203632026		
Superfi, Birmingham	C2116012675		
Universal Electronics, Wolverhampton	090223741		
<b>WILTSHIRE</b>			
Hi-Phase Audio, Swindon	0793520548		
P.R. Sounds, Mells	0793520393		
P.R. Sounds, Trowbridge	C225703045		
	0225777799		
<b>WORCESTERSHIRE</b>			
David Waring Cameras & Hi-Fi, Worcester	090527551		
<b>YORKSHIRE NORTH</b>			
Maxwells, Northallerton	C609773535		
Scarborough Hi-Fi Centre, Scarborough	0723374547		
Vickers Hi-Fi, York	C904239559		
<b>YORKSHIRE SOUTH</b>			
Superfi, Sheffield	C242723768		
<b>YORKSHIRE WEST</b>			
Amrik Electronics, Bradford	C274722530		
Amrik Electronics, Leeds	C502752025		
Eric Wiley, Castleford	C977533068		
Superfi, Leeds	C975646774		
	C532449075		
<b>JERSEY</b>			
Fotosound, St Helier	C43495950		
<b>NORTHERN IRELAND</b>			
<b>CO. DOWN</b>			
Hi-Fi Experience, Belfast	C202249117		
L.R. Sound & Vision, Belfast	C232732452		
	C232445138		
<b>CO. ANTRIM</b>			
L.R. Sound & Vision, Larne	C974272757		
Nicholl Bros, Ballymena	C26649516		
<b>SCOTLAND</b>			
<b>GRAMPIAN</b>			
Autosonic, Aberdeen	C224573777		
Holburn Hi-Fi, Aberdeen	C224585713		
	C224572729		
<b>MIDLOTHIAN</b>			
Bill Hutchinson, Edinburgh	031-6672977		
<b>STRATHCLYDE</b>			
Bill Hutchinson, Glasgow	041-2422857		
<b>TAYSIDE</b>			
Robert Ritchie, Montrose	C67470765		
<b>WALES</b>			
<b>CLWYD</b>			
Lloyds TV, Video & Hi-Fi, Wrexham	0578364128		
Owens, Colwyn Bay	C492530582		
<b>GLAMORGAN</b>			
Tele Electrical Services, Bridgend	C556654156		
<b>GWENT</b>			
Hi-Fi Western, Newport	C633262750		
<b>GWYNEDD</b>			
Owens, Garsington	0242362651		

A common misconception about hi-fi is that it is a consumer durable just like most other consumer durables; you view the goods, have a quick audition or trial, write a cheque and carry them home. I've always viewed hi-fi as being like buying a bespoke suit or dress, where the quality and cut of cloth is tailored to one's means and shape. And just as going to a tailor doesn't always guarantee better results than buying 'off the peg' in Marks and Spencer, so hi-fi dealers have a vital role to play in helping you choose your system.

### What do you want?

Occasionally at *Hi-Fi Choice* we hear stories where dealers peddle their 'own' cloth and styles to the detriment of the needs of the customer. We heard of a famously respected (BADA) dealer where the budding audiophile was forced, sitting with his back to the system, to judge the difference between a good record deck and a comparably priced CD player. The dealer in this instance had entirely missed the point that his customer wanted a CD player for ease of use, and particularly for its remote controllability.

The most common complaint is of dealers talking down to customers, particularly to women, investing their trade with some black art - and some irrelevant highfalutin jargon. There are also incidents of dealers being unable to explain, in English, the advantages and disadvantages between such concepts as ribbon and box speakers, conventional and unipivot tonearms, or Sony's parallel tracking CD player laser and Philips' pivoted 'arm' type.

While it's not necessary for you to know why your system does what it does, it is necessary for your dealer to know, and to be able to make you a suit that feels fabulous every time you put it on.

It's for these reasons that *Choice* preaches the value of the independent specialist. By and large the sales assistant in the multiple chain store just doesn't have the in-depth knowledge of product that allows him to help you make the right decision - especially if he's trying to sell you a camcorder as well.

The keyword for the independent is synergy, and he or she should be able to sell you a system, starting from as little as



# Choosing and Using

*Just as you use a shoe shop  
for footwear or a wine mer-  
chant for claret you should  
use a specialist for hi-fi.*

*Dan Houston examines the  
role of the dealer.*

£500, which is reliable and consistently pleasurable. Perhaps surprisingly he may stock only a few brands to cover a variety of sources, amplification and speakers. The common sense in this approach is that the dealer will know more about a few brands than if he stocked the entire contents of the *Hi-Fi Choice Directory*. Manufacturers often excel in one area of hi-fi - such as cassette decks, but make other source equipment and amplifiers as well. Synergy is the mixing and matching of different brands to optimise the strengths of those brands.

Most dealers are regularly visited by reps who want them to try the latest products in the hope that they open an account for that brand. And if they have the slightest degree of open-mindedness dealers are constantly trying out new products within their established ranges. In the





# a dealer

ideal world they reject products purely on the grounds of sound quality and reliability, but the industry is inordinately rife with politics and dealers often risk losing one brand if they wish to sell another. One should therefore read between the lines a bit when a product is getting rave reviews and your dealer says he doesn't rate it highly. There again not all products sound good in all systems, especially as one approaches the so called "high end" where such matters as wiring within the separate components begins to play its part on the overall synergy of sound.

It is therefore worth visiting several dealers with a view to choosing and using one. It may be that you visit their shop for ten minutes to find out what they sell and how they sell it. Service is important; don't feel rushed but do feel that the

dealer treats you as a valued customer. It hardly needs saying that hi-fi has been among the worst hit industries in the recession and that with the dealer hoping to make between 30 and 40 per cent commission on his sales he should be as caring and comprehensive, if not as obsequious, as that tailor we spoke of.

## A convincing demonstration

There should be a dedicated listening room, unless the dealer works from home, or operates by appointment only. The main ingredient of the listening session is trust. The dealer will be establishing what your needs and means are and hopefully will be able to demonstrate that he can fulfil the requirements. Trust doesn't mean that you will become bosom pals and start playing golf once a week, but it is a two way thing. It makes little sense to audition equipment before you can afford it, and one of the dealers' most common complaints is that customers use their facilities to listen to equipment before going down the road to buy it at a chain store which is holding a sale.

There are several reasons for not following the latter approach. Firstly it's extremely short-sighted, wasting a dealer's time and money which might threaten his business - so where will you go when you want to upgrade? But more importantly you won't receive the installation advice and backup service at which the small independents excel.

If a dealer can make equipment sound good in his demonstration room, he should be able to make it sound good in your listening room. His experience on siting loudspeakers, and other equipment, as well as setting up a turntable can be invaluable when one considers the effects of acoustics within differing environments.

As a spin off from the initial 'trusting relationship' several dealers have started operating a home demonstration service. This is possible with BADA's seven day money back guarantee system, but a better solution is the 'try before you buy' approach. It's especially important where loudspeakers are concerned, as they are the only elements in the system which interact with the room itself. But if you are system building, and changing your source or amplification then it's useful to hear how the new component sits within the system and its room setting.

Dealers offering home demonstrations are still as rare as rocking horse droppings, but if you want to hear the difference acoustics make then try setting up your system in the kitchen for a while.

If a dealer discourages home demonstrations then this doesn't mean he's not a good dealer; he may like having evenings to himself. Another element of finding the right shop for you is that as you upgrade to a better system over the years the dealer will let you take kit home to try out, on trust.



*A good dealer should provide a pleasant atmosphere in which to shop.*

Like other industries the hi-fi business has benefited from great leaps forward in terms of technology over the last decade, from the invention of Compact Disc to the development of ultra large scale integrated circuits which will soon allow music to be stored on a chip. As new formats arrive dealers play a vital role in establishing their success. Dealers are in business to make money, and it's true that a few are avid music fans making a living from their hobby; the advantage of the specialists is that they tend not to be taken in by the 'latest thing is better' approach, recognising that the industry's longevity relies upon people wanting to listen to music in a satellite broadcasting age.

Unlike other types of shopping where the tactile nature of the goods allows you to make your choice, hi-fi relies on your perception of sound quality. For me good hi-fi is something which takes precedence over television; which brings a performance close if not in front of me, and which is unfatiguing after several hours of use. Choose and use a dealer who can demonstrate this.





PUT TOGETHER A TAILOR-MADE





COLLECTION.

## SEPARATES

*Classic groups are made up of great individuals, and everyone has particular favourites.*

*From the melancholic tone of a cello to the deafening roar of a thrash metal drummer.*

*Each will benefit from a different type of hi-fi reproduction. And as you're doing the listening you should be the one putting together your system.*

*Our range of separates are designed to bring you an infinite repertoire of sound.*

*But however you put them together, all our remote controlled components can be operated by the SH-R500 remote. (In fact it's so versatile it'll control most makes of TV, video and satellite as well.)*

*All in all this year's collection has been created to suit everyone, whichever models you choose.*

---

*Separates shown: SU-VX800 Amplifier. ST-690L Tuner. RS-BX707 Quartz Direct Drive 3 Head Cassette Deck. SL-PS900 Programmable CD with MASH. SH-R500 Learning Remote Control for components with infra-red receivers.*

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

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**Technics**  
For Music Lovers.



# A happy association?

*BADA is an acronym for the British Audio Dealers Association.*

*BADA's Operations Officer, Michael Lewin, explains just what a member of the public can expect from a BADA dealer.*

**M**odern shoppers expect to be 'sold to'. You expect features and benefits to be clearly outlined by the sales assistant, who may or may not have taken some steps to identify your requirements. But essentially you expect (and get sold) a package - whether it's the latest line in water-filters or the most recent Far-Eastern midi system.

Specialist hi-fi dealers like to think they're different; they offer a different service; sure, they sell things and they have to make a profit, if only to make sure they're still around to answer your questions next year. But their original motivation for being in the business is likely to be different from your average High Street shop-owner. Hi-fi dealers very often became involved because of their own enjoyment of hi-fi, not to mention an interest and, frequently, participation in the making of music. When you walk into his shop, the premise from which the specialist hi-fi dealer embarks is that the reason you want to buy some equipment is to listen to music.

There are other shops, too, which start because of an overwhelming interest in the subject: stamp dealers, bicycle shops, fishing tackle, guns, musical instruments. Do you go to the local department store to buy these items? Of course not! Because all of these shopkeepers are distinguished by their special involvement in the subject; in each case you expect to be dealt with by a knowledgeable enthusiast, who will treat you exclusively, frequently on the basis of a shared interest.

## What they do

BADA, the British Audio Dealers Association, founded in 1982, is the trade association of the specialist hi-fi dealers in the UK. Like the other specialists mentioned above, their businesses are based not necessarily on making a sale to each person who walks through their doors, but on getting to know their customers as individuals, establishing long-standing rela-

tionships, which lead to continued custom over many years, repeat sales and, most importantly, recommendation to friends and relatives.

These are some of the trading motives of the hi-fi specialist. Are there any other distinguishing features?

First and foremost, by definition, he (or she) will have used his own skill and judgement to select equipment which is then offered for sale to the customer, by demonstration.

To make this selection, the dealer clearly has to identify the criteria on which he bases these judgements, which, incidentally, he then passes on to his customers during the course of a demonstration. By and large, these are musical measures; and he must be ready and able to define, illustrate and substantiate these criteria during the course of a listening session. Usually these relate to the ability of the equipment to reveal the music satisfactorily to the listener; this can be translated into terms of pitch, tempo, definition and

resolution of detail. All of which is a little different from the average 'High Street' trader, who may be more concerned with selling a mass market product, heavily advertised and promoted, which he can 'move' from his stock shelves with the minimum of effort.

## Putting one's money . . .

The specialist has to be prepared to back his judgement, by introducing possibly unknown brands to listeners, giving them the chance to use their own ears to verify any performance claims. He has to put his money where his mouth is, too; because he effectively enters into a partnership with the customer who buys as a result of his recommendation and demonstration; for example the BADA Charter, on display in all BADA shops, explains the seven day exchange/refund scheme to which all BADA dealers are committed, where a customer has chosen a product on the shop's advice. This, of course, in strict contrast to products bought by consumers solely on the basis of magazine reviews. (Not that magazines do not have a valid and important part to play in bringing new products and developments to the attention of the public.)

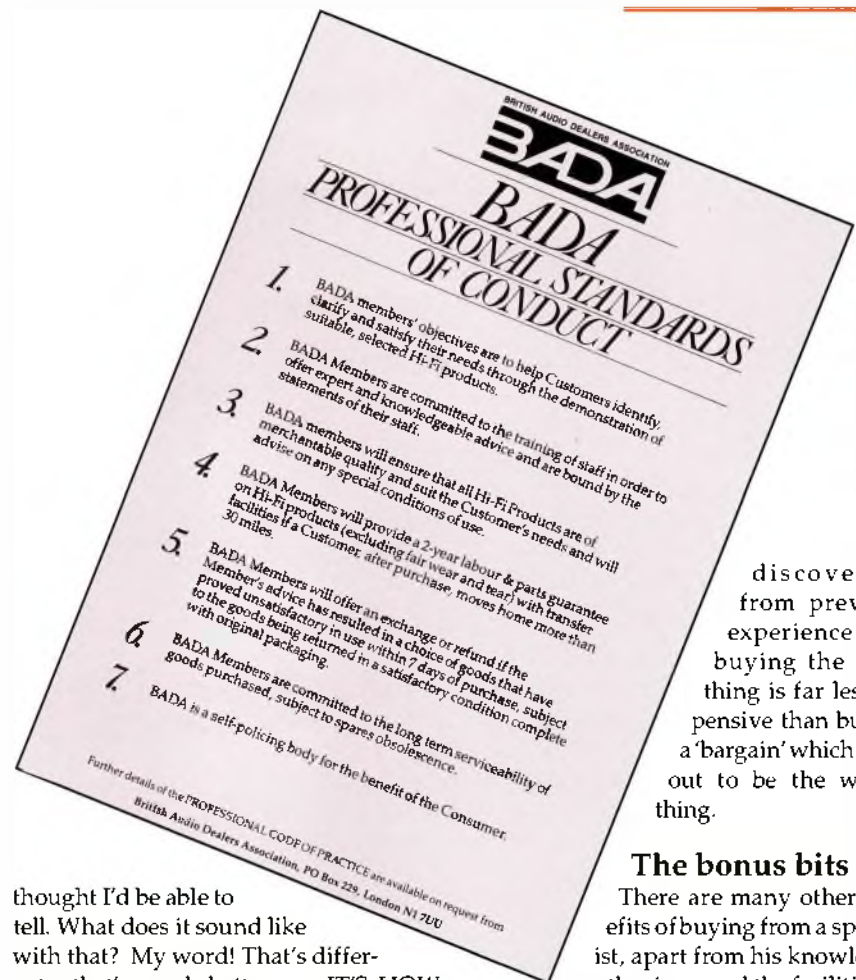
Specialist dealers, certainly the BADA members, allocate space for separate demonstration (listening) rooms, as well as making a large investment in 'demonstration stock' - at least one of each model. Dem stock is generally not available for sale but is reserved for demonstration use, if you choose an item and the only one left in the shop is the dem model, don't be surprised if the dealer refuses to let you have it; it's his lifeblood - the only means he has of demonstrating it not only to you but also to all his other customers. However he'll probably offer to lend you an equivalent item, until new stock arrives.

In many cases, if the dealer has more than one dem room, he will have to invest in an equal amount of demonstration stock



*BADA's Operations Officer Michael Lewin.*





of the more popular models. For example, one BADA member had as many as 15 Linn LP12s on permanent demonstration, many of them fitted with different combinations of arms, cartridges and power-supplies.

What use to me, you may ask, is all this investment in stock and space for demonstration? Why should I be concerned that, in contrast to the High Street multiples, with their carefully conceived shelves stacked with a meaningless mass of near identical black boxes, the specialists should have gone to such lengths to use this expensive space to build a room that is vaguely the dimensions of an 'average' lounge? Let alone fill this room with a selection of what look like similar black boxes? The answer is "Because the only way to buy hi-fi is to listen to it!" And that is what the specialist lets you do.

## Let your ears decide

The specialist's success stands or falls on quality; the quality of the musical result that he helps you to achieve; not to mention the quality of his staff (to whose training, for example, all BADA members are committed.)

The good specialist will have trained his staff to follow his example: of sitting down with you, the customer, in quiet, comfortable surroundings and discussing your short-term and long-term hi-fi objectives, probably even helping you to identify what these objectives are; of proposing possible alternatives; of setting these up, properly and in the correct context and letting you listen to them.

To be more accurate, most likely making you listen to them! You would be amazed at the number of people who visit a specialist shop for the first time and say "Don't bother to play it to me - I don't have trained ears - just tell me what I need." Sit them down in the dem room, play them the difference between a couple of amplifiers and within five minutes they're saying "Oh yes! I like that, I never

thought I'd be able to tell. What does it sound like with that? My word! That's different; that's much better . . . IT'S HOW MUCH?!" (Actually, you will also be surprised at how little it costs to make a good sound with the right gear.)

Joking apart, one of the first things you learn is that everyone has the ability to discriminate, to discern the difference between various pieces of equipment; you don't need 'trained ears'; you might need five minutes and a little guidance on forgetting those preconceptions about 'too much bass and not enough treble' - and concentrating simply on the music; you will quickly agree that you can't buy hi-fi by looking at it, at least not if you are the slightest bit interested in what it's going to sound like.

In fact, as it's in the specialist dealer's interest for you to make the right choice for the right reasons, he should be prepared to let you spend as much listening time as you need, before coming to a decision. As always, the keyword here is 'reasonable'; two hours spent comparing the relative merits of two £200 amplifiers might be possible on a Tuesday morning in the summer - but not feasible on a busy Saturday afternoon, three weeks before Christmas!

He's not selling to you 'on price' (ie, on quantity) but on quality; he's unlikely to be advertising his company on being 'the cheapest in town'; ironically, many satisfied customers of specialist dealers will attest to the value that they have received,

discovering from previous experience that buying the right thing is far less expensive than buying a 'bargain' which turns out to be the wrong thing.

## The bonus bits

There are many other benefits of buying from a specialist, apart from his knowledge, enthusiasm and the facilities offered. BADA members not only provide a two year guarantee (transferable in the event that you move house) but also have to give prompt and efficient service in the unfortunate event of a breakdown. Through the BADA affiliation scheme for manufacturers and distributors, close relationships are maintained between the BADA members and their suppliers.

Specialist dealers invariably offer home installation of more complicated systems because, again, it is in their interests for these systems to work at their best. It is not uncommon for them to arrange a personal visit to survey a potentially difficult site, before a purchase is finalised. The advent of cost-effective, computerised business systems also means that your Customer History can be kept on easily accessible file, so if you need a new stylus, you don't even have to say what it is: the specialist will have that information.

It is a regrettable fact that the majority of the public are not aware of what the specialist hi-fi dealer can do for them; which is a pity; because so often, after an interesting and enjoyable demonstration, I have heard customers saying "If only I'd known about your shop ten years ago; I could have saved myself so much time, money and aggravation; not to mention the enjoyment I have missed; why didn't I know about you before?"

**KENWOOD'S LATEST MIDI FORMULA.  
FIVE PARTS HI-FI AND ONE-BIT CD.**







As you probably know, 1-bit CD is the new standard in serious compact disc players. And it will come as no surprise that Kenwood's Hi-Fi range includes several 1-bit CD players, earning rave reviews from the critics.

But a 1-bit CD in a midi Hi-Fi system, from as little as £550? Now that's a little out of the ordinary.

At Kenwood, they don't believe that the convenience and the user-friendliness of Hi-Fi should come at the expense of sound quality. A fact that you can prove to yourself in an audition at your Kenwood dealer.

The other part of the Kenwood midi formula? Well, some midi systems only look like separates. In reality, they're just dressed-up music centres.

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If music plays an important role in your life then the new 500 Series from Yamaha Hi-Fi is designed for you.

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What's more, the RS Remote Unit gives you armchair control of all system functions for a command performance - every time.



## THE 500 SERIES

### AX550

Direct Signal Path Integrated Amplifier effortlessly delivers 140 W/ch DIN music power.

### CDX-550 E

CD Player featuring all new S-Bit Plus technology for pure, natural sound.

### TX-550

Direct PLL Synthesis AM/FM Stereo Tuner for broadcast quality listening.

### KX-530

3-Motor Amorphous Head Cassette Deck featuring \*Dolby Hx Pro for maximum performance.

### RS REMOTE CONTROL

Full function, hand-held unit provides total system control.

### SYSTEM OPTION - TURNTABLE

Complete your 500 Series line-up with the Yamaha TT-400RS fully automatic belt-drive turntable.



If you're into good sounds then Yamaha have got just the Hi-Fi system for you - the 50 Series.

Yamaha Hi-Fi has always been at the forefront of audio technology and the 50 Series system features an integrated range of components designed to deliver the finest sound quality and value for money.

Available in Black or Titanium\* and Featuring RS remote control the 50 Series system sounds every bit as good as it looks - naturally.



## THE 50 SERIES

### RX-450

Stereo Receiver featuring High Dynamic Power amplifier and sophisticated AM/FM Stereo Tuner with remote control and CD Direct facility.

### CDX-450 E

Quality CD Player featuring Yamaha Single-Bit technology for improved performance and natural sound.

### KX-250

2-motor transport Cassette Deck featuring Play Trim facility and \*Dolby HxPro combines Hi-Fi performance with value for money.

### RS REMOTE CONTROL

Full function, hand-held unit provides total system control.

### SYSTEM OPTION - CD MULTICHANGER

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\*New Titanium finish available from November 1991

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# The Independent Angle

**H**ello. Is that directory enquiries? Do you have a number for BADA? Having explained that it wasn't the British Antique Dealers Association, I was told that there was "no listing for the British Audio Dealers Association". Oh well, I should have known, you don't get much for 45p these days.

This, I'm afraid to say, is the main problem with (and for) BADA. Almost nobody who needs to has heard of it. Those of us who read hi-fi magazines and frequent 'specialist dealers' will, no doubt, be pretty familiar with BADA. That, however, isn't really helping anyone. Let me explain.

## BADA's role

As I see it, BADA aims to play three roles. The first is as an organised group of respectable retailers when dealing with trade matters, especially equipment manufacturers. BADA does some admirable work in this area, especially when it comes to negotiations on margins and warranties. It also provides a worthwhile forum for dealers to share information. It has to be said that some of the largest independent dealers are not BADA members, and they often carry more clout with the hungry manufacturer or distributor than BADA would like, but that's another story.

The second role is one of consumer watchdog - BADA provides a conciliation service for those customers who feel aggrieved by their dealer. This is certainly useful, but BADA doesn't have any kind of real power, or (I think) the ability to offer financial recompense. BADA certainly isn't the organisation ABTA is. So we have a dealer's organisation, run by dealers that is also a consumer organisation run for the customer's benefit.

Anyway - the third (and I think most attractive) job for BADA is to promote the specialist dealer to potential hi-fi buyers. Lead them from midi mayhem to something more satisfying. This brings me back to my problem on the phone - very, very, few people seem to have heard of BADA. In six years of trading, my staff and I can only recall about 10 (out of 6,000) clients who mentioned BADA. We explained why we were not BADA members, and they all bought systems anyway. "Of course you won't have people asking about BADA," I can hear Mike Lewin shouting from his piece on page 18,

*Not all good dealers are members of BADA. We asked The Cornflake Shop's Steve Moore why he has refused to sign on the dotted line and insists on trading as an independent.*



"you're not BADA members - people who know about the organisation go to a BADA dealer." Well, I have to report that that may be true, but speaking to friends who work in, or run, BADA retailers, they hardly come across any new customers who have heard of it either. If you don't believe me, try asking your non-hi-fi friends (you know - those people whose recent purchase of a naff stack system or music centre dismayed you so much).

## The Charter

The BADA charter spells out a number of professional standards that its dealers "will" maintain, including commitments to the quality of the goods and services offered. The ideas of a transferrable warranty, and a trial period are certainly worthwhile, however, BADA has no monopoly on such standards, and many independent dealers would argue that they offer at least as good a service as some BADA dealers, and a better service than many. Despite this, some of the very best

shops I know are BADA members. What this tells us is that the standards set should be fairly run-of-the-mill for most specialist shops. The service you receive (advice, demonstration, installation, back-up) and the selection of equipment is all down to the people running and working in each shop. BADA can monitor its own dealers all it likes, but it can't force shops to join, and so ultimately it is only half-useful to

*Central London's Cornflake Shop, home of the best coffee in the world of hi-fi.*

the consumer. There are some mediocre dealers within BADA, and some excellent ones outside it.

Were BADA run by an independent body (which monitored all dealers) it could give a more comprehensive guide. We would certainly register with (and help fund) such a body, if it really enforced standards and publicised its work.

I feel that if BADA raised and enforced standards, did some good PR and advertising outside specialist magazines it would get more support from dealers. Currently BADA offers nothing that the good independent dealer hasn't been offering for years, and there is therefore little attraction for dealers to join. If BADA produced a well-publicised and truly authoritative guide, dealers would have to join (and get their act together if necessary). This has to be the best way forward for everybody.





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# You drop it. Sony DAT will pick it up.

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It picks up heavy metal as well. In fact, a Sony DAT player will record anything you like. Perfectly.

It's the difference between numbers and bumps. Whereas standard recording leaves an imprint on a metal tape, digital DAT technology records sound as an indelible numerical code. The imprint loses its edge. The numbers come up true every time. In short, you've got a CD quality recording machine.

A Sony DAT deck, for example, enables you to record and preserve all your non-digital material, as well as making digital compilations from your CD or tuner.

That's four faultless hours of your favourite music on a cassette the size of a matchbox.

The Sony DAT Walkman® personal stereo is another pocket-size piece of perfection.

It'll record from any of your equipment and play back through headphones, your hi-fi or car stereo.

Like the deck, it'll fast forward at 200 x



playing speed and pre-select tracks in any order you want.

So have a listen to a Sony DAT. You'll never pick up anything else.

**SONY.**  
Why compromise?





# The year in CD Players

A clearly defined but quite unexpected consensus underscored our tests this year. No, our listeners did not find all bitstream players emerging triumphant but then neither did they come down wholeheartedly in favour of our traditional multibit contenders. In fact our reaction to the various conversion technologies was quite mixed, which is reflected in the smattering of technologies harboured within the list of Recommendeds and Best Buys.

In truth what emerged was the thought that you needn't spend a fortune on a CD player to enjoy a decent, foot-tapping sound. Quite the reverse in fact, for only one player above £400 was judged sufficiently outstanding to warrant Recommendation!

The problem appeared to be that nearly every time our listeners were faced with a costly unit they struggled to ascribe it some character - phrases like 'very polite, civilised and refined' were the norm. Our cheaper contenders were, on the whole, a little less conservative in their music-making but for all their raggedness they at least aroused the enthusiasm of our panel. Perhaps in a well-meaning attempt to rid their flagship CD players of all 'digital nasties' certain manufacturers have also snuffed out any spark of emotion.

The honour of costliest Recommendation of the year went to JVC's £520 XL-

Z1011. It's a player that combines first-generation PEM technology with good ol' K2 (JVC's jitter-buster) and a pitifully insubstantial transport, but it works, offering a decidedly beefy and confident sound. Staying at the higher end of the price band for the moment, Philips' re-born CD850, now in MkII form, also scraped a Recommendation, though this is as much for its excellent build quality and flexibility as its sound which, to be frank, is two steps sideways and half a step back from the original.

Our listeners recognised a certain common spirit between the Philips CD850II and the Marantz CD-62 which, considering they are virtually one and the same machine, is gratifying if hardly surprising.

Still, the CD-62 has the edge with its warmer and fuller sound while offering a worthwhile saving of £100 over the CD850II.

One of the interesting arrivals this year was Yamaha's CDX-450, a beautifully built machine equipped with a new hybrid PWM DAC from Burr

Brown. Unfortunately the response of the panel was rather mixed. On the one hand the Yamaha can pull out the subtlest and most meaningful of details without sounding contrived but, on the other, its mild demeanour causes it to shy away from the most exciting of dynamics. No consensus here so you'll have to make up your own mind!

*This year saw Bit Stream come to dominate the market, although, as Paul Miller reports, multibit players still managed to clock up their fair share of Recommended and Best Buy accolades.*



All three of Kenwood's latest players acquitted themselves with flying colours though, of the trio, the most expensive machine, the DP-7030 was perhaps the least exciting. The extra dosh buys you an impressive standard of construction and finish but this is also reflected in its warm, sober and overly refined outlook, something which tends to back up the remarks that were made in the introduction to this piece about more expensive players not necessarily blowing away their cheaper siblings.

## Almost, but not quite . . .

Besides those Recommendations already mentioned, and indeed those players included in the main review section and not mentioned here, there are a trio of players that deserve special mention because of the fact that they escaped a Best Buy by the slimmest of margins.

Kenwood's £200 bitstreamer, the DP-5030, is based on the same Sony technology as the DP-7030 but is clearly the best player in their current range with a mildly understated but luxurious and disarmingly detailed sound. By contrast Philips' CD618 offers a very clean and fresh sound that's both relaxed and satisfyingly crisp



over the pace and excitement of its music, it is difficult to get quite so enthusiastic about the very limited convenience of the player.

## Over the £200 hurdle

Over the £200 price point the Marantz CD-52 is guaranteed to bring a certain spice to your listening with its rich, warm and uncommonly full-bodied sound. It is not exactly neutral nor especially refined, but its lavish colour remains faithful to the heart if not the tone of the music. If you like your music to sweep boldly from the speakers then fire-up the CD-52 and you'll be in for a treat.

Despite all the aforementioned machines, the multibit contingent were not completely washed away, as Sansui's delightful little CD-X211 ably demonstrates. Here's a player with a very agreeable sound that benefits from all the dynamic prowess of a good 16-bit player while avoiding the tendency towards grittiness. This is certainly not the sort of player to aggravate a lean or bright sounding system and so seems ideally suited to many budget amps.

Our remaining £300 Best Buys are genuine trail blazers and they are also true 1-bit PDM Bit Stream players, reflecting a move away from higher-speed PWM bitstream converters that I expect to continue over the next few years. Yep, there's bitstream and then there's Bit Stream.

For Pioneer this is all new ground, but in one fell swoop it has leapt to the top of the pile with its own 1-bit PDM DAC and a rather novel CD drive system. The sound of the PD-8700 is mellower than the lookalike PD-7700 but it is also grander in scale, a big and decidedly physical sound that's unflustered by the most daunting of acoustics. Moreover its music is remarkably emotive, charged with a tension that brings individual instruments to life. If you like the look of Pioneer's new players then the PD-8700 is the one to audition.

Our last Best Buy goes to the long-awaited son-of-865 from Rotel, a player that is undoubtedly more uniform and mature and yet imbued with a clarity that distinguishes it from all available competition. Allowing yourself to be enchanted by the RCD-965BX is no arduous task for its music is both potent and beguiling, capturing its silvery fire without adding any fuel of its own. All this plus an enviable standard of construction and a sensible range of facilities. This, then, is the CD player of the moment.

- a bargain compared to costlier players that are based on the same basic circuit layout. Once again, simplicity wins out!

Last, but certainly not least, we have Pioneer's cheapest 'turntable' CD player. The PD-7700 is certainly an up-beat performer with a tight, confident and zippy quality to its music that keeps you on the edge of your seat. It's not harsh or fatiguing, I hasten to add, simply bubbling with enthusiasm.

## The Best Buys

So what of the cream? Well, I'm pleased to say we uncovered no less than seven Best Buys this year. Six of which are bitstream CD players that will wreak havoc with the competition at their respective price points, and priced so that they won't rip you off in the process.

Our Best Buys are players that shone through in the listening tests without our panel having any knowledge of their price or manufacture.

Take Technics' SL-PG200A for instance. Here's a player that offers just about every feature you'll need plus full remote control in an attractive and well-built package. It's based on the favourite SL-P277A and so retains the open, uncluttered and

refreshingly vibrant sound which made that player such a winner. At just £160 it is a bargain, nudging ahead of Philips' CD618 with its expertly-judged blend of composure, detail and an incorrigible effervescence.

Less visually attractive, but equally well specified, is Aiwa's XC-700. Not only was this one of the first players to use Philips' top differential Bit Stream DAC - the SAA7350 - but it was (and still is) by far the cheapest. The player's sound has a subtle, silky-smooth and effortless quality. It doesn't bellow detail from the speakers but simply allows it to flow unhindered and collect in an irresistible pool of sound.

Our final sub-£200 bitstreamer came from NAD, a budget offering that's apparently a less sophisticated version of the 5440. Ok, so the 5425's fascia is virtually a feature free zone but by plucking various components from within the player NAD has actually succeeded in freeing more of the music's natural life and vitality.

It provides an eternally optimistic view of the music without ever becoming brash or crude, an open and welcoming sound that captures rather than demands your attention. Still, if the 5425 has a firm grip



# The year in

*With DAT and Dolby S grabbing the headlines and three-head machines*

# Cassette Decks

*dropping below the £200 mark, Alvin Gold*

*reports that 1991 has been an interesting*

*year for the humble compact cassette.*

**T**he past year has been a confusing one for those who seek long term trends. It has not, however, been an uneventful one. DAT was launched not for the first but for the second time, and Dolby S was finally launched following considerable delay. Whilst all this has been happening, most eyes have been turned on Philips and Sony, both of whom have pretenders to the cassette throne on the stocks for release in 1992.

An obvious trend in the market is that prices for cassette decks have started to tumble, with the entry level price for a three-head, dual transport deck dropping to an historical low of £200.

The price point for three-head, dual capstan decks isn't the only one that has been on the move. There are some new £100 models, including at least one - the Aiwa AD-F410 - that boasts Dolby HX Pro. Despite the low, low price, Aiwa has been able to use competent electronics and a decent transport. Last year, practically the same deck, with the addition of a record sensitivity adjustment, was on sale for £150, which is a measure of how the industry has been affected by the recession (and Aiwa's increasingly aggressive marketing stance).

One of the key models in the £200 area is also an Aiwa, in this case the AD-F810. This model has three heads and dual capstans in addition to a range of other attractive user features. There is a similarly priced Sony model too, the TC-K570, again with three heads, but a single capstan transport this time, though it happens to be a rather good one. There is no rule to say that dual capstan transports are always better than their single capstan counterparts. With cassette decks as with other

types of hi-fi equipment, it is too easy to be taken in by the hype.

It is interesting to see just how polished all these and other recent cassette decks have become. The £200 Sony even has a fully powered cassette loading door plumbed into the deck's transport logic. There's nothing clever about this technically; every drawer loading CD player has offered the same since the year dot. But it is new to affordable cassette decks.

## Whistles and bells

Tape tuning aids that adjust the deck's audio circuits for the bias, sensitivity and sometimes equalisation requirements of

particular tapes remain a class of feature that most manufacturers have yet to yet to come to grips with under the £300 price point. But a striking exception that has been available for over a year is the Pioneer CT-447. This two-head deck can set its own record bias, level (sensitivity) and equalisation. The circuit responsible is called Auto BLE, and is quite an interesting piece of kit. So far, other manufacturers have failed to adopt this idea for their more affordable models, but with new formulations of tape proliferating and no obvious convergence in their magnetic properties, the requirement for accurate tape set-up, if only to avoid Dolby



*Just a selection from the 46 cassette decks that passed through our labs this year.*



mistracking, is greater than ever. In the last few months, a new Pioneer model, the CT-337 (not tested in *Choice* so far) brings this same feature to the £150 price point. And that, folks, is the magic of microprocessors.

## In the digital domain

DAT has, as already mentioned, made another comeback, but it seems to have been a pretty forlorn effort. Triggered by some measure of agreement with the record industry and regulatory authorities in the United States and Europe, several Japanese companies, most notably Sony, JVC, Aiwa and Kenwood, made a concerted push with some mains and portable battery driven models in the early part of 1991. Judged against the number of cassette decks that sell at comparable prices (ie over £500), they have enjoyed considerable success. But this doesn't amount to much in relation to the market as a whole. In the several years of backroom development that DAT producers have had available, DAT hardware seems to have changed little.

Although prices have reduced (by my reckoning by something like 35 per cent in real terms), the much sharper price falls that would be required to open DAT up to a genuine mass market have failed to materialise. DAT requires lots of high tolerance engineering, and is therefore an intrinsically expensive medium. Reducing prices to affordable levels was never going to be the comparatively trivial problem it turned out to be in the case of CD.

The key technical features of DCC and to an extent also Mini Disc are predicated on this simple but critical realisation. DAT may just settle down into a long term alternative to the top end cassette deck, but there again maybe not: the lack of software is sure to continue to work against the medium, and 1991 may well turn out in retrospect to have been DAT's last stand in its domestic incarnation.

## Extracting the hiss

DAT wasn't the only technology in trouble in 1991. Dolby S has also received what can only be described as an equivocal reception. Taking a look at the complexity of the circuit required to make Dolby S run shows why it has taken so

long, and why the decks are so expensive.

Even the cheapest currently available Dolby S cassette decks are in the same ballpark pricewise as a budget DAT recorder. Later generations of Dolby S chips will be simpler and cheaper but this may be too late, especially as DCC is promised for early 1992.

Whether there is room for Dolby S has to be open to question. Dolby C, which is a little less powerful as a noise reduction process, has failed to attract any substantial backing from the makers of prerecorded material even though Dolby C chips are fitted to all but the lowest stratum of hardware. Unless the music software industry can rouse itself to show more interest in Dolby S, it is unlikely that

manual tape type switching, by omitting Dolby HX Pro and by leaving out almost all the usual roster of the gadgets. The new Nakamichis are at least dressed in modern clothes, but in a way this makes them appear even more bizarre, especially the *Cassette Deck One* with its manual head azimuth adjustment feature. But the audible superiority of these decks, the *One* especially, shows once again that Nakamichi must know something that has escaped most of its competitors.

## Defeating yourself

There have been some interesting minor trends and trendlets which became particularly obvious this year. It was amusing, if a little disconcerting, to see that some more expensive cassette decks are beginning to appear with bypassable Dolby HX Pro. On the face of it, this



*Cassette 'anti-hero' Nakamichi continues to build on its reputation.*

cassette deck manufacturers will rush to fit expensive Dolby S chipsets to their products. The industry as a whole has been taking a 'wait and see' approach to Dolby S, and the imminent launch of DCC is unlikely to galvanise them into action. Of course if DCC is delayed, or the medium flops (both of which are distinct possibilities) things might be different.

The anti-hero in the cassette deck arena in 1991 was Nakamichi. The company launched two decks this year, both cocked a snook at the rest of the market by promulgating such bizarre idiosyncrasies as

makes no obvious sense. All Dolby HX Pro does, after all, is to dynamically vary the bias signal so that the effective bias applied to the tape (which consists of the bias signal plus high frequency music content, which has a biasing action) remains constant. Constant (effective) bias means a more linear recording process with better dynamics, especially at high levels and high frequencies. High bias tapes make less use of Dolby HX Pro than low bias though, and it does seem that omitting the process with this type of tape is a help rather than a hindrance.





*The last year has been quite an interesting one for amplifiers in general and*

*budget models in particular. Paul Miller sums up the results of our two amplifier tests and looks at the models that made the headlines.*

# The year in Amplifiers

The climate of change in amplifier design is significantly cooler than in the realm of CD players. Indeed it is very rare to discover an amplifier that is genuinely new or innovative. As in the world of loudspeakers the very best performers are often those that have been refined over a period of time, current models that benefit from the lessons of their forebears. In most cases the technology does not advance in leaps and bounds but inches cautiously forward, responding to changes and trends in the marketplace.

Talking of which, one trend that has gained momentum this year is the vogue for minimalist or 'UK-oriented' amplifiers. In the past this niche market has supported a contingent of home grown, no-frills amplifiers, basic boxes equipped with little else besides a volume control and input selector. But now the giants of the Far East have stirred from their slumber and responded to pressure from their UK counterparts. And as our listening panel soon discovered, they've been rather successful in the attempt.

One further trend that emerged through 1991 concerned the greater awareness of radio frequency interference and its implications for amplifier performance. Just look at how much 'cleaner' the RF IMD plots are compared to those of a year

or more ago. To some extent this has had the effect of unifying amplifier quality, conferring similarities in tonal balance and presentation that the panel remarked upon time after time.

Yet this sudden clearing-up of RF IMD is not the result of wholesale changes in circuit design, changes that might genuinely reduce the electronics' susceptibility to RF noise. Instead it's simply a reflection of the stiffer RF filters being employed. This tightening-up of specs comes as a direct consequence of tougher European rules on interference which are becoming increasingly important due to the imminence of 1992. Unfortunately the filters can introduce colorations of their own, distortions that are quite distinct from the business of banishing RF. Damn sound quality - welcome to the single market!

## The head count

This year's crop of amplifiers contained its fair share of surprises, both good and bad. By hook or by crook we ended up with a grand total of fourteen Recommendations (fifteen if you count Arcam's D110 preamp) and just four Best Buys.

We encountered very few real screamers in our tests while, more often than not, the least inspiring amplifiers

were marked down because they simply failed to capture the mood of the marketplace.

At the very budget end of the market amplifiers like the JVC AX-A3, a very smooth if not overtly dynamic design, act as a performance guide. This is a sensible no-frills model and one that should earn JVC new-found respect as well as a place in a fair number of starter systems.

Between £150-£200 the scene is cluttered with various quality designs including the Creek 4040 which, in Series 3 form, offers higher overload margins and an altogether tidier, refined sound. Compared to the Denon PMA-350 and Marantz PM-30SE it is looking a little expensive, however. Bucking recent trends AR's A-05 found greater favour with our panelists than any of its companions had in the past. Here at last is the dryness and control we've heard before but tempered with a richness and detail that has otherwise been missing.

Yet for just £10 more just look at the luxurious build quality that's available in the form of Kenwood's KA-5020. Here is one of the few amplifiers that seems to offer the best of both worlds, a generous array of facilities coupled with a sound that's both vibrant and alive. A surprising and powerful package that's capable of

sustaining nearly 200W into 4ohms!

Denon's *PMA-350* is a richer and warmer-sounding amp by comparison, one that'll entice you with its beguiling rather than forceful presentation. If you're looking for something with a little more blood 'n guts then try the *PM-30SE* instead, an expressive amplifier that bustles with detail. This amp is pitched directly at the Pioneer *A-300*, our remaining sub-£200 Recommendation. As both amps are vying for the same slot it's interesting to note that neither is particularly consistent from input to input.

In Pioneer's case it's the MM stage that lets the side down with its lack of freshness and detail while, returning to the *PM-30SE*, we discovered that its CD input was markedly brighter and sharper than the accompanying disc input. Both amps have a lot going for them but neither can be Recommended without some qualification.

Stepping up another rung on the ladder brings us to the *PM-40SE*, another Marantz product that has received hearty accolades from one or two quarters. In fact judging from earlier reviews I fully expected Marantz's *PM-40SE* to have our listeners dancing in the aisle but, alas, it was not to be. The amp is certainly very good, however, with a fresh and hearty balance that makes you sit up and take notice.

## The middle market

Between £300-£400 four utterly contrasting designs offer themselves for Recommendation. The enigmatic Lescan *Quattro* will appeal to the surround-sound enthusiast with its four-channel operation while the average audiophile could not fail to be delighted with its magnetic and utterly three-dimensional sound. It would be easy to pass over the *Quattro* for its low power output and quirky design philosophy, but coupled with sensitive speakers it's capable of developing a deceptively 'big' sound. It also has the advantage of giving you the option of bi-amping your speakers using just a single amplifier and used in this way is capable of some very creditable results.

Then there's QED and its uprated *A270*, a model that has fared well enough previously but whose current competitiveness is taxed by options like the new Premium Analogue disc board. Stick with the improved *A270CD* model and its natural command of dynamics and soundstaging will have you on the edge of your seat.

Harman Kardon's *HK6500*, in common

with the Mission *Cyrus Two*, offers a drier and more substantial sound with a greater tolerance of insensitive speakers. The former is the more open, airy and sparkling of the two while the latter competes with a tremendously punchy and confident sound via disc.

With a more substantial budget, however, there's little to touch the latest *8000A* from Audiolab. Powerful but calm and refined with it, the *8000A* is neither bland nor excitable. At best it is almost paradoxical, combining an authoritative grip over music and speaker alike without strangling its delicate, emotive qualities. An ideal choice for a neutral and thoroughly transparent CD-based system.

We tested a number of pre/power combinations this year but only the Hafler *SE100/SE120* was rewarded with a Recommended flash. This is not an especially powerful duo but then it also proved less taxing than many of its competitors. Indeed, the smooth, open and expressive quality that flooded across via CD sealed its recommendation. As a line-only combo it represents particularly good value, enabling you to add an MM/MC disc input for an extra £100 at a later date, should you so desire.

## The Best Buys

The four Best Buys of this year arrived in groups of two, though perhaps only one might have been tipped for success before the race had begun. Our surprises began with the £150 CV5600 from Dual. This amplifier sounds dangerously close to Rotel's *RA-820AX*, a coincidence that seems less fanciful when you realise that Rotel actually builds the CV5600! It's a rich and colourful amplifier that's at its happiest reproducing the vibrant string tone of guitar or violin. Bigger and costlier amplifiers will have a better command of the deepest bass notes, but only a handful will counter its persuasive midband.

Then came Kenwood, a company that have proved more than capable in the past even though their *KA-3020* is something of a dark horse. Nothing special technically, it's just one of those amps where everything seems to fall into place. The result is a remarkably composed sound reinforced by a deep and punchy bass which blends delightfully with its smoother but lighter mid and treble.

The rise of Aura's *VA-50* was also unexpected. It may have been touted as a 'total re-vamp of the *VA-40*' but, in real-

ity, there was little internal evidence of such a transformation, instead the mods that propel the *VA-50* to the status of Best Buy are subtle, considered revisions. Nevertheless they are sufficient to expose the hitherto squandered qualities of this established MOSFET amp, drawing out an easy-going almost liquid style of music making that builds towards an expansive and thoroughly enchanting conclusion.



*Pioneer's A400 won the day while...*



*the Aura VA-50 won Best Buy status...*



*and the Cyrus II carried on regardless.*

## The dread A400

But the star performer of them all, the one amplifier that seems to combine the positive attributes of every winner, is Pioneer's *A-400*. But then, since its introduction, this devastating amplifier has proceeded to see off most contenders up to £500 or more! It is the possessor of a crystalline focus brings forth the most captivating music, fierce in its resolution of technical detail but never less than warm-hearted in its communication of the music's natural emotion.

It will be extremely interesting to see just how, not only the established specialists, but also the major Japanese manufacturers will respond to this most unexpected of gauntlets.

To see how the story unfolds you'll just have to wait until March 1992 and our next Amplifiers Issue!



# The year in Loudspeakers

*Size gets less important as the years pass and this year has seen a plethora of small boxes, some capable of excellent results, as Paul Messenger reports.*

**A**nother year, another eighty or so new loudspeakers. Many — probably the majority — were competent enough overall performers to deserve a Recommended flag on the corner of the review, but it's sobering to realise that only a handful really made a lasting impression on my fragile memory banks.

Twenty-five more hopefuls are assembling themselves in the hall at this very moment, ready to make their *Choice* review debuts in the January issue. They include some pretty radical new designs from Tannoy and KEF, replacing the key models from these two leading brands that have come my way this past couple of years.

Which in turn explains why neither brand features amongst the reprinted reviews in this collection. Each had good models — I particularly regret the passing of the Tannoy M95 — but the old ranges are now discontinued, and the new are still in the assessment pipeline. Mordaunt-Short likewise has a whole new range on the way.

## The long view

The Tannoys and KEFs have changed more than most. In general loudspeakers evolve very slowly, and I keep around me a few examples from twenty and thirty years back (specifically the Spendor BCL, the LS3/5A and the original Quad Electrostatic) as a salutary reminder that such classics can still hold their heads high amidst the class of '91, in certain respects at least.

Such examples serve to illustrate that sound quality *per se* hasn't necessarily ad-

vanced all that far over the past decade or two, never mind over the past twelve months. But that shouldn't be taken to mean that loudspeakers haven't made some serious progress over the years.

The real advances have come in the detail and production engineering that is applied to models selling at genuine mass market prices. The consequence can be seen in a levelling up of overall performance standards, with greatly improved consistency, reliability, longevity and value for money. Far more loudspeakers, at far lower inflation-adjusted prices, are now able to deliver genuinely hi-fi performance than ever before.

## Small is still beautiful

The most obvious long term loudspeaker design trend is of course the steady shrinking of the enclosure itself, which seems to continue inexorably from year to year. It's actually a peculiarly British market phenomenon, and has been encouraged by a number of coincident factors.

Most people in any case prefer small loudspeakers, and modern loudspeaker stands give little miniatures (seven litres of enclosure volume or less) a fine opportunity to show off their strengths. Small size almost automatically confers good

coherence, low cabinet coloration and a low price tag as well.

There's no question that the best of the current crop of budget miniatures sets an impressive standard.

Mission's 760 has recently taken the top sales spot, but Mordaunt-Short is currently finalising the 5.10 to succeed the redoubtable 3.10, and Goodmans introduced its *Maxim 3* at the September '91 Penta Show. Fierce competition keeps

everyone on their toes, and several recent models feature extensive and elaborate structural plastic mouldings as part of the cabinetwork, a technique which offers several advantages, but which has done little to counter the deserved popularity of the all-wood, real-wood veneer JPW *Sonata*.

Budget babies may dominate the monthly sales charts, but they really only represent the bottom line of the hi-fi performance ladder. However there's no avoiding the very real constraints imposed by the small driver and enclosure. There's no way of getting any serious welly out of these small, lightweight boxes.

Bass extension, power handling and loudness capabilities are the inevitable sacrifices; their significance will depend on personal taste, not to mention size of amplifier and room.

The easiest way to get decent loudness and a proper helping of welly is to move up a step in size and price. There's quite a clutch of good value 14 litre-or-so models either side of the £200 mark — seemingly timeless free-space models like the JPW *P1* and Wharfedale 505.2, plus more recent wall-mounts like the Heybrook *Point 5 S2* and *HB1 S3*, the Royd *A14 II*, Linn *Index II* and Arcam *Alpha*.

Increasing the size of main driver and enclosure will certainly result in a bigger and louder sound, but by the time the extra component and shipping costs are added, there's little left over to try and control the unwanted vibrations in an enclosure which now has much larger radiating panels and less inherent stiffness to boot.

All of the above helps

*Although a relative newcomer to the loudspeaker market, NAD enjoyed success with both its new models this year.*



*The Castle Chester was judged to be such outstanding value for money that it became our most expensive Best Buy ever.*



explain the increasing success of what are perhaps best described as 'luxury compacts' — narrow but quite deep 10-12litre enclosures, featuring advanced engineering and real wood veneers.

Celestion set the stereotype several years ago with its popular and respected SL series, but the 1991 introductions of the Epos ES11, the SD Acoustics SD3 and the Arcam Delta 2 has brought fresh impetus and a wider range of choice.

Speaker stands have two main purposes. They support the small loudspeaker more or less rigidly, and also raise it high enough off the ground so the tweeter is roughly at ear height. They also divert a significant percentage of the money spent on loudspeakers each year into the coffers of the stand makers, which doesn't seem such a good idea from the speaker manufacturer's perspective.

One obvious alternative is to extend the speaker box down to the floor, eliminating the stand altogether.

The two NAD speakers featured in the *Best Buy Guide* provide the perfect example. The £150 miniature 8225 needs all the help a nearby rear wall and good stand can provide, whereas £300 buys the same basic driver line-up in the floorstanding 8100. The latter is if anything a little generous in the midbass, and so is best pulled well clear of the wall, gaining thereby in terms of lower coloration and

improved imaging, though sacrificing a little perhaps in agility.

### The new generation

Floorstanding speakers have always been with us of course, but the latest generation of tall, slim and compact two-way models with proper spike or frame/spike support are very different from the multi-driver boom-boxes of yore. They're elegant to look at, often take up no more space than a bookshelf speaker on a stand, and feature a whole variety of advanced driver, cabinet and loading engineering techniques.

A whole clutch of interesting, good value examples have come my way this past year or two. Standout examples include compact wall-mounts like the Royd Apex, Linn Kaber, Ruark Talisman, and Naim IBL, while the free space acoustic alternative is provided by the Equation 0, Castle Chester, TDL Studio 1, SD OBS and Dahlquist DQ8.

To describe them as a group implies some homogeneity, whereas in fact the reverse is the case — and is fundamentally what makes them so interesting. Though often very different from one another in intent, execution and even the manner in which they should be used, they collectively bring

new respectability to the middle reaches of the loudspeaker market, £400 up to around £1,200.

Historically floorstanders have usually been better avoided in favour of the advanced 'large bookshelf' stand-mounts — the timeless Spondor and Rogers BBC monitor style designs, for example, or the Epos ES14.

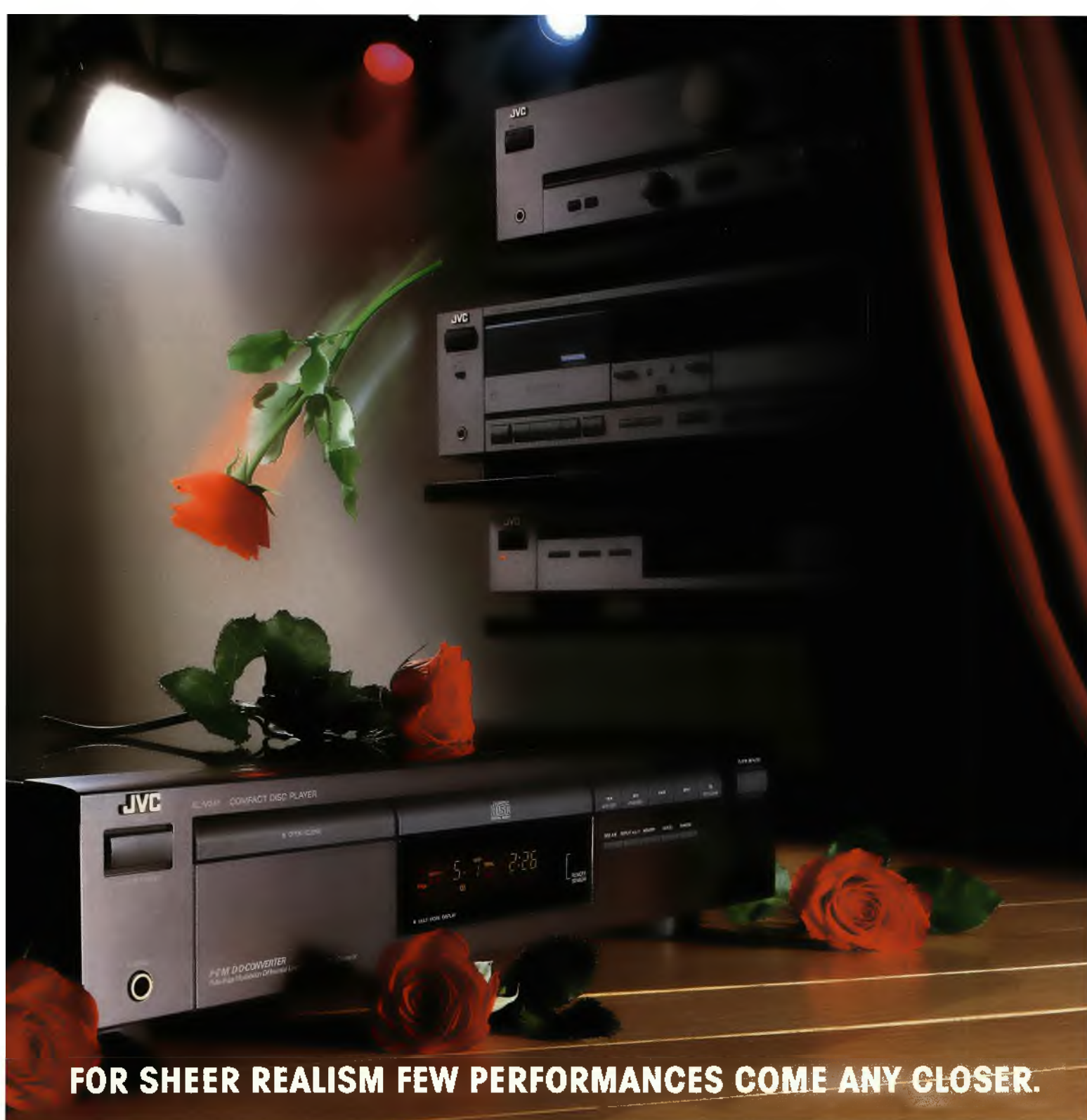
The new generation of compact floorstanders won't replace this classic configuration and shape, which in any case has its own particular strengths. But they do extend dramatically the range of choice available to the discerning buyer, and make the task of searching out a really good hi-fi loudspeaker a whole lot more interesting and rewarding for those

prepared to take a little trouble.



*The year proved to be a good one for the British company Celestion with both the diminutive 3 and the larger 7 gaining mass market acceptance.*





## FOR SHEER REALISM FEW PERFORMANCES COME ANY CLOSER.

It's hardly surprising that JVC's latest hi-fi separates have picked up so much applause from the hi-fi press.

Each component has been designed to recreate music, purely and simply, establishing new standards of accuracy in the reproduction of digital sound wherever they perform.

The XL-V241 Compact Disc player, for instance, features the highly acclaimed 1-bit Pulse Edge Modulation (PEM) DA converter, an exclusive JVC creation. It dramatically reduces zero-crossing distortion, non-linearity and glitches, offering twice the resolution of conventional 1-bit DA converters.

The PEM converter allows 4th order noise shaping which virtually eliminates re-quantization noise and together with an advanced oversampling system

provides a very high signal-to-noise ratio, close to the theoretical upper-limit.

All of this means you can sit back and enjoy the subtle caress of the most delicate nuances, or suddenly be shaken by the most stirring musical crescendo, with a total sense of realism.

Recommended as an ideal partner for this player is an amplifier such as the JVC AX-A341. Providing up to 85 watts per channel, there's also a 'CD Direct' switch to make sure your ears receive the ultimate in sound purity.

Completing the line-up is a range of matching tuners, cassette decks, and other hi-fi separates. Each component, a polished performer in its own right. Together with the right partner, definitely a class act.

# JVC

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**LINN**



**MOST HI-FI SYSTEMS**



**LINN HI-FI SYSTEM**

**N**ine years on and the little silver disc continues to erase the conventional vinyl LP from the mass market. For though the cost of the discs themselves seems hardly to have budged, the price of the players themselves has tumbled year after year. Now it is possible to choose from a clutch of perfectly adequate players that cost no more than £130, less than the price of a dozen discs.

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

In the short term players will not become appreciably cheaper. Instead the technology and facilities available at each existing price point will be steadily upgraded. After all, below a certain point it is the exorbitant cost of the discs themselves - and not the

tom File memory. Kenwood and Yamaha also offer this facility on some of their players.

Build quality also takes an upturn as you progress from the budget £160-£200 models to those pitched at £250 or more. Plastic mouldings are replaced by alloy panels just as the casework is reinforced with extra struts and substantial metalwork. This together with separate mains transformers for the digital and analogue circuits and beefier CD transport mechanisms can increase the weight of the player several times over. So they 'feel' like good value even if, in reality, the less substantial players are no less reliable.

Nevertheless there's no doubting the pride of ownership that stems from a chunky flagship player, the sort of player that performs every function with slick efficiency and cannot help but ooze class at every opportunity.

### Fording the Bitstream

But what about technology? You might expect that paying more will take you further down the technological path. In fact the last couple of years has witnessed profound changes in the digital gubbins at the heart of every CD player, but so sweeping have been these changes that almost every new player - whether it costs £130 or £500 - will have been touched.

This technological innovation comes under the heading of bitstream, a swift little revolution that has heralded the most fundamental change in the way CD players actually process the digital data since the format was originally introduced. It has been a quiet but wholesale revolution, influencing the technical and subjective performance of the player without disrupting the layout or range of controls that are on offer.

Bitstream is all about converting the CD's digital data back into recognisable music. At one time CD players used multibit Digital-to-Analogue Converters (DACs) to do the job but these chips were often rather inaccurate at low-levels, they produced unwanted spikes called glitches and suffered from hiccups like zero-cross distortion. The new generation of bitstream DACs overcome these problems by reducing the large 16-bit digital numbers into smaller packets of four bits or less.

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

Most importantly, however, you need not fret over the relative compatibility of different CD players. Regardless of the technology housed within each and every machine they must still conform to certain agreed standards. So every CD player will play the standard 12cm silver (or gold) disc, will offer the same basic track skip, pause and stop facilities. On a final note, never connect a CD player to an input market 'phono' or 'disc' on your amp but choose instead any line-level connection such as aux, tuner, tape or, indeed, one marked specifically for CD.

## Choosing and Using ... CD Players

*Paul Miller offers helpful advice to those looking to invest in a CD player and explains what you should look for when changing over to the digital medium.*

price of the player - that prevents our first time buyer from taking a dip in digital waters.

### What to expect

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

If features are a real priority then look to machines from Sony and Technics, particularly the former who pride themselves in developing ever more comprehensive facilities. Have you ever noticed how some tracks count down from -2secs to -1secs before the music starts? Well the latest Sony players are equipped with an auto-cue facility that takes you directly to the beginning of the music rather than the nominal start point of the track! Heaven knows what they'll come up with next.

Of course the bigger players are graced with appropriately grand facilities including expansive non-volatile memories used to recognise favourite tracks from many tens or hundreds of different CDs. Philips started the ball rolling with FTS (Favourite Track selection) while Sony followed suit with their Cus-



# Aiwa XC-700

**Best Buy**

AIWA (UK) LTD, UNIT 5, HEATHROW SUMMIT CENTRE, SKYPORT DRIVE, WEST DRAYTON, MIDDLESEX, UB7 0LY. TEL: (081) 897 7000



Never judge a book by its cover. Or for that matter, never judge a CD player by its fascia. The XC-700 puts a busy enough face on the world with its centralised drawer flanked by a myriad different buttons, but it looks rather anonymous. It's fiddly too, with a direct access keypad crowded together with various programming options.

There's even a 'cal tone' facility to help set tape deck record levels while a further row of keys cater for peak and index search, random and repeat play modes. Construction is pretty lightweight, the carcass containing 90 per cent air, but that's not all you'll find lurking within the XC-700.

Remarkably Aiwa has found the funds to accommodate a Philips BitStream DAC. Not the original SAA7320 used by Rotel and Kelvin. Nor even the common-or-garden SAA7321 that Philips and Marantz use in their £200+ players. Instead Aiwa has gone completely bananas and included Philips' so-called BS DAC, the SAA7350 that companies like Deltec and Meridian use in their state-of-the-art convertors!

For Aiwa to offer one of the first integrated CD players with Philips' top-of-the-line PDM DAC is remarkable enough, but to do so at £180 it seems almost impossible to believe.

## Lab Report

The performance of this player is not strictly comparable with other PDM players in this test because the SAA7350 DAC has its own, individual foibles. For instance the S/N ratio is up by a good 6dB but linearity, in this case at least, is only just acceptable. Also, this DAC uses 3rd- rather than 2nd-order noise-shaping, together with stylised analogue filtering, which is responsible for the flatter ultrasonic noise 'curve' seen on the -70dB plot.

The choice of analogue op-amps

influences the 3D plot because these are responsible for the strongish 2nd harmonic (typically 0.0045-0.02 per cent). Furthermore, all stop-band images (the V-shaped patterns) are caused by the eight times oversampling filter (NPC SM5840), showing closer resemblance to the Denon DCD-2560 and Kenwood DP-4030 CD players. The mild 0.25dB frequency response droop isn't likely to be audible.

## Sound Quality

There's no disguising the fact that this player was greeted with rapturous enthusiasm by all members of the listening panel. At the time I thought their reaction a little too eager, but I hadn't then discovered the secret of Aiwa's black box. Either way it goes to show the danger of having any preconceived notions about a product, however innocent they might seem at the time.

Freed from any such prejudice, the listeners thought the sound neither too forward nor dynamic, but fundamentally very 'natural', gently drawing them into the flow of the music. With no undue emphasis or bias towards any part of the musical spectrum, the sound of individual instruments was allowed to swell and die away in a fashion that seemed utterly natural and effortless. A sense of space, fluidity and ease permeated the width and depth of the soundstage, winking out subtle tonal details that might otherwise have been concealed.

Both the synthesised and acoustic bass underpinning our pop and jazz selections shared a fulsome and resonance that brought weight and substance into the music without spilling over and muddling more delicate details. In all it's an enviable performance for any player, let alone one costing £170.

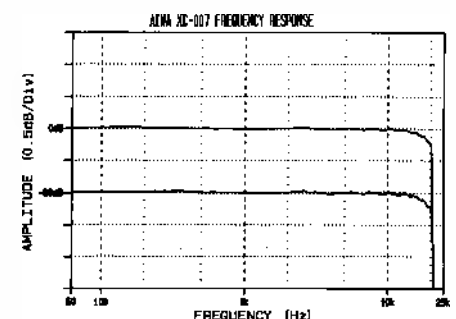
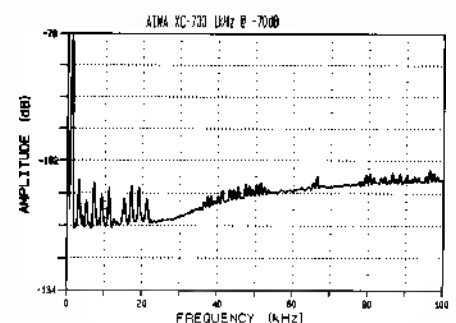
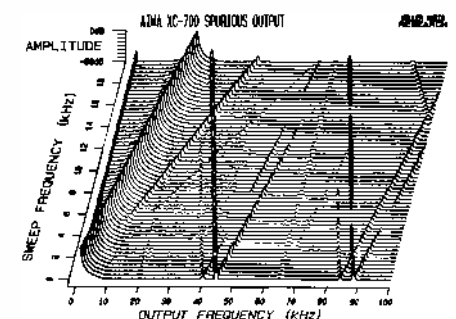
## Conclusion

The XC-700 was the biggest surprise of the entire test - not even Aiwa or its agents

in this country had any notion of its hidden technology! A £170 player equipped with Philips top Bit Stream DAC plus every feature under the sun seems almost too good to be true. The fact that it happens to sound bloody marvellous is merely incidental, ho ho. But seriously folks, this is the cream of Best Buys.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.04dB	0.04dB	0.11dB
Channel Separation	102.6dB	105.4dB	83.2dB
THD vs Level, 0dB	-89.6dB	-86.9dB	-73.6dB
	-30dB	-73.4dB	-71.8dB
	-60dB	-44.7dB	-42.0dB
	-80dB	-23.9dB	-21.8dB
Dithered	-90dB	-13.8dB	-13.0dB
Resolution @ -60dB		+0.04dB	+0.03dB
	-80dB	+0.63dB	+0.46dB
	-90dB	+1.63dB	+1.20dB
	-95dB	+1.59dB	0.13dB
	-100dB	+1.54dB	
Peak Output Level, L			2.294V
			2.283V
Output Impedance			981ohms
CCIR IMD, 0dB			-86.5dB
Suppression of stop-band IMD			61.0dB
De-emphasis Accuracy, 1kHz+			0.01dB
			+0.02dB
			+0.06dB
S/N Ratio (A-wtd), w/o emp			105.7dB
			105.4dB
Track Access Time (99)			4.5secs
Typical Retail Price			£180



# Marantz CD-52

MARANTZ HI-FI (UK) LTD, KINGSBRIDGE HOUSE, PADBURY OAKS, 575-583 BATH ROAD, LONGFORD, MIDDLESEX UB7 0EH. TEL: (0753) 680 868

**Best Buy**



Up until now bitstream has been avoided by Marantz. But all that's about to change with this new and trend-setting budget player. The £200 CD-52 is actually one of three new players that all share the same basic circuit design, leaving the CD-62 as an odd-man out in the current range.

Marantz has also taken the trouble to re-style these new players, though the bulbous plastic fascia and contoured drawer of the CD-52 seem to me hardly an improvement on their earlier designs. I also find it irksome having to push the drawer in order to load a CD - why couldn't Marantz duplicate the open/close button found on the remote?

Still, the player is otherwise well equipped, offering no less than two FTS memories, a switchable digital output, full repeat, random and program play modes plus direct track access and tape edit. There's no index cueing nor a variable output, though the headphones socket does have its own manual volume control. If the fluorescent blue display looks familiar, that's because Marantz has pinched it from Philips' latest 6 series players.

## Lab report

In contrast with the CD-62, the CD-52 employs an NPC eight times oversampling filter ahead of the SAA7350 DAC. So, though the overall rate remains unchanged at 256 times, this does mean it has avoided the frequency response ripples while also improving the stop-band rejection from a poor 55dB to a slightly less poor 61dB. There's no real improvement in the 100dB signal-to-noise ratio while linearity has taken a downturn with errors of nearly 5dB below -90dB. This is a very disappointing result for the SAA7350 DAC.

Unfortunately the CD-52 also suffers from the same potentially damning levels of ultrasonic noise produced by the CD-62, Arcam Delta 70.3, Philips CD850MkII

and any other player using this DAC at 256 times rather than 384 times oversampling. This is obvious both from the 1kHz/-70dB and 3D plots, while pushing up nominal low-level high frequency distortion beyond 100 per cent.

## Sound quality

Having built this player from the ground up, Marantz enjoyed far greater flexibility in engineering its sound than it did with, say, the CD-62. This is reflected in the mellow and decidedly euphonic character, a warmth and richness of tone which filtered through regardless of our selection of music.

On this occasion Mary Black's voice with its sweet, almost husky tone and solidly focused, genuinely believable image had a marked impact on our panel. By the same token our listeners thought its embellishment of strings from the Pachelbel selection was far from neutral, even if the rhythmic interplay between the cellos, violins and harp was beautifully depicted. Technically it is flawed, but on an emotional level it really seems to hit the mark.

There is a veritable pool of richness, a velvety depth that's regularly drawn upon by this player to give the music as much impact as possible. This was particularly evident with our Marty Paich CD where the sax, trumpet and vibes leapt from the speakers with a solid and purposeful sound, not loose or blousy but tactile and confident.

## Conclusion

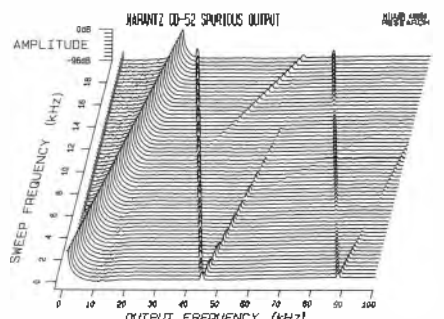
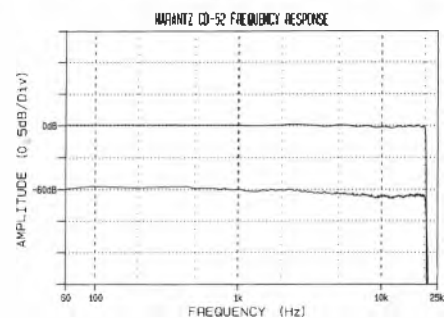
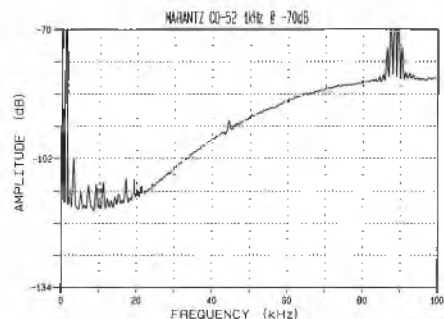
A hearty, full-blooded 'warts and all' presentation, commented one listener who applauded the CD-52 for 'really having a go'.

It doesn't take a genius to realise that Marantz is attempting to recreate the full and gutsy sound of its earlier 16-bit players with the CD-52. And if this player is representative of the up-and-coming CD-

42 and CD-72, Marantz is not only on the right track but can look forward to grasping the reins in the vanguard of the bitstream bandwagon.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.05dB	0.06dB	0.03dB
Channel Separation	108.6dB	106.3dB	87.4dB
THD vs Level, 0dB	-94.7dB	-96.8dB	-70.6dB
-30dB	-72.3dB	-75.0dB	-48.8dB
-60dB	-38.4dB	-42.5dB	-18.6dB
-80dB	-20.5dB	-25.7dB	+1.45dB
Dithered, -90dB	-19.5dB	-10.7dB	+9.95dB
Resolution @ -60dB		+0.10dB	+0.01dB
-80dB		+1.24dB	+0.33dB
-90dB		+3.56dB	+0.65dB
-95dB		+4.95dB	+3.45dB
-100dB		+4.75dB	
Peak Output Level, L		2.226V	
R		2.211V	
Relative Output Level		+0.90dB	
Output Impedance		207ohm	
Radio Frequency Spurious	19.2mV @ 22.6MHz/113MHz		
1Hz Noise Modulation			+5.5dB
CCIR IMD, 0dB			-95.2dB
Suppression of stop-band IMD			61.4dB
De-emphasis Accuracy, 1kHz			0.00dB
5kHz			+0.01dB
16kHz			-0.01dB
S/N Ratio (A-wtd, w emp, 0LSB			103.6dB
w/o emp, 0LSB			103.3dB
w/o emp, 1LSB			100.5dB
Digital Output			Coaxial
Crystal Clock Accuracy			+45ppm
Track Access Time (99)			4.1secs
Typical Retail Price			£200





We have always said that we would not make a CD player until we could make one that sounded as good as the best analogue turntables.

## The Naim CDS



# NAD 5425

NAD MARKETING LTD, ADASTRA HOUSE, 401-405 NETHER STREET,  
LONDON N3 1QG. TEL: (081) 349 4034

**Best Buy**



Flushed with the success of the 5440 and 5000, its first fully-fledged low-bit players, NAD has channelled its knowhow into a pair of cheaper players. The £200 5425 is distinguished from the £170 5420 by its slim, 7-key remote control, though neither player exactly bristles with features. They offer only basic programming, repeat, track skip and scan.

The 5425 really scores in terms of sound quality. It uses the same MN6471 MASH/PWM DAC that NAD first employed in the 5440 player but assembly has moved from Singapore to Taiwan to cut down on overheads. Costs have also been reduced by trimming off 'luxury' features like CDR, variable and digital outputs while employing a simpler back-lit LC display instead of the fluorescent panel used on the 5440.

What savings have been made have been used to maximise the quality of the player's power supply, digital and analogue electronics. Separate series-shunt regulators are employed for L and R channels, while RF decoupling and circuit layout have been further optimised. High quality Signetics NE5532N op-amps are retained in the buffer and analogue filter stages, which, as in the 5440, curtail all RF noise emanating from the DAC.

## Lab Report

The effect of this five-pole filter is most noticeable on the 1kHz/-70dB plot where the usual increase in ultrasonic quantisation noise is abruptly curtailed above 40kHz.

This filter action continues well into the RF region (nominally above 1MHz) where the 5425 is singularly free of such interference. Evidence of early filtering is also seen in the 0.4dB droop at 20kHz, though, more importantly, the -60dB response curve reveals a break in linearity around 10.5kHz.

Other players using this same MN6471 PWM DAC show a similar disruption

here, along with a near-identical 3D 'fingerprint'. Still, the final low-level resolution displayed by the 5425 remains spot-on target.

## Sound quality

Along with just one or two other players in this review group, the 5425 went down a storm. The panel was unanimous in its applause for the very sonorous, purposeful and involving sound. It possesses such a marvellous sense of depth, a spaciousness that holds true even when faced with the resonant impact of the drums from Holst's *March*. It even resolved the interplay between woodwind and brass while preserving the massive dynamic contrasts that occur simultaneously.

These counterpoints were further highlighted by an ability to present the subtlest tonal features of each instrument - a combination of finesse and absolute control. Few players tread the line between excitement and brashness with equal fortune, for the 5425 even makes the 5440 sound a little too reserved and cautious.

Simpler tracks also benefit from this open and lively attitude, percussive brushwork of the pop tracks being resolved as capably as the brassy rasp of sax from our jazz CD. This player is always richly detailed and has a real grip on individual instruments. It's a delightful and convincing sound that draws the listener into the realm of the music rather than providing what amounts to a merely superficial veneer.

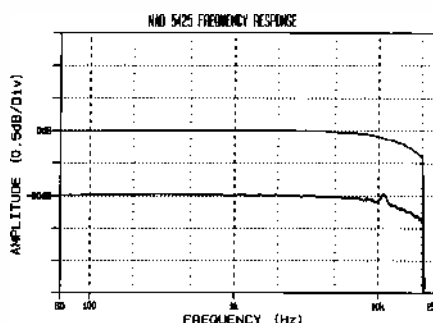
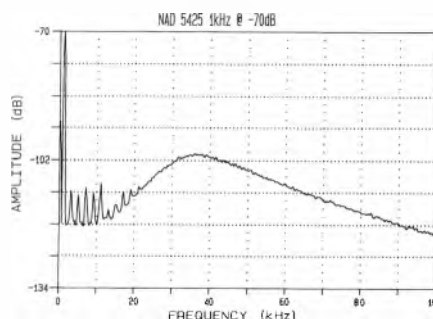
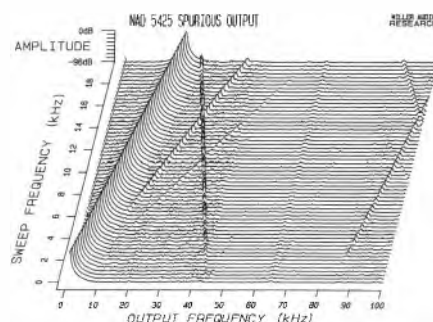
## Conclusion

NAD's new cheapie is a real cracker. It may have all the stylistic flair of a Lego brick but this has no effect on its enthusiasm for playing music. Genuinely convincing music that lives and breathes! If features have a low priority then NAD's remote-less 5420 could turn out to be something of a mega-bargain at just £170;

even at £200, the 5425 is still a sure-fire Best Buy.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.03dB	0.04dB	0.04dB
Channel Separation	117.3dB	108.0dB	86.3dB
THD vs Level, 0dB	-108.5dB	-105.3dB	-80.2dB
-30dB	-82.5dB	-77.0dB	-64.8dB
-60dB	-53.4dB	-50.5dB	-39.2dB
-80dB	-25.3dB	-28.2dB	-18.8dB
Dithered -90dB	-17.9dB	-18.4dB	-11.5dB
Resolution @ -60dB		+0.01dB	0.00dB
-80dB		-0.08dB	-0.01dB
-90dB		+0.14dB	+0.58dB
-95dB		+0.05dB	-4.38dB
-100dB		+0.01dB	
Peak Output Level, L			2.205V
R			2.194V
Output Impedance			115ohm
Radio Frequency Spurious			<1mV broadband
CCR IMD, 0dB			-95.8dB
Suppression of stop-band IMD			81.3dB
De-emphasis Accuracy, 1kHz			0.00dB
5kHz			-0.03dB
16kHz			-0.20dB
S/N Ratio (A-wtd), w/o emp			105.7dB
w emp			110.5dB
Track Access Time (99)			3.2secs
Typical Retail Price			£200





# Pioneer PD-8700

PIONEER HIGH FIDELITY (GB) LTD, 1-6 FIELD WAY, GREENTORD,  
MIDDLESEX UB6 8UZ. TEL: (081) 575 5757

**Best Buy**



Surely the only differences between a PD-8700 and a PD-7700 are a couple of index skip and auto-fader controls, a timer facility, display 'off' and motorised volume control? Er, no. Because Pioneer has re-equipped this player with separate mains transformers for the digital and analogue circuits, while also isolating the two PD2026A DACs and analogue filter stages up onto a separate PCB.

So, even if the PD-8700 offers little advantage in terms of convenience, these internal revisions have a profound impact on its sound quality. Of course the wealth of widgets that litter the black alloy fascia do little to enhance Pioneer's 'audiophile' pretension. Nevertheless, a pat on the back is deserved for developing its own PDM bitstream DAC. Like Philips' 7320 and 7350 series this is a true 1-bit device, though the use of second order noise-shaping at an elevated 384 times oversampling is closer in execution to Yamaha's rather than Philips' latest devices.

## Lab report

With two stereo PDM DACs operating in differential mode, an improved audio network and isolated power supplies, the PD-8700 stretches the performance of the PD-7700 in several key areas. For a start, THD is lower, especially at high frequencies where there is also some cancellation of ultrasonic quantisation noise (see -70dB plot). 20kHz Distortion from -30dB to -90dB is consistently 10dB better (3.2:1) than that of the PD-7700, itself no mean achiever in this regard.

Stop-band rejection is unchanged because the integral 384 times upsampler is simply not as effective as, say, dedicated filters like the Sony CXD1244. Nevertheless there is a slight improvement in the 'real' signal-to-noise ratio of 103dB though, judging by the 0LSB figures of 123-124dB, these PDM DACs also use a 'cheat mode' which switches them off

during measurement.

Linearity is just great, with maximum errors of 0.7dB across the entire band (0 to -100dB); channel separation is fantastic and 1Hz noise mod suitably quashed to just +1.3dB. Gripes? Yes, Pioneer should pay closer attention to the tolerance of its crystals. A +218 to +235ppm error pushes it deep into shoddy Class Two territory.

## Sound quality

In spite of my token winge, unanimous praise greeted this player as its thoroughly natural, transparent and engaging sound was voted the best of the day. The midband is especially open and three dimensional, bringing a wonderful sense of solidity and scale to all forms of music. The sheer presence of Mary Black's voice was uncanny, precise and intimately articulate.

This forward but big and inviting sound will build upon the natural acoustic of even the simplest recordings, filling the room with bubbling, sparkling music. Dynamics are handled in an equally engaging fashion, bringing a new dimension to the brass on our jazz track just as Chris Rea's voice seemed to ooze immediacy and character. The music propels the guttural weight and power of Rea's vocals with an enthusiasm that makes other players seem positively lacklustre.

The balance, spaciousness and integration of the strings from Pachelbel's Canon was also quite superb, captivating our listeners. Still, there was some dissension over the quality of the bass, for though there was certainly enough of it, not all were convinced of its control or focus. But what do you expect for £300? Perfection?

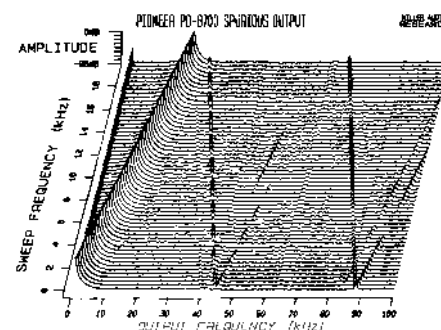
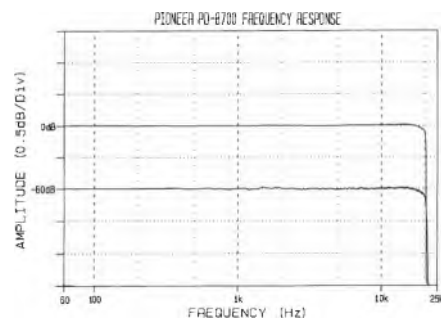
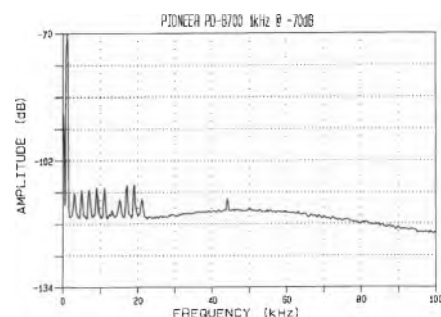
## Conclusion

Along with Rotel's new player, this clumsy-looking bitstreamer from Pioneer looks set to stomp all over the competition. The PD-8700 may not be as pithy as the PD-7700 nor as uniform as the RCD-965BX but, like the very best PDM play-

ers, it has the ability to reach out and send shivers down your spine.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.05dB	0.06dB	0.10dB
Channel Separation	149.4dB	137.5dB	107.4dB
THD vs Level, 0dB	-100.3dB	-100.1dB	-90.5dB
-30dB	-94.6dB	-82.4dB	-78.5dB
-60dB	-56.2dB	-53.8dB	-51.0dB
-80dB	-28.3dB	-32.7dB	-30.7dB
-90dB	-18.6dB	-22.3dB	-20.1dB
Dithered, Resolution @ -60dB	0.00dB	0.02dB	-0.02dB
-80dB	-0.12dB	-0.13dB	
-90dB	-0.54dB	-0.71dB	
-95dB	-0.58dB	-0.50dB	
100dB	-0.20dB		
Peak Output Level, L	2.359V		
R	2.343V		
Relative Output Level	+1.40dB		
Output Impedance	1.063kohm		
Radio Frequency Spurious	<1mV	broadband	
1Hz Noise Modulation		+1.3dB	
CCIR IMD, 0dB		-95.7dB	
Suppression of stop-band IMD		63.7dB	
De-emphasis Accuracy, 1kHz		+0.01dB	
5kHz		+0.01dB	
16kHz		-0.01dB	
S/N Ratio (A-wtd), w emp, 0LSB		123.6dB	
w/o emp, 0LSB		124.2dB	
w/o emp, 1LSB		102.6dB	
Digital Output		Optical	
Crystal Clock Accuracy		+217.5ppm	
Track Access Time (99)		4.5secs	
Typical Retail Price		£300	



# Rotel RCD-965BX

GAMEPATH, 25 HEATHFIELD, STACEY BUSHES,  
MILTON KEYNES MK12 6HR. TEL: (0908) 317 707

**Best Buy**



Rotel's original RCD-865 whipped up a storm, especially from Philips which was a trifled miffed at someone else pipping it to the post with its own technology! And then there were the golden-eared reviewers who thought bitstream would never amount to much anyway.

We know better now of course, and so do the UK arm of Rotel which has spent the intervening two years working on its replacement - the RCD-965BX. Visually it's hardly a departure from the original, though the satin-black alloy fascia with its clear fluorescent display is a little softer on the eye. Extra features include index skipping which joins traditional trackskip, search, repeat, random and program play options. There's a new slimline remote too, an attractive little handset that adds direct track access to the tally of widgets.

Inside it's all change with Philips' new SAA7323 PDM DAC replacing the SAA7320 used before. The 7320 family are all single-ended DACs using a total of 256 times oversampling and second order noise-shaping. Nevertheless the SAA7323, with its 352kHz dither, is much closer in execution to the 7320 than the intermediate 7321.

Meanwhile Rotel has a completely new and wholly symmetrical board layout for this combination of SAA7310 decoder, SAA7323 DAC and analogue filter.

## Lab report

This player conforms to accepted standards with a nominal 2V output, though its performance elsewhere is still far from conventional. In particular although the SAA7323 DAC avoids the sporadic high-level idle tones of the SAA7320, various fixed signals, including the CLV reference tone of 7.35kHz, are still present. This drone is visible on the -70dB plot and, naturally enough, compromises the signal-to-noise ratio to the tune of about 5dB or so.

Meanwhile the 3D plot highlights the

third and fifth harmonic distortions that mark the 7320 family while extended hum products can be seen to influence the player's frequency response at low levels. Interestingly, the new 1Hz noise modulation test reveals the 965BX to be the least affected of the group even if figures for linearity and stop-band rejection are far from state of the art.

## Sound quality

There was no mistaking the calibre of this player, which was greeted with unanimous applause from our panel. Yet if one over-riding feature of its sound struck our listeners, other than its generally engaging character of course, then this was its sheer poise and elegance in handling all percussive sounds. Whether it was the lone cymbal from Mary Black's *Columbus*, the harpsichord from Pachelbel's *Canon*, or the vibes and percussion from Marty Paich, all possessed an uncommon delicacy and clarity.

This sense of control and integration of even the most complex passages seems almost intuitive, for though the music has a comfortable 'at home' feel, the overall presentation is far from over-civilised or dusty. Our listeners complimented the player for its bubbly but incredibly refined performance, the music sparkling with enthusiasm and vitality but always tempered with a remarkably realistic sense of proportion.

More importantly, although our listeners were duly impressed with its technical proficiency, they were utterly transfixed by the sheer conviction and passion of the music itself.

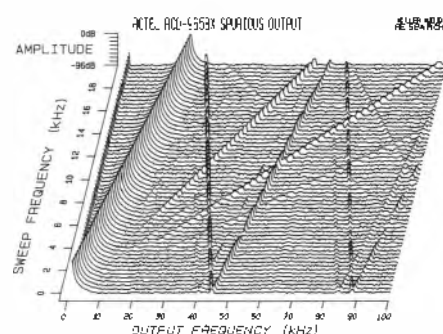
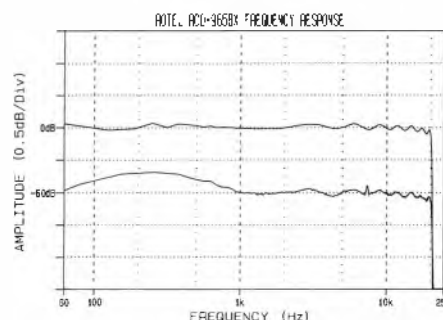
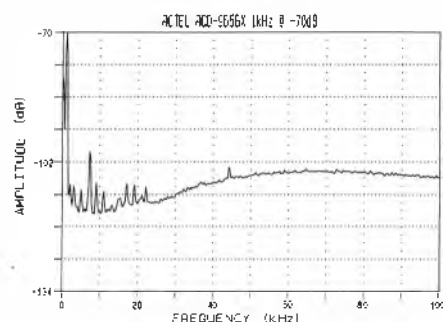
## Conclusion

Every group test has its star performer and, this time around, it's Rotel that carries home the honours. The RCD-965BX is a shrewdly balanced player, equipped with a sensible range of facilities, solidly built and engineered to produce the sort

of sound that many high-end products wouldn't have a hope of achieving. This is a Best Buy with knobs on.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.01dB	0.01dB	0.00dB
Channel Separation	92.6dB	101.4dB	96.4dB
THD vs Level, 0dB	-95.5dB	-93.6dB	-70.8dB
-30dB	-79.1dB	-76.7dB	-66.6dB
-60dB	-51.4dB	-47.6dB	-40.1dB
-80dB	-24.2dB	-24.0dB	-17.6dB
Dithered, -90dB	-4.95dB	-11.2dB	-6.25dB
Resolution @ -60dB		-0.07dB	-0.08dB
-80dB		-0.60dB	-0.83dB
-90dB		-3.52dB	-3.85dB
-95dB		-1.62dB	+0.95dB
-100dB		-1.05dB	
Peak Output Level, L		2.075V	
R		2.077V	
Relative Output Level		+0.32dB	
Output Impedance		208ohm	
Radio Frequency Spurious		2.1mV @ 11.3MHz	
1Hz Noise Modulation		+0.91dB	
CCIR IMD, 0dB		-95.5dB	
Suppression of stop-band IMD		55.2dB	
De-emphasis Accuracy, 1kHz		-0.04dB	
5kHz		0.00dB	
16kHz		-0.01dB	
S/N Ratio (A-wtd), w emp, 0LSB		94.3dB	
w/o emp, 0LSB		93.1dB	
w/o emp, 1LSB		93.6dB	
Digital Output		Coaxial	
Crystal Clock Accuracy		+8.8ppm	
Track Access Time (99)		3secs	
Typical Retail Price		£300	





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
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# Technics SL-PG200A

PANASONIC UK, WILLOUGHBY ROAD, BRACKNELL, BERKS, RG12 4FP. TEL: (0344) 853 157

**Best Buy**



Replacing an existing and well-received player like the *SL-P277A* might seem a trifle risky. But in the event there's no need to worry, because the new *SL-PG200A* turns out to be a real cracker - packed with widgets and armed with a sound to challenge the very best below £200.

In fact this player looks pretty similar to its predecessor, the slim bronze fascia occupied by a multi-function fluorescent display and a bank of peripheral features that include comprehensive tape edit, disc link and time fade options. In fact the *SL-PG200A* is bedecked with every facility that graced its predecessor plus, in this instance, a new peak search option.

Even the comprehensive remote is retained and extra space made available for - yep, you guessed it - a peak search button. Either way, with features like a 12dB digital volume control, direct track access, various repeat, random and program play modes, the *SL-PG200A* is one tough cookie to beat. Technics has even opted for Philips' CDM4 transport mechanism once again, a decision that saves it money on this European-built model while giving the remainder of the digital electronics something of a head start.

## Lab report

The *SL-PG200A* is also equipped with Technics' *MN6474* bitstream DAC, an IC that contains two oversampling filters (amounting to 32 times) followed by partial truncation to 3.5 bits, third order MASH and four PWM DACs operating in differential mode. Got that? Good, because this strategy results in very low THD figures (typically 0.0085 per cent at -30dB and just 0.21 per cent at -60dB) in addition to a resolution that holds to 0.25dB limits all the way down to -100dB. A pity, then, that third order IMD increases to -63dB.

The peculiar dip at 11kHz in the -60dB response is also a feature of the *MN6471* /

6474 family as is the partial streak of stop-band noise (81dB down on 3D plot). This chip produces a lot of ultrasonic quantisation noise, though Technics' analogue filter is still very effective (see -70dB plot). Noise modulation is also very low (+2.2dB) but Technics has been caught cheating on the signal-to-noise test; just look at the difference between the 0LSB and 1LSB offset results.

## Sound quality

Mellow, delicate and thoroughly engaging - that's the initial and lasting impression of our panel. And though it's not an aggressive or forward-sounding unit, neither is it flat or overly-civilised. Instead its music possesses a very natural balance, a fluidity and smoothness that keeps everything bobbing along in the most beguiling fashion.

A rash of compliments greeted the conclusion to our Mary Black selection which sounded beautifully open, transparent and airy. Furthermore, it seemed full of the kind of subtle detail easily missed by other, far costlier players. The delicate patter of percussion was especially alive and vibrant, drawing out the natural brightness of the music without introducing any artificial spotlight of its own.

Still, the sound was mildly less convincing with the busier and raucous tone of Chris Rea's voice, tending to sound a little lighter in weight and impact than perhaps it should. However, only two listeners thought it less involving here while a total of five others consistently voted it a 'genuine cracker' on two separate occasions.

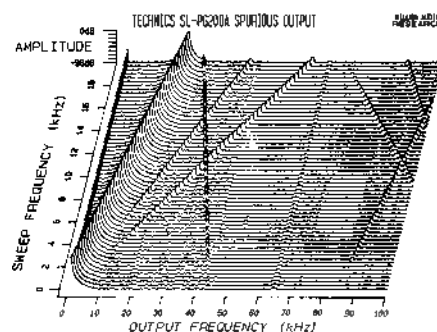
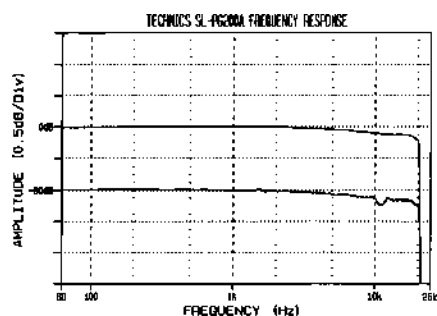
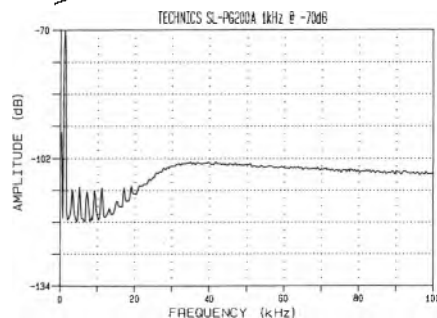
## Conclusion

Technics has simply plonked the old player in a slightly updated box, added one extra feature and, Kato's-your-uncle, the *SL-P277A* lives on to fight another day. Nowadays of course it's called the *SL-PG200A*. Our panel knew nothing of

this intriguing situation, but when informed of the retail price announced that Technics was giving it away. And who am I to disagree? So let's give it an unreserved Best Buy.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.07dB	0.08dB	0.22dB
Channel Separation	103.4dB	102.5dB	60.7dB
THD vs Level, 0dB	-97.1dB	-97.3dB	-74.3dB
-30dB	-85.7dB	-81.4dB	-64.9dB
-60dB	-56.0dB	-53.5dB	-38.2dB
-80dB	-28.3dB	-32.7dB	-18.5dB
Dithered, -90dB	-17.5dB	-21.9dB	-8.55dB
Resolution @ -60dB		+0.01dB	+0.15dB
-80dB		+0.02dB	+0.04dB
-90dB		-0.17dB	-0.55dB
-95dB		+0.30dB	-1.50dB
-100dB		+0.25dB	
Peak Output Level, L		2.087V	
R		2.105V	
Relative Output Level		+0.41dB	
Output Impedance		784ohm	
Radio Frequency Spurious		4.2mV @ 28MHz	
1Hz Noise Modulation		+2.2dB	
CCIR IMD, 0dB		-85.7dB	
Suppression of stop-band IMD		81.3dB	
De-emphasis Accuracy, 1kHz		0.00dB	
5kHz		+0.01dB	
16kHz		+0.02dB	
S/N Ratio (A-wtd), w emp, 0LSB		111.9dB	
w/o emp, 0LSB		108.4dB	
w/o emp, 1LSB		101.3dB	
Digital Output		None	
Crystal Clock Accuracy		+2.5ppm	
Track Access Time (99)		2.9secs	
Typical Retail Price		£160	





# Acoustic Research CD-07

ACOUSTIC RESEARCH LTD, ALEXANDRA STREET, HYDE,  
CHESHIRE SK14 1DY. TEL: (061) 367 8871



Not long after our review of Acoustic Research's *CD-06SE* in issue 95, that model was replaced by the new £300 *CD-07*. This player bears all the visual hallmarks of other AR separates, with its sloping satin-black fascia and large disc-like control, but has been made especially elegant by transferring every function except play and load to a matching remote control.

This handset will also fire-up various tuner, tape and amp functions, so don't get the buttons confused. Furthermore, if you lose or damage the remote you'll find that operation of the player is severely restricted. Otherwise it's a doddle to use.

The CD mechanism is a more recent CDM4 item from Philips, though the guts of the player come courtesy of Rotel's OEM division. This might be Acoustic Research's first venture into bitstream territory but the player itself is actually taken from Rotel's second model, the *RCD-865BX*.

We never saw the *865BX* in this country, still there's plenty here to keep the enthusiasts happy with plantations of BGF electrolytics and quality Raytheon op-amps making up the analogue output stage.

## Lab report

AR's player uses the same SAA7321 PDM DAC in a very similar application to both the Philips *CD618* and Micromega *Logic*, hence the directly comparable 3D 'fingerprints' with their rippled stopband images (the V-patterns) and dominant third/fifth order harmonics. The -70dB/1kHz plots are very similar too, though the proprietary filtering has reduced ultrasonic quantisation noise by a further 6-8dB.

The DAC is deployed in single-ended mode so neither linearity nor signal-to-noise ratio are optimised: values of 97-98dB are a good 10dB behind the best bitstream players. The ripple in the fre-

quency response is also a function of the SAA7321 or, more correctly, its integral four times FIR filter. The rippling seems enhanced on the -60dB response though this is unlikely to have much subjective impact.

## Sound quality

Our listeners quickly linked the sound of this player with both the *CD618* and Micromega *Logic*, players that employ the same basic technology and which were heard earlier on the same day. This sound was distinguished by its crisp and dynamic bass quality which was solid, lilting and rhythmic if not especially full or heavy.

In tonal and dynamic terms the player seems very even-handed, though our panel did suggest it could sound a little pinched on strings, just as it lacked the full resonant chestiness with our Chris Rea selection.

Nevertheless, the overall presentation was very likeable and civilised. There is the faintest loss of high frequency detail and low-level ambient information, but this is certainly not sufficient to take the edge off the sound.

The stereo imaging was also a touch suspect at times, compromising the stability of central performers as well as its front-to-back resolution. Easy listening, the panel thought, but not the most thrilling player ever devised.

## Conclusion

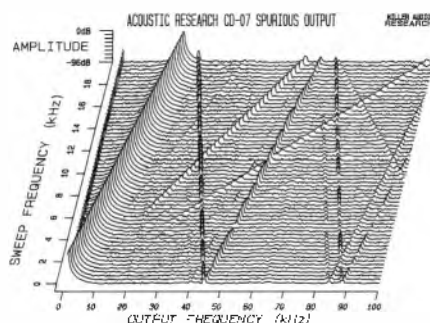
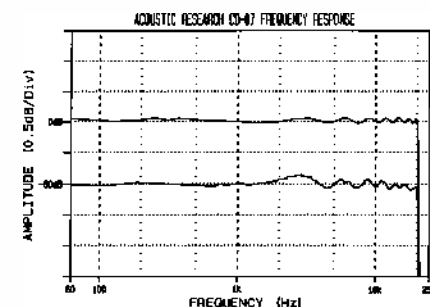
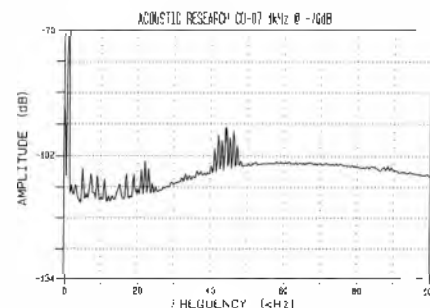
In this instance AR has bought in a tried-and-tested model from elsewhere, and the *CD-07* is clearly superior to either the *CD-06* or *CD-06SE*.

Its slightly vague imagery and easy-going demeanour may limit its competitiveness but this is certainly a step in the right direction for Acoustic Research and is rewarded by a slightly tentative Recommendation.

**Recommended**

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.05dB	0.05dB	0.07dB
Channel Separation	85.5dB	87.2dB	82.6dB
THD vs Level, 0dB	-94.1dB	-94.1dB	-72.2dB
-30dB	-76.6dB	-67.7dB	-69.0dB
-60dB	-44.8dB	-45.2dB	-38.9dB
-80dB	-16.4dB	-24.0dB	-17.0dB
Dithered, -90dB	-4.75dB	-10.2dB	-4.45dB
Resolution @ -60dB		-0.03dB	-0.14dB
-80dB		-0.81dB	-1.31dB
-90dB		-1.56dB	-4.20dB
-95dB		-1.95dB	-0.30dB
-100dB		+0.55dB	
Peak Output Level, L		1.966V	
R		1.977V	
Relative Output Level		-0.13dB	
Output Impedance		204ohm	
Radio Frequency Spurious		<1 mVbroadband	
1Hz Noise Modulation		+4.9dB	
CCIR IMD, 0dB		-96.2dB	
Suppression of stop-band IMD		55.3dB	
De-emphasis Accuracy, 1kHz		0.00dB	
5kHz		+0.07dB	
16kHz		+0.16dB	
S/N Ratio (A-wtd), w emp, 0LSB		99.9dB	
w/o emp, 0LSB		97.7dB	
w/o emp, 1LSB		97.4dB	
Digital Output		Coaxial	
Crystal Clock Accuracy		-16.3ppm	
Track Access Time (99)		3secs	
Typical Retail Price		£300	



# Aiwa XC-900

AIWA (UK) LTD, UNIT 5, HEATHROW SUMMIT CENTRE, SKYPORT DRIVE, WEST DRAYTON, MIDDLESEX, UB7 0LY. TEL: (081) 897 7000

**Recommended**



The Aiwa XC-700 (see page 38) showed us the danger of having preconceived notions about a product. For here's a perfectly ordinary, lightweight player that quite unexpectedly stormed through to a Best Buy. It was only later when reducing the player to small piles of screws, wire and integrated circuits that I discovered the hidden secret: here was a sub-£200 player equipped with what was, at the time, Philips' top Bit Stream DAC.

So, with the benefit of hindsight, expectations for Aiwa's XC-900 were obviously running high. But what was that about preconceived notions? On the face of it this player looks like a tarted-up version of the XC-700, doubling-up the size of the direct access keypad and adding extras like a timer facility and motorised volume control for its headphone and variable outputs. (Odd this, because there's also a digital fader control built into the same circuit.)

The remote handset is that much bigger too, though this simply duplicates more of the features already available on the player itself. Speaking of which, you're faced with the same clumsy black plastic fascia, centralised drawer mechanism (with a fifth foot!) and rather cluttered fluorescent display.

## Lab report

As expected, the XC-900 uses the same combination of NPC eight times oversampling filter and Philips SAA7350 DAC as the XC-700. In fact the implementation is similar to Marantz's CD-52 though Aiwa has avoided the vast mountains of ultrasonic noise (see -70dB plot) by using a 16.9MHz clock and running the DAC at 384 times oversampling instead of 256 times.

However, compared to the XC-700, it's equally clear from the -70dB plot that audioband noise has deteriorated by about 8dB. Perhaps this ties in with the remarks made by our panel concerning low-level

ambient detail.

Otherwise the conventional THD and IMD measurements show that the XC-900 has a slight advantage over the XC-700, just as figures for linearity show the same constantly positive deviation.

Both the slight ripple on the frequency response and stop-band noise (the V-patterns) on the 3D plot are caused by the NPC filter, by the way.

## Sound quality

If the XC-700 was greeted with enthusiasm, then the XC-900 prompted little more than equanimity from our panel. One dissenter found it difficult to relax when listening to this player though his colleagues seemed more appreciative of its open, fairly dynamic and expressive character. The contrast between Mary Black's vocals and the accompanying guitar seemed realistic enough, the inherently dead sound of the guitar counterpointing the richer vibrancy of her voice.

Similarly, the Pachelbel baroque sounded light and pleasantly airy, but now some of the finer detail was masked by the more dominant character of the main strings. All the listeners then concurred that this loss of fine low-level detail and subtle ambience could be attributed to a certain constriction of stereo depth and shortening of perspective. So, the XC-900's music is not unpleasantly compressed but neither does it enjoy the fresh, immediate and engrossing quality of the cheaper XC-700.

## Conclusion

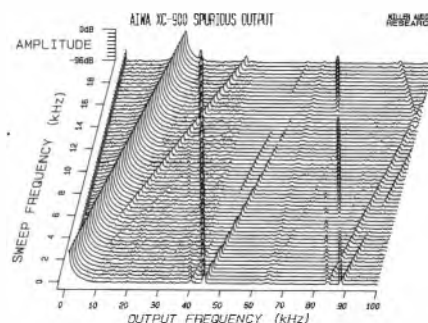
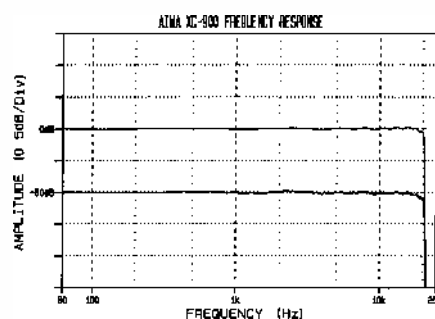
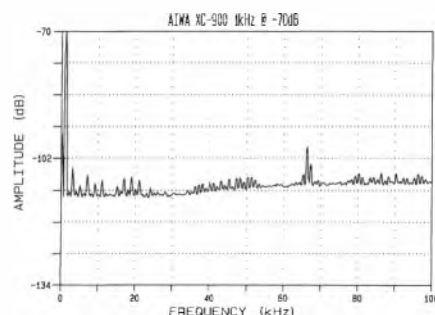
As we've found with amplifiers in the past, and are now discovering with CD players, instigating the slightest revisions to a basically sound product can often throw the whole thing out of kilter. So it is with Aiwa's XC-900, which sounds suspiciously like a strangled XC-700.

It's sufficiently well-equipped and free of nasties to it scrape a begrudging Rec-

ommendation, but, as I said in the introduction, you really shouldn't take anything for granted in this business.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.01dB	0.00dB	0.04dB
Channel Separation	105.9dB	107.2dB	87.6dB
THD vs Level, 0dB	-94.7dB	-92.0dB	-76.4dB
-30dB	-77.2dB	-73.5dB	-72.4dB
-60dB	-43.2dB	-43.3dB	-43.0dB
-80dB	-22.5dB	-26.3dB	-24.0dB
Dithered, -90dB	-17.8dB	-17.9dB	-15.2dB
Resolution @ -60dB		+0.05dB	+0.03dB
-80dB		+0.78dB	+0.48dB
-90dB		+1.78dB	+1.23dB
-95dB		+2.00dB	+4.25dB
-100dB		+2.45dB	
Peak Output Level, L	2.079V		
R	2.081V		
Relative Output Level	+0.34dB		
Output Impedance	953ohm		
Radio Frequency Spurious		1.9mV @ 17MHz	
1Hz Noise Modulation		+2.8dB	
CCIR IMD, 0dB		-98.6dB	
Suppression of stop-band IMD		61.8dB	
De-emphasis Accuracy, 1kHz		+0.01dB	
5kHz		+0.02dB	
16kHz		+0.02dB	
S/N Ratio (A-wtd), w emp, 0LSB		104.5dB	
w/o emp, 0LSB		104.2dB	
w/o emp, 1LSB		100.0dB	
Digital Output		Optical	
Crystal Clock Accuracy		-81.3ppm	
Track Access Time (99)		4.2secs	
Typical Retail Price		£209	





# Denon DCD-860

HAYDEN LABS LTD, HAYDEN HOUSE, CHILTERN HILL, CHALFONT  
ST PETER, BUCKS SL9 9EW. TEL: (0753) 888 447



Representing one of the last bastions of multi-bit technology, Denon's new *DCD-860* replaces the older *DCD-820* by offering various extra features. However, the internal strategy remains very similar, with two 18-bit DACs and eight times oversampling filter. Denon insists on referring to these as its own latest MSB-adjusted 'Super-Linear' DACs whereas they turn out to be Burr Brown *PCM61s*.

Once you strip away the hype this player seems to have a lot to offer. The slim black fascia is decorated with a fluorescent display covering track, index and time info, while a row of keys provide direct track access. The player also includes a Sony digital signal processor that enables the data rate to be manipulated in steps of 0.1 per cent, giving rise to the novel pitch control seen on the player's fascia; note that the digital output is defeated once this pitch control is brought into play.

Plenty of extra widgets are provided for the keen home-taper. Features such as auto space, peak search, programmable fade, time edit, pick and link will allow several CDs to be edited in succession. The remote handset offers random and repeat play options, together with full control over the variable output.

## Lab report

This beastie is relatively straightforward compared to many of Denon's CD players, though the performance of the eight times oversampling filter gives some cause for concern. This is responsible for the 0.15dB ripple seen on both 0dB and -60dB frequency responses, in addition to the swathe of stop-band intermodulation on the 3D plot. In fact rejection of 28dB stop Band is extremely poor and comparable to many budget players produced two or three years ago.

The linearity of the DACs is impressive enough, particularly at 20kHz where the -95dB error is just -1.5dB, a result far

better than that obtained with most low-bit convertors. Its multi-bit foundation is also revealed by the downward sloping noise pattern on the 1kHz/-70dB plot, where distortion harmonics are also gratifyingly low (typically 0.56 per cent at -60dB and 6.3 per cent at -80dB). Most impressive of all, however, is the almost complete absence of spurious RF noise, a feature that often bodes well for sound quality.

## Sound quality

Sonically the *DCD-860* came over as a less substantial and slightly less polite version of the *DCD-2560*, factors that weigh very much in its favour. The presentation is still very relaxed and competent, but manages to pack in plenty of detail without sounding cramped, compressed or dirty. In fact the panel complimented the player on its very clean and spacious sound staging. Although there's a hint of treble emphasis at times, it's not sufficient to aggravate vocal sibilance or highlight percussive sounds.

This is very much the sort of well-rounded and comfortable sound that prompts listeners to wind up the volume. The panel certainly felt the desire to step on the gas, bringing up the level without any fear of the sound becoming over loud or objectionable. It simply swells to accommodate the extra power and impetus, rather than directing energy towards individual, bright-sounding instruments.

## Conclusion

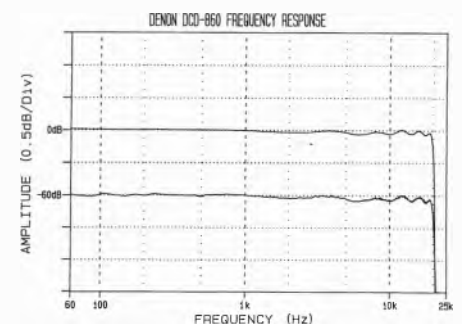
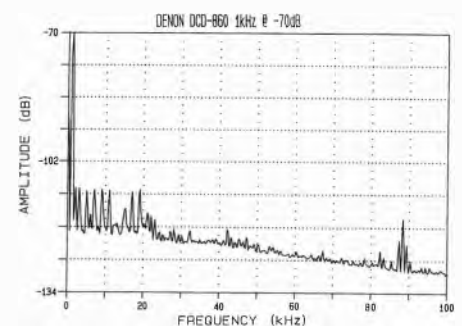
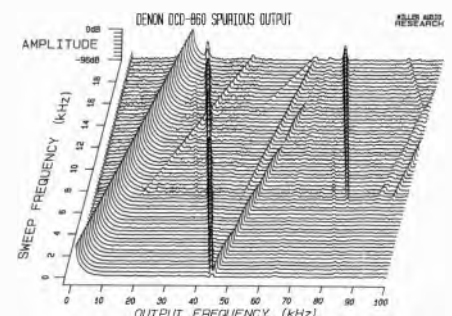
Denon has found a winning formula in the *DCD-860*. It certainly struck a chord with our panellists, while clearly surpassing a *DCD-660* (based on similar circuitry) that I had been listening to earlier. Curiously enough, it bears comparison with Philips' *CD634* in terms of its evenhanded and agreeable balance, despite the gulf separating their

**Recommended**

technologies. Yet with its ability to throw open the doors to a very roomy and communicative sound, Denon's *DCD-860* emerges as all the more successful.

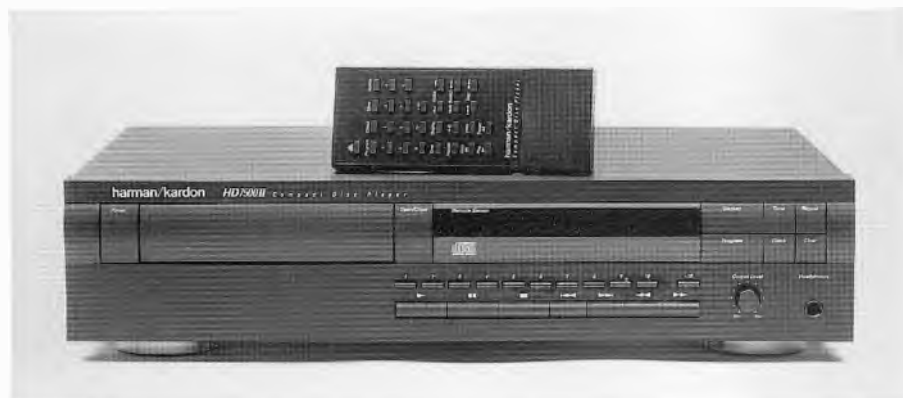
## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.13dB	0.13dB	0.12dB
Channel Separation	107.6dB	106.9dB	81.8dB
THD vs Level, 0dB	-98.6dB	-102.5dB	-75.9dB
-30dB	-76.9dB	-74.2dB	-69.9dB
-60dB	-43.1dB	-44.8dB	-52.0dB
-80dB	-19.0dB	-23.7dB	-31.2dB
Dithered -90dB	-15.8dB	-16.1dB	-27.6dB
Resolution @ -60dB		+0.03dB	+0.04dB
-80dB		+0.35dB	-0.17dB
-90dB		+0.54dB	+0.12dB
-95dB		-1.96dB	-1.53dB
-100dB			-2.26dB
Peak Output Level, L			1.833V
R			1.807V
Output Impedance			689ohms
Radio Frequency Spurious			1.5mV broadband
CCIR IMD, 0dB			-93.5dB
Suppression of stop-band IMD			27.9dB
De-emphasis Accuracy, 1kHz			0.00dB
5kHz			-0.02dB
16kHz			+0.14dB
S/N Ratio (A-wtd), w/o emp			107.5dB
w emp			107.6dB
Track Access Time (99)			3.2secs
Typical Retail Price			£260



# Harman Kardon HD7500II

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



Now in *MkII* guise but with little external evidence of any change, the *HD7500II* has the same curvaceous black plastic fascia as the cheaper *HD7450* but has extra on-board features such as direct track access to improve operating flexibility. More important, perhaps, the *HD7500* is graced with a volume control that feeds both the headphone and variable-output sockets.

Inside, however, it's all change. HK has used the same control, processing and low-bit DAC ICs, but with four separately regulated power supplies, judicious RF filtering, and a complex all-discrete analogue output stage. In fact the only visible integrated op-amp forms part of the headphone circuit.

HK has sandwiched the DAC between two sticky felt layers, though, in my experience, these PWM DACs are less susceptible to vibration than 16-bit devices such as the *TDA1541*. On the other hand, they are very sensitive to stray RF noise, not least because of the very high processing speed. For example, in order to synthesise accurately up to 11 different analogue pulse 'widths' after 32 times oversampling, truncation from 16-bit to 3.5-bit data and 3rd-order noise-shaping, this *MN6471* DAC requires a trigger accuracy of 33.9MHz. That's 33.9 million times a second!

## Lab report

There is a slight glitch in the linearity of the -60dB response plot, while the -95dB resolution matches HK's *HD7450*. The 3D plot looks similar too, but this disguises a significant improvement in bass distortion (now 0.008 per cent at -30dB instead of 0.06 per cent). Furthermore both the audio and RF spectra are much cleaner on this player, since the *HD7450* suffers from spurious HF tones that compromise its S/N ratio. Free of such interference, the

*HD7500II* clocks-up a 113dB S/N ratio (some 9-10dB better than the *HD7450*) which implies an 18-bit resolution.

The de-emphasis accuracy of the player is spot-on, while the 1kHz/-70dB spectrum reveals further improvements over its stablemate. HK has managed to 'lose' about 8dB of ultrasonic quantisation noise while reducing the low-level 20kHz THD below 100 per cent

## Sound quality

Judging by the row of appreciative nods, our panel was quite moved by the rousing conclusion to *Holst's March*. Indeed the listeners were particularly impressed by the way this player got to grips with the weight and definition of bass notes leading to a tangible sense of scale and power. Still, our first and lasting impression was of an expansive, clean and dynamic sound.

If we were eager to hear more, then the unit itself seemed happy to oblige by playing in double time. It was certainly very quick on its feet, yet in the view of one listener, still slightly aggressive. There was also the suggestion of sibilance exaggeration with female vocals, which could sound a shade thin at times. But it was certainly as detailed as Kenwood's *DP-7030* for instance, though not as tightly controlled or damped.

Instead this is a player that magnifies the emotive strengths of a recording, bubbling with enthusiasm for the music itself rather than maintaining strict control over its technical presentation.

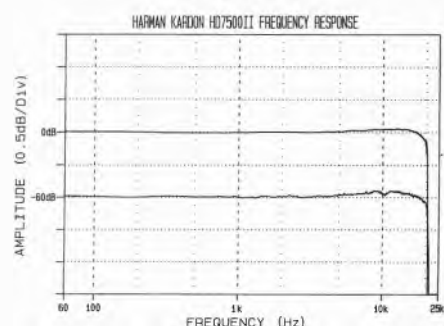
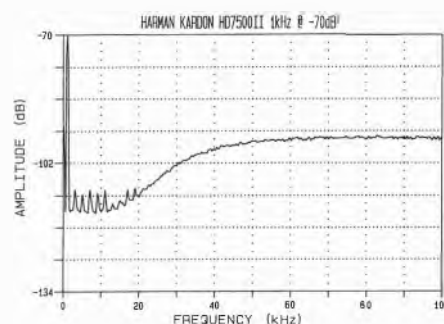
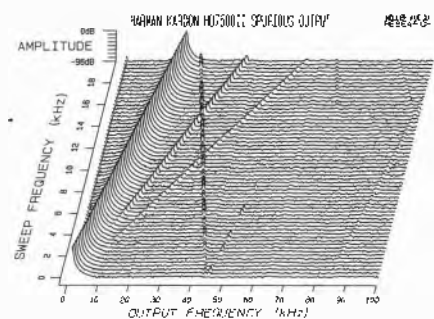
## Conclusion

The *HD7500II* successfully addresses those basic problems that undermine the performance of the cheaper *HD7450*, allowing the potential of the Technics MASH/PWM DAC to emerge. It doesn't pull the music apart in a ruthless or

analytical fashion, but it does cut through to its heart. The end result is a racey but appealing and communicative sound that deserves the warmest Recommendation.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.03dB	0.02dB	0.04dB
Channel Separation	122.0dB	110.3dB	86.7dB
THD vs Level, 0dB	-99.6dB	-93.7dB	-73.0dB
-30dB	-81.5dB	-73.8dB	-56.4dB
-60dB	-52.5dB	-48.5dB	-29.1dB
-80dB	-26.4dB	-25.8dB	-10.4dB
Dithered -90dB	-17.4dB	-16.8dB	-0.77dB
Resolution @ -60dB		+0.01dB	0.00dB
-80dB		+0.02dB	+0.02dB
-90dB		-0.22dB	+0.20dB
-95dB		+0.58dB	-3.70dB
-100dB		+0.75dB	
Peak Output Level, L			2.222V
R			2.217V
Output Impedance			105ohms
Radio Frequency Spurious		4.5mV @ 33.9MHz	
CCIR IMD, 0dB			-96.1dB
Suppression of stop-band IMD			82.4dB
De-emphasis Accuracy, 1kHz			0.00dB
5kHz			-0.01dB
16kHz			-0.01dB
S/N Ratio (A-wtd), w/o emp			109.4dB
w emp			113.3dB
Track Access Time (99)			4.1secs
Typical Retail Price			£350





# JVC XL-Z1011

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

**Recommended**



The XL-Z1011 is JVC's flagship model which combines K2 with first-generation PEM technology. In terms of features and appearance this heavyweight player is no different from the 18-bit XL-Z1010 it replaces. It conceals direct access, tape edit, program and repeat play facilities behind a pull-down flap, so that when all hatches are battened down the XL-Z1011 is left looking purposeful but uncluttered. You can even switch off the orange display.

Extra features like intro search, fade and index skip are available on a matching remote which also commands a motorised volume control found on the player itself. Faced with this and the sophistication of the technology within, the insubstantial disc tray and lightweight transport mechanism seem a trifle misplaced.

Still, any jitter or noise introduced by these half-hearted mechanics are effectively discarded by JVC's internal K2 interface. This is not a simple re-timing circuit but an optically isolated interface that lies between the signal processor and oversampling filter plus PEM DAC. The K2 identifies and then regenerates the desired digital code without duplicating the interference.

## Lab report

In this instance the measured results are consistent with other players using the earlier JCE 4302A DAC with its lower 32 times oversample rate. Resolution is quite superb with minimal errors of just 0.3-0.35dB down to -100dB and a frequency response that tails-off by an equally acceptable 0.25dB at 20kHz. The absence of any ripple here together with the freedom from stopband products on the 3D plot bear testament to the quality of the digital filters.

The K2 interface eases THD down to around 0.009 per cent at -30dB and 0.18 per cent at -60dB though any improvement at higher frequencies is offset by the increase in ultrasonic quantisation noise

(see -70dB plot). THD above 1kHz or so is primarily third order, as shown on the 3D plot. Otherwise all is well with moderate levels of RF, an acceptable +4dB noise modulation, a Class One clock accuracy and 'real-life' signal to noiseratio of 106dB. The fixed output impedance is pretty low too, so long interconnects won't cause a problem.

## Sound quality

Right from the outset this player proved to be a strong favourite with the listeners, maintaining their interest from one piece of music to the next. This was one time when the musical cycle of Pachelbel's *Canon* seemed especially meaningful, assisted by the unstrained character of the strings and natural vibrancy of the harpsichord. There is an engaging neutrality and transparency about this player that reveals the full richness and colour of instruments without any false emphasis.

The XL-Z1011's music sounds both generous and hearty with a bass that's surprisingly full and rumbustious - entertaining but never contrived. Our panel commented on the vivid spirit of Chris Rea's guitar and the full-blooded resonance of the xylophone from our jazz selection. They also felt the music had a much greater sense of purpose than is common, urged along by a genuinely deep and well-resolved bass.

## Conclusion

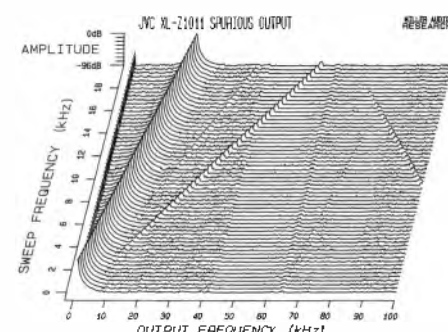
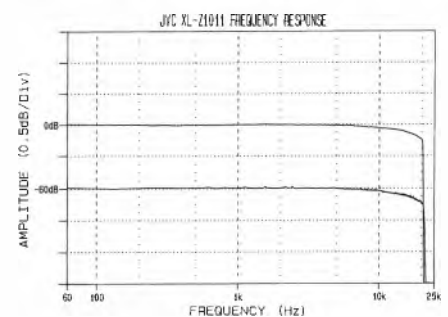
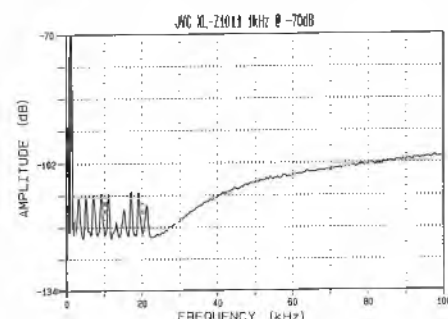
This is certainly the most successful implementation of JVC's original PEM bitstream DAC, which is ironic when you consider that the K2 interface was developed alongside older multibit technology. Nevertheless the XL-Z1011 was applauded by our listeners as a fine all-rounder with no obvious weaknesses.

Crucial to its success is the fact that it enjoys the refinement of other high cost players while escaping their customary blandness. So anyone who still believes

that bitstream players lack pace and dynamics should listen to the XL-Z1011, our costliest Recommendation in issue 100.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.02dB	0.01dB	0.02dB
Channel Separation	125.9dB	113.9dB	88.5dB
THD vs Level, 0dB	-92.8dB	-101.3dB	-80.0dB
-30dB	-92.5dB	-80.5dB	-66.4dB
-60dB	-57.4dB	-55.0dB	-37.3dB
-80dB	-28.0dB	-35.6dB	-17.8dB
Dithered, -90dB	-18.4dB	-21.3dB	-7.45dB
Resolution @ -60dB		-0.01dB	-0.01dB
-80dB		-0.04dB	-0.03dB
-90dB		-0.31dB	-0.33dB
-95dB		-0.13dB	-0.15dB
-100dB		+0.35dB	
Peak Output Level, L	2.138V		
R	2.142V		
Relative Output Level	+0.59dB		
Output Impedance	100ohm		
Radio Frequency Spurious		3.6mV @ 65MHz	
1Hz Noise Modulation		+3.9dB	
CCIR IMD, 0dB		-96.9dB	
Suppression of stop-band IMD		102.0dB	
De-emphasis Accuracy, 1kHz		+0.04dB	
5kHz		+0.01dB	
16kHz		-0.01dB	
S/N Ratio (A-wtd), w emp, 0LSB		110.7dB	
w/o emp, 0LSB		110.3dB	
w/o emp, 1LSB		106.2dB	
Digital Output		Opt/Coax	
Crystal Clock Accuracy		+42.5ppm	
Track Access Time (99)		5.8secs	
Typical Retail Price		£520	



# Kenwood DP-4030

TRIO-KENWOOD UK LTD, KENWOOD HOUSE, DWIGHT ROAD, WATFORD, HERTS, WD1 8EB. TEL: (0923) 816 444

**Recommended**



Kenwood has finally taken the plunge into the bitstream, leaving Denon as the only major Far Eastern company yet to have a paddle. The DP-4030 replaces the older 18-bit 4020 and features a change of styling as well as technology. The satin black fascia is free of any spurious marketing clap-trap, while the features that are provided seem very generous for the price.

Full remote control operation gives direct track access, 20-track programming, random, repeat and time play options all from the comfort of your armchair. There's also tape edit, peak search, repeat and space functions that'll make recording from CD a doddle. The player even has a motorised volume control (operable from the remote) that feeds the headphone and variable output phono sockets.

Technically this player is rather novel because it's the first to use a new low-bit PWM DAC from NPC (Nippon Precision Circuits). This flexible LSI may be used at a variety of different oversample rates and with varying degrees of truncation. In this instance Kenwood is running the DAC at a maximum of 32 times oversampling (eight times followed by four times) while 3rd-order noise shaping covers a range from 16-bit to 3.5-bit. Used in this way it's very similar to the original version of the Technics/NTT MASH/PWM DAC used in some of the first low-bit CD players.

## Lab Report

Performance-wise this NPC DAC has its own fingerprint, so while distortion is extremely low through bass and midrange frequencies (typically 0.0008 per cent) it climbs to around 0.02 per cent at 20kHz. This is visible on the 3D plot as a mild 2nd- and 3rd-harmonic while the stop-band intermodulation V-patterns (-61dB) are caused by the initial eight times oversampling filter. There's the merest hint of passband ripple on both frequency

response plots but neither this nor the slight 0.4dB droop at 20kHz are likely to have any subjective impact.

What's more interesting is the very pronounced shelf of ultrasonic noise on the -70dB/1kHz plot, which is about 40dB higher than most multi-bit designs and about 25dB higher than some other low-bit systems. Digital tracking enables the player to achieve a state of the art S/N ratio of 122.5dB, though ultimate resolution and dynamic range is restricted by drifts of about 1.9dB in linearity at -100dB.

## Sound Quality

Kenwood may have taken a risk by opting for what amounts to an unknown chipset, but it's a risk that has paid off in this instance. The panel was quite taken by the engagingly fluid style which was easy-going and nicely composed. To be sure, the soundstaging lacks extreme depth but foreground images are tactile enough. Bass lacks extreme depth and power but the general 'feel' of bass notes still blends in well with the mid and treble.

In many respects this sums up the overall character of the player, for it seems very evenhanded and polite despite obvious limits to its resolution of intricate detail. The panel thought that instrumental separation was quite good even if the instruments themselves could have sounded warmer, fuller and more vivid. Though not subtle, this mild veiling is at least consistent from bass to treble, and helps produce a cautious but engaging sound.

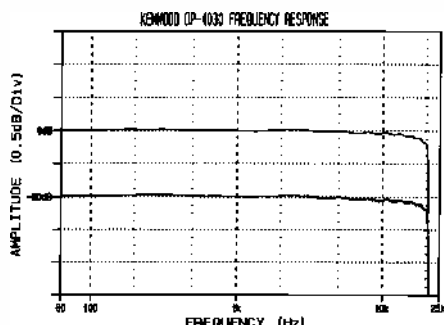
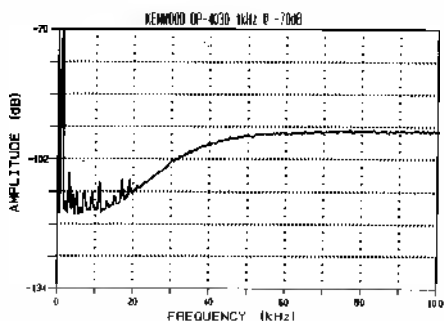
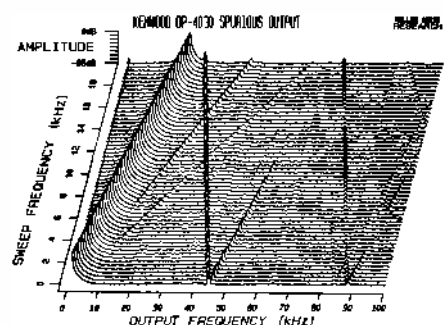
## Conclusion

This is a classic example of a well-balanced CD player, designed to offer a very refined and deceptively classy sound yet without over-stretching its modest capabilities. You simply don't hear the DP-4030 getting into trouble and, to a degree, what you cannot hear doesn't end up bothering

you! Furthermore it is pleasant to operate, well built and lavishly equipped for a sub-£200 player, qualities that only serve to reinforce a hearty Recommendation.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.13dB	0.15dB	0.07dB
Channel Separation	93.1dB	100.5dB	82.4dB
THD vs Level, 0dB	-104.6dB	-101.2dB	-73.5dB
-30dB	-78.6dB	-74.9dB	-55.7dB
-60dB	-44.6dB	-44.3dB	-25.7dB
-80dB	-20.4dB	-20.5dB	-5.50dB
Dithered -90dB	-9.25dB	-13.7dB	-1.15dB
Resolution @ -60dB		0.00dB	-0.02dB
-80dB		-0.11dB	-0.10dB
-90dB		+1.22dB	-1.02dB
-95dB		+1.48dB	-5.30dB
-100dB		+1.85dB	
Peak Output Level, L	2.223V		
R		2.189V	
Output Impedance			753ohms
Radio Frequency Spurious		10.2mV @ 128MHz	
CCIR IMD, 0dB			-95.1dB
Suppression of stop-band IMD			60.8dB
De-emphasis Accuracy, 1kHz			0.00dB
5kHz			0.00dB
16kHz			-0.09dB
S/N Ratio (A-wtd), w/o emp			122.1dB
w emp			122.5dB
Track Access Time (99)			4.1secs
Typical Retail Price			£180



# Kenwood DP-5030

TRIO-KENWOOD UK LTD, KENWOOD HOUSE, DWIGHT ROAD, WATFORD, HERTS WD1 8EB. TEL: (0923) 816 444

**Recommended**



The Trio-Kenwood Corporation is a comparative latecomer to the bitstream party but its implementation of other people's technology has been a great success so far. Including the £200 DP-5030, I might add, a player that shares the external appearance of the budget DP-4030 with electronics that are culled from the DP-7030.

The 5030's chunky alloy fascia is dominated by a large fluorescent display that covers details of track and time if not indices. In fact, index cueing is about the only major facility missing from this unit. Otherwise you have a broad choice of program, random and repeat play modes, direct track access, peak search and comprehensive tape editing.

You can dim the display, operate the motorised volume control by remote or even store favourite selections from up to 80 CDs in the Disc File memory. Not quite up to Sony standards, it's still a tidy enough package for £200. Interestingly enough, a Sony PLM DAC is used, with particular attention paid to the quality and jitter-performance of the master clock that 'times' each transition of the bitstream DAC.

## Lab report

Bearing in mind that Kenwood has adapted Sony's PLM bitstream technology to suit its own ends, comparisons between this and the CDP-591 or CDP-991 are quite revealing. The pattern of distortion and linearity is, broadly speaking, comparable, though the DP-5030 does achieve a 20Hz THD of just 0.00023 per cent; one for the record books, methinks.

Nevertheless there are crucial differences both in the reduction of 1Hz noise modulation to +1.4dB and in the suppression of ultrasonic quantisation noise (see -70dB plot), both courtesy of Kenwood's proprietary Master Clock system.

Other differences are explained by the eight times oversampling filter which

comes from NPC rather than Sony. Hence the V-shaped stop-band images on the 3D plot bear a closer resemblance to Aiwa's XC-900, as does the slight ripple on the frequency response. Other gripes? Well, the DAC's 'cheat mode' is obvious enough from the zero least significant bit signal-to-noise measurements, though the real life figure of just 99.5dB (A-wtd) is actually quite poor for this bitstreamer.

## Sound quality

The luxurious, silky-smooth sound of this player had everyone fooled into thinking they were listening to a far costlier beast. But then, that's the beauty of a truly blind listening test. The balance, poise and sense of proportion displayed by this machine quite belies the modest asking price.

In many respects the 5030's sound is mildly understated, yet there's no loss of detail. It successfully disentangled the two violins that play at a very similar pitch through the Pachelbel track, for instance, enabling us to enjoy the subtleties of each instrument without feeling that the music had been pulled mercilessly apart.

Moreover, this player allows the music to flow, so that even our rock selection sounded big and comfortable as the sound swelled in response to dynamic variations within each track. This sense of scale was retained with the jazz track, developing a terrific sense of space. It could sound loud when the music so demanded, but would otherwise maintain a rare sense of composure. Polite but still able to bark, thought our listeners.

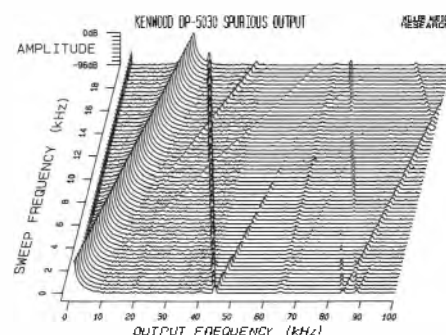
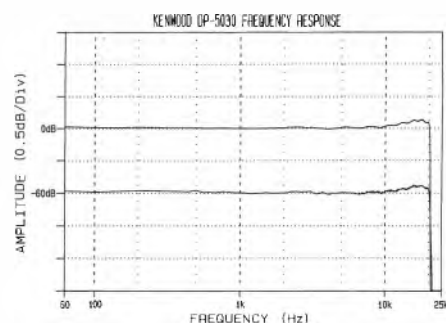
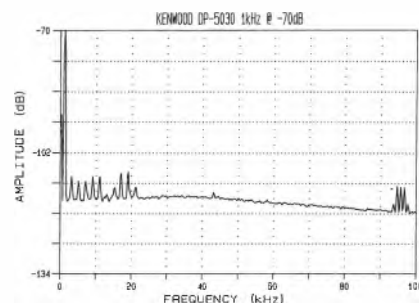
## Conclusion

Having already covered Kenwood's other players it's fair to say that the DP-5030 is the most successful of the bunch. Only its occasional reluctance to 'rough it' with the most high-spirited of musical styles separates it from the very best at £200. Nevertheless, the 5030 provides a sound that's disarmingly smooth and detailed -

giving champagne quality at a beer budget price. A whisker short of a Best Buy, it nevertheless deserves the firmest Recommendation.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.42dB	0.43dB	0.30dB
Channel Separation	124.1dB	118.2dB	94.3dB
THD vs Level, 0dB	-112.7dB	-103.1dB	-79.9dB
-30dB	-78.3dB	-76.5dB	-76.7dB
-60dB	-46.1dB	-46.9dB	-49.6dB
-80dB	-26.3dB	-31.4dB	-29.6dB
Dithered, -90dB	-16.7dB	-20.2dB	-20.4dB
Resolution @ -60dB		+0.01dB	-0.03dB
-80dB		+0.27dB	-0.06dB
-90dB		+0.75dB	-0.52dB
-95dB		+1.39dB	+0.90dB
-100dB		+1.15dB	
Peak Output Level, L		2.027V	
R		2.127V	
Relative Output Level		+0.33dB	
Output Impedance		967ohm	
Radio Frequency Spurious		18.7mV @ 45MHz	
1Hz Noise Modulation			+1.4dB
CCIR IMD, 0dB			-95.5dB
Suppression of stop-band IMD			61.7dB
De-emphasis Accuracy, 1kHz			-0.01dB
5kHz			-0.04dB
16kHz			+0.11dB
S/N Ratio (A-wtd), w emp, 0LSB			122.8dB
w/o emp, 0LSB			122.9dB
w/o emp, 1LSB			99.5dB
Digital Output			Optical
Crystal Clock Accuracy			-5ppm
Track Access Time (99)			4secs
Typical Retail Price			£200





# Kenwood DP-7030

TRIO-KENWOOD UK LTD, KENWOOD HOUSE, DWIGHT ROAD, WATFORD, HERTS, WD1 8EB. TEL: (0923) 816 444

**Recommended**



Although Trio-Kenwood makes few of its own basic electronic components, the company has carved a very successful niche by adapting and developing existing systems to suit its own requirements. So it is with the DP-7030, the third and costliest player of the new range.

Sony's PLM bitstream DAC takes pride of place, though Kenwood has tweaked the normal master clock circuit with a discrete FET oscillator. Given the rather unfortunate codename 'CLAPI', this clock reduces noise that might otherwise contribute to jitter and so cause distortion within the DAC.

There's no mistaking the purposeful and sturdy appearance of this unit. Its centralised drawer underlines a high quality fluorescent display and a matrix of illuminated keys, which give direct track access, helping you fill the 20-position memory without having to squint at tiny buttons.

The remote echoes that of the DP-4030 but with the addition of index selection. More important perhaps, the DP-7030 is fitted with a non-volatile disc file, enabling storage of favourite tracks or even parts of tracks (time play) from up to 80 different discs.

## Lab Report

Comparisons with other players which use the CXD2552 DAC, such as the Sony CDP-990, are very interesting. The 3D plot is not so 'clean' because Kenwood uses NPC's SM5840 oversampling filter which has a poorer stop-band rejection (61dB) than Sony's CXD1244 filter (105dB). Consequently the V-shaped intermodulation patterns match up with those of the DP-4030 in addition to players from Denon, Aiwa and Nakamichi. The absolute resolution or in-band S/N ratio of the DAC is not too hot either, and Sony's own players easily better both figures.

The consequence of Kenwood's master

clock technology is revealed by the low level -70dB plot instead. There is less high frequency distortion (0.28 per cent at -60dB and 3.4 per cent at -80dB) plus a level of ultrasonic noise that as far as I am aware is lower than any other low-bit player currently available.

## Sound Quality

Compared to Kenwood's budget player, the DP-7030 provided a busier sound, bustling with musical detail yet exuding a confidence and refinement that is reminiscent of far costlier machines. There was improved separation of individual strands within the music and crisper imaging throughout the breadth and depth of the soundstage.

It was more responsive to dynamic inflections but still seemed mildly restrained when compared to technical relatives such as the Sony CDP-990. For example, the Holst *March* teetered on the edge of a crescendo but just failed to explode into life; one listener suggested its sense of excitement was urbane rather than passionate.

Technically speaking, the presentation was infallibly neutral, only in the resolution of subtle emotional clues was it less inspired. Too civilised and polite for its own good perhaps, it's unlikely to cause fatigue in the long term, equally unlikely to stir the soul. This is not to suggest the player's bland or boring; it does have character, but one of control and of understatement.

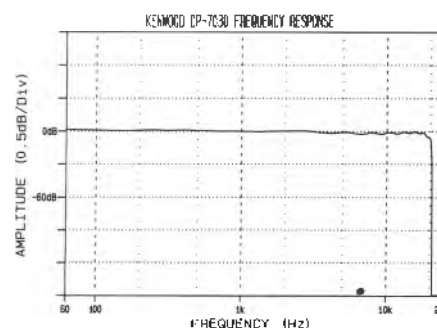
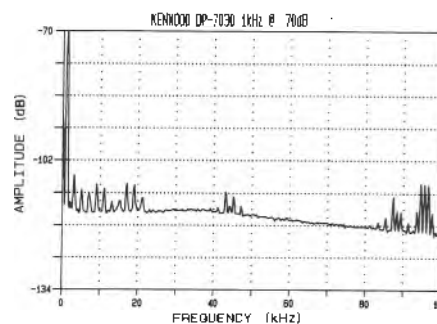
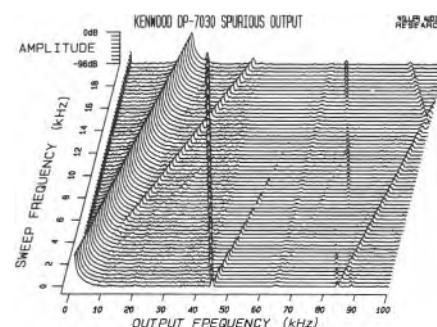
## Conclusion

Kenwood's mods to the Sony DAC together with its own analogue circuitry have resulted in a player that's not instantly comparable with the CDP-990 - the immediate competition. Perhaps this is no bad thing, for the sober appearance and sound of the DP-7030 will appeal to a different audience. Taking into account the superb construction, slick operation

and gracious sound quality, the DP-7030 also achieves Recommendation by the skin of its teeth.

## TEST RESULTS

	20Hz	kHz	20kHz
Channel Balance	0.05dB	0.06dB	0.04dB
Channel Separation	113.0dB	104.7dB	83.1dB
THD vs Level, 0dB	-95.9dB	-94.7dB	-73.7dB
-30dB	-76.0dB	-74.5dB	-75.1dB
-60dB	-44.5dB	-45.5dB	-51.0dB
-80dB	-22.4dB	-25.4dB	-29.3dB
Dithered -90dB	-7.85dB	-12.6dB	-22.3
Resolution @ -60dB		+0.04dB	0.00dB
-80dB		+0.79dB	+0.09dB
-90dB		+1.78dB	+0.13dB
-95dB		+1.75dB	-3.07dB
-100dB		+1.70dB	
Peak Output Level, L			2.045V
R			2.032V
Output Impedance			206ohms
Radio Frequency Spurious		12mV@124MHz	
CCIR IMD, 0dB			-95.5dB
Suppression of stop-band IMD			61.0dB
De-emphasis Accuracy, 1kHz			+0.02dB
5kHz			+0.02dB
16kHz			-0.33dB
S/N Ratio (A-wtd), w/o emp			111.5dB
w emp			111.8dB
Track Access Time (99)			2.8secs
Typical Retail Price			£300





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### **DM620 Hi-fi Choice May 1991 Best Buy:**

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# Marantz CD-62

MARANTZ HI-FI (UK) LTD, KINGSBRIDGE HOUSE, PADBURY OAKS, 575-583 BATH ROAD, LONGFORD, MIDDLESEX UB7 0EH. TEL: (0753) 680 868



Take a Philips *CD850MkII*, lose a few of its fancy facilities, equip it with a slightly cheaper version of the *CDM4* transport, plonk the whole thing in an old *CD-50* case and - hey presto - you've got a Marantz *CD-62*. A bit of a cheek, you might think, but then saving £100 on the price of an *850* is not to be sniffed at.

Featurewise of course the *CD-62* is no different to the 16-bit *CD-50*, even if there has been a fundamental upgrade in technology. Single FTS memory and index skip facilities are provided on a remote which also includes Philips' ubiquitous eight step volume control circuit.

In addition there's the customary range of direct track access, program, repeat and random play facilities. A lone coaxial digital output also enables the *CD-62* to be deployed as a CD transport at some later date.

Marantz has tried to make the best of the Philips building blocks by tinkering with the op-amps that form the heart of the post-DAC filter. So, out go the Motorola *LM833Ns* to be replaced by Signetics *NE5532s* which account for the slightly warmer and more rounded character.

## Lab report

Changing the type and gain of the op-amps has also resulted in minor technical differences between the *CD-62* and *CD850MkII*. For a start, peak output level is some -0.95dB under spec at 1.79V even though the output impedance (206ohms) and frequency response remain unchanged. The response ripple is caused by the initial four times filter, which is also responsible for the relatively poor 55dB rejection of stop-band noise seen on the 3D plot.

Distortion is also a little higher on this model (typically 0.002 instead of 0.0009 per cent), though the wave of ultrasonic noise produced by the *SA47350* DAC tends to disguise this fact on the 3D plot.

Once again the -70dB plot reveals this huge output of re-quantisation or truncation noise which persists at levels some 15dB above machines using the *SA47321* DAC and 35dB or more above the best bitstream and multibit players.

The fact that this noise increases so markedly at 256 times rather than 384 times oversampling (cf the Aiwa *XC-700* and *XC-900*, Deltec *Little Bit*, *PDM1* and *PDM2*), suggests an oversight in the design of the *SA47350* Bit Stream DAC.

## Sound quality

Surprisingly enough, our listeners compared this player to the *CD-52* (*Player X* as far as they were concerned) liking the way it retained the music's natural bounce, even if its overall character was less appealing. It seemed rich in balance but oddly contained or gagged, almost as if missing the foremost edge of each note.

Instruments that ordinarily set the pace within a piece of music are faintly smeared, so although the basic rhythm is retained there isn't quite the sense of urgency or speed achieved by other players. In this respect it's a little like the *CD850MkII*, lacking the bite of a truly confident player but still providing a sound that enables individual instruments to pull together in a smooth and even-handed fashion.

The sound is not disparate then, but neither is it a model of clarity.

## Conclusion

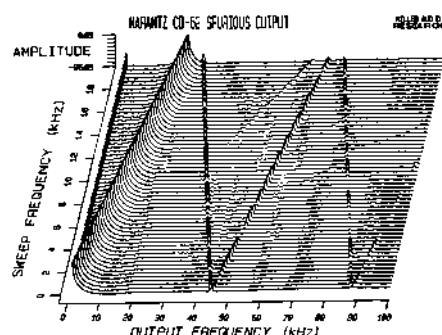
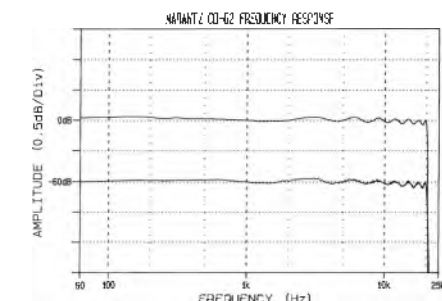
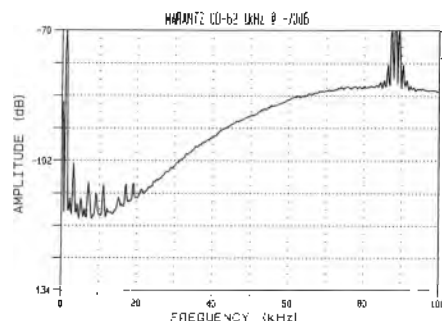
Cobbling together a player from established bits and bobs may make economic sense, but leaves the *CD-62* sitting very uneasily in among the *CD-42*, *52* and *72* - all players that were designed from the ground up by Marantz.

Retaining the old *CD-50* case is hardly an inspiring move either, but the slight sonic advantage over Philips' *CD850MkII* plus the saving of £100 should not go unobserved. So when all is said and done the *CD-62* is not a bad player, simply

undermined by the *CD-52* which does a more convincing job for less dosh.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.03dB	0.03dB	0.04dB
Channel Separation	108.4dB	106.6dB	96.1dB
THD vs Level, 0dB	-96.4dB	-93.4dB	-72.9dB
-30dB	-71.3dB	-71.1dB	-47.9dB
-60dB	-43.3dB	-42.6dB	-20.1dB
-80dB	-20.7dB	-25.3dB	+0.15dB
Dithered, -90dB	-17.0dB	-18.1dB	+0.16dB
Resolution @ -60dB		+0.09dB	+0.01dB
-80dB		+0.76dB	+0.04dB
-90dB		+1.79dB	+0.85dB
-95dB		+1.95dB	+1.25dB
-100dB		+2.45dB	
Peak Output Level, L	1.792V		
R	1.799V		
Relative Output Level	-0.94dB		
Output Impedance	206ohm		
Radio Frequency Spurious	14mV @ 45.2MHz		
1Hz Noise Modulation		+1.7dB	
CCIR IMD, 0dB		-95.3dB	
Suppression of stop-band IMD		55.1dB	
De-emphasis Accuracy, 1kHz		0.00dB	
5kHz		0.00dB	
16kHz		-0.03dB	
S/N Ratio (A-wtd), w emp, 0LSB		104.5dB	
w/o emp, 0LSB		100.9dB	
w/o emp, 1LSB		100.7dB	
Digital Output		Coaxial	
Crystal Clock Accuracy		+43.8ppm	
Track Access Time (99)		4secs	
Typical Retail Price		£300	





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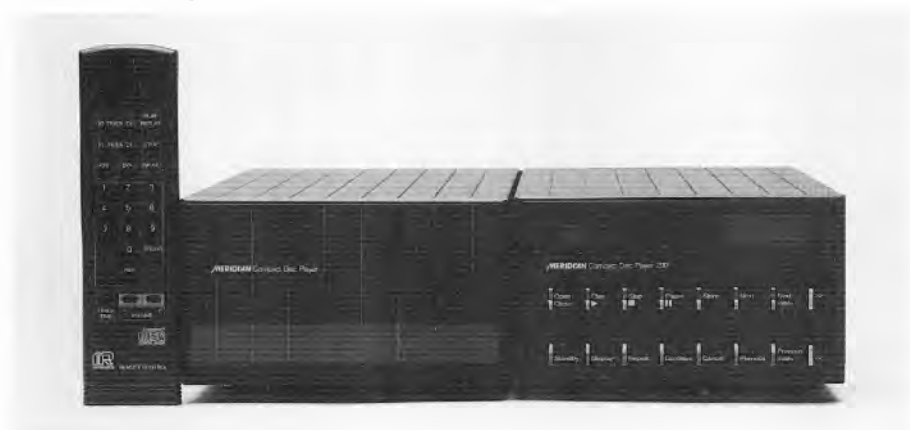
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# Meridian 200

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



Meridian's first and cheapest CD transport is actually derived from the integrated 208 CD player, sharing the same basic mechanism and range of facilities. At a touch the open/close button and the left half of its stylish fascia breaks clear of the main chassis to reveal a die-cast magnesium platform, below which lies the motor spindle and swing-arm laser assembly. There's no separate disc tray as such, you simply load the CD directly onto the mechanism which then withdraws into the heart of the player.

Inside the player a laminated arm swings across to clamp the disc while the entire assembly is decoupled on three sorbothane blobs. Third-generation servo and control ICs mean swift and secure track access, while Philips' latest SAA7310 decoder improves upon the error-correction offered by older chips like the SAA7210. But Meridian has not stopped here, choosing to implement Philips' new PCF3523 ADOC (audio digital output circuit) to drive the digital output via a miniature transformer.

## Lab report

A clock frequency error of just 28ppm guarantees a Class 1 status, even though the jitter spectrum shows an unusual but 'real' component 73Hz off the main 1kHz signal. Digital spikes are well controlled while the final band noise figure of -24.9dB is on a par with Teac's sub-£1,000 player. Meridian's output transformer introduces a slope to the digital waveshape but at least any ringing into the 606 DAC is both mild and well damped. Spurious RF noise is also well contained.

## Sound quality

Via the Meridian 606 DAC: this combination did not enjoy quite the perceived depth or the bass weight of the CDD882/606 pairing, yet in almost every other respect our panelists judged it superior. Lavish with their praise our listeners ap-

preciated the 200's excellent sense of definition, clarity and stereo focus - qualities which are retained without it screaming detail from the speakers.

The treble was also very refreshing, cymbals sounding very delicate and tonally pure without being made to appear obvious or over-dramatic. Indeed, it was this very natural, truthful and unfatiguing demeanour that so endeared the combination to our listeners. So even if the florid phrasing of the recorder (Vivaldi disc) was sometimes buried beneath the weight of strings, our listeners never lost sight of this delicate instrument throughout the entire passage.

Via the Teac D-10 DAC: a very solid, fresh and dynamic sound was apparent which made everything sound more immediate, three dimensional and tactile. Soundstaging was up with the very best and though there was no obvious sense of band-limiting, its delivery of the lowest bass notes could have been punchier. Oddly enough there was absolutely no sense of the 200 'dragging its heels' in the fashion of 602, which it trounced with its out-of-the-box imagery and grand sense of scale.

Via the Wadia's X-64.4 DAC: with a sound that was notably more diluted than it was with either Wadia transport while also far less involving than it had been with Philips' CDD882, the 200 still sounded more even-handed than the 602! It certainly did not harden up in the fashion of the 602, but the music itself lacked vibrancy and colour - a very bleached or grey sound in the view of most listeners.

## Conclusion

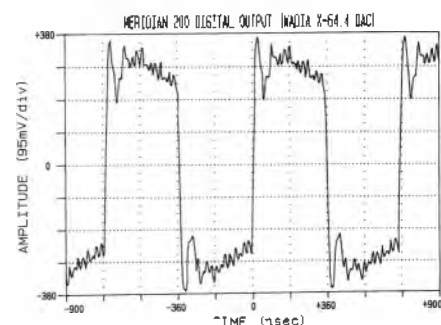
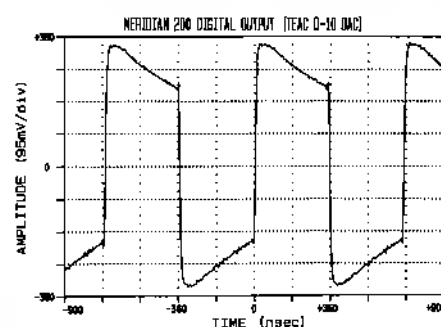
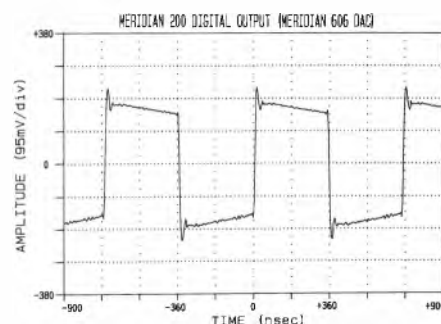
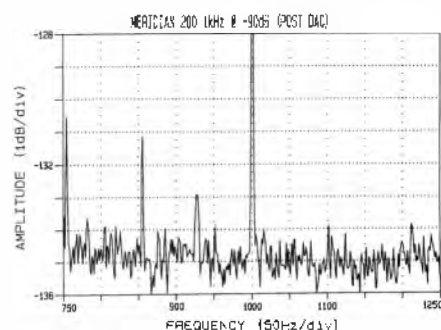
Partnered with either the Meridian or Teac DACs the 200 transport romped home to enthusiastic applause from our listeners, a result that ties-up nicely with our collective experience of this machine with most other DACs. Combine this with a fine optical output (our panelists thought

**Recommended**

it the least compromised of the group) and you've a recipe for success. As a star performer at a realistic price, Meridian's 200 earns my most heartfelt Recommendation.

## TEST RESULTS

	Teac	Meridian	Wadia
Digital output (mVp-p)	713.3	448.6	742.8
Edge rise time (nsecs)	7.98	7.98	15.5
Digital output (optical)		-15 to -21dBm	
Output impedance			78ohms
Clock/repetition rate			2.8224MHz
Clock Accuracy			27.5ppm
Frequency error at 20kHz			+0.55Hz
Jitter + noise at -90dB			-24.93dB
Error correction			<3.8mm
Track access (99)			2.2secs
Typical Retail Price			£812



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# NAD 5440

NAD MARKETING LTD, ADASTRA HOUSE, 401-405 NETHER STREET,  
LONDON N3 1QG. TEL: (081) 349 4034

**Recommended**



Surrounded by ranks of anonymous black fascias seething with buttons and glaring displays, the sober appearance of the NAD 5440 is highly distinctive. Beside the soft orange fluorescent display is a trio of rocker switches for play/pause, track skip and scan, while a series of plastic pushbuttons offer various programming and repeat facilities.

A small remote handset is equipped with a direct access keypad plus up/down volume buttons that control the player's variable output: the 5.5V available here is more than enough to satiate the most insensitive power amplifier. NAD has also included its CDR (Controlled Dynamic Range) feature, using a Yamaha processor to squash the dynamic range of the digital data into a smaller 'window' that's claimed to be ideally suited for taping for home or in-car use.

Inside lies a MASH/PWM DAC, complete with multiple regulated power supplies that isolate the transport, display, digital and analogue circuits. High quality Signetics op-amps are used as part of a five-pole filter which removes almost all spurious RF noise, while low-inductance ceramic capacitors, close-up against the DAC itself, minimise local interference. Many passive components in the analogue section are superior in quality to those in the 5425.

## Lab report

Comparisons with the cheaper NAD 5245 are interesting, to say the least. On the one hand improvements in board layout have increased stereo separation from 108dB to 121dB midband, while the -60dB response plot is both 'cleaner' and less disturbed by the DAC's customary glitch at 10.5kHz. Intermodulation distortion is also down by 7.8dB and de-emphasis accuracy much improved.

By contrast, harmonic distortion is slight worse at peak level (0.0012 instead of 0.00054 per cent), linearity is out by -

1.1dB at -100dB and the ultimate S/N ratio actually down by 1dB or so. Sample variation can be blamed for much of this, as the basic 'character' of the MASH/PWM chipset is revealed on the 3D plot by the light spray of 2nd and 3rd harmonics plus some partial stop-band intermodulation.

## Sound quality

The panel took some time to digest and savour the full, rolling and exceptionally fluid sound of this player. The panel agreed that its strength lay in an "inky black" silence (mindless of the fact that Ed has slapped an embargo on such phrases). Decaying notes were heard to disappear into the fathomless depths of its soundstage, lingering just a fraction longer before being absorbed by the velvety blackness.

There's a marvellous sense of vocal articulation, the presence of the performer vivid but not too forward or unnaturally enthusiastic.

However, the 5440 did not quite grasp the finest details of percussion or brass in the fashion of the cheaper 5425. The interplay between various instruments was suggested rather than obvious, the smoother ride of the 5440 giving a more refined but also milder overview of the music.

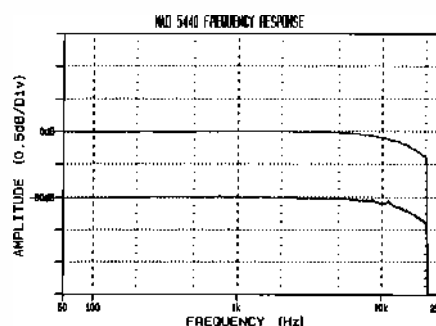
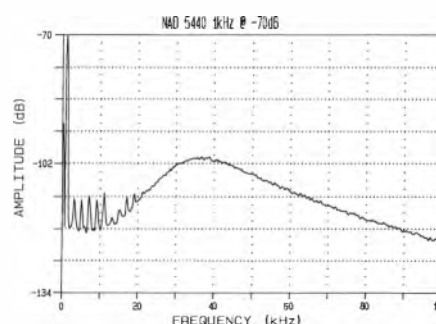
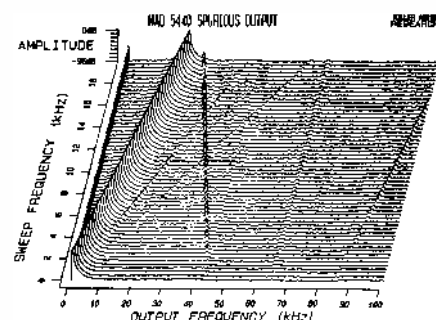
## Conclusion

NAD's first foray into low-bit technology is a remarkably successful one for NAD. The aesthetic design and range of facilities may be a little weak compared to much of the competition, but the unquestionably smooth and luxuriously detailed sound of the 5440 are the just reward for painstaking design.

This is no text-book implementation of the popular MASH/PWM chip but rather a reappraisal and fuller realisation of its true potential, which deserves Recommendation.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.07dB	0.07dB	0.03dB
Channel Separation	117.5dB	121.5dB	110.5dB
THD vs Level, 0dB	-104.7dB	-98.4dB	-76.7dB
-30dB	-81.7dB	-76.9dB	-63.4dB
-60dB	-52.6dB	-50.5dB	-35.1dB
-80dB	-25.3dB	-27.0dB	-17.7dB
Dithered -90dB	-17.8dB	-17.6dB	-11.4dB
Resolution @ -60dB	0.00dB	+0.01dB	+0.01dB
-80dB	+0.02dB	-0.08dB	-0.08dB
-90dB	-0.09dB	+0.03dB	+0.03dB
-95dB	-0.85dB	-0.85dB	-5.25dB
-100dB	-1.06dB	-1.06dB	-1.06dB
Peak Output Level, L		2.188V (5.455V)	
R		2.207V (5.510V)	
Output Impedance			116ohm
Radio Frequency Spurious		1-2mV broadband	
CCIR IMD, 0dB			-103.6dB
Suppression of stop-band IMD			82.8dB
De-emphasis Accuracy, 1kHz			-0.01dB
5kHz			-0.05dB
16kHz			0.00dB
S/N Ratio (A-wtd), w/o emp			105.8dB
w emp			109.6dB
Track Access Time (99)			4.6secs
Typical Retail Price			£300



# Philips CD618

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



With the introduction of this new sub-£200 Bit Stream CD player, Philips is squeezing out what remains of its 16-bit range. In fact, the equally new £130 CD604, which uses the economy TDA1543 chipset, is likely to be its last multibit player. So in effect the CD618 unseats the popular CD610, advancing its technology and adding extra features for good measure.

In fact this player uses the latest iteration of Philips' CD624 circuit board complete with the same CDM4 transport, power supplies, third generation decoder and SAA7321 Bit Stream DAC. However, and despite the pictures in Philips' brochure, the CD618 does not share the same remote control but features its own, oddly shaped handset. This together with facilities included on the player itself add up to everything the CD624 has to offer, except FTS and preset memories.

Oh yes, the digital output is not switchable in this instance and you'll have to make do with nickel rather than gold-plated phonos. So that's where the extra £30 went...

## Lab report

If you compare the specs for this player with those of the CD624 in issue 95 you'll find them broadly similar. The -70dB plot highlights the same hump of ultrasonic quantisation noise while the 0dB and -60dB responses suffer the same rippling, courtesy of the DAC's primary four times oversampling filter. This filter is also responsible for the characteristic stop-band products visible on the 3D plot while the DAC itself is held accountable for the strong third and fifth harmonics.

Where differences do exist they can be put down to the tolerance and selection of individual components. So the linearity of the DAC is actually within Philips' upper bracket while the increase in second harmonic at 0dB causes the overall THD to fall from typically 0.0018 to 0.0061 per cent in this instance. Noise modula-

tion is a low +2.3dB (typical for a good PDM DAC) but the final signal-to-noise ratio falls near the lower end of Philips' tolerance at just 95-96dB. Values up to 100dB are possible with the SAA7321.

## Sound quality

After the disappointing showing of both Philips' CD624 and CD634, the very positive response of our listeners to the CD618 was an unexpected, if pleasant, surprise. All were impressed by the broad, spacious and unforced sound of a player which was also regarded as having a great sense of stereo depth. Listeners repeatedly remarked on the sense of cohesion and integration which allowed the music to flow in a thoroughly natural and unhurried fashion.

The soundstaging was very broad, although some central performers could seem a little stretched as a result. Other mild criticisms centred on a bass which was not especially full and even slightly lumpy at times. Yet it was the strength and definition of percussion that drew most compliments, especially as this sparkling quality was free of fatiguing coloration. Interestingly enough, one listener compared the player to Micromega's Logic (without knowing the true identity of either machine), suggesting that the CD618 was actually the better of the two.

## Conclusion

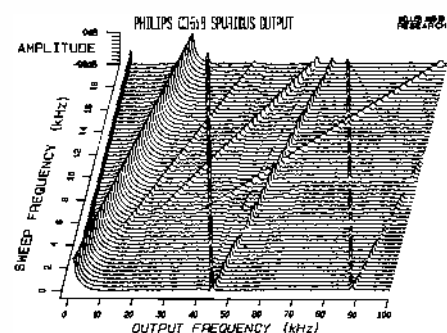
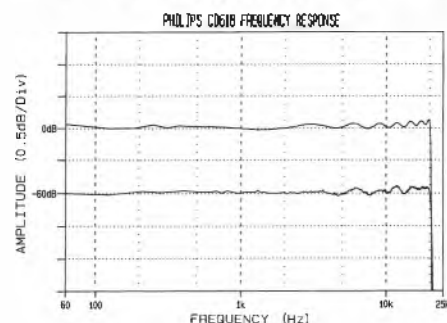
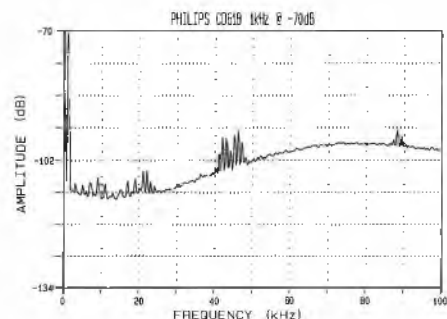
This budget player is no less substantial nor any less swift in operation than either the CD624 or CD634, players which share the same basic configuration. Nevertheless, in its latest guise (iteration three by my reckoning) this Bit Stream circuit offers a worthwhile improvement in sound quality. So much so that the fizzy, enthusiastic sound of the CD618 was judged head and shoulders above either the CD624 or CD634 we reviewed in issue 95.

Assuming these players are also using the latest boards, perhaps they too have

witnessed similar subjective improvements. Either way, this leaves us with Philips' best 7321-based model at the lowest list price, just short of a Best Buy but heartily Recommended.

## TEST RESULTS

	20kHz	1kHz	20kHz
Channel Balance	0.07dB	0.08dB	0.08dB
Channel Separation	87.5dB	86.9dB	90.7dB
THD vs Level, 0dB	-83.1dB	-84.3dB	-67.6dB
-30dB	-70.5dB	-72.0dB	-64.4dB
-60dB	-45.6dB	-46.6dB	-32.1dB
-80dB	-19.8dB	-26.3dB	-13.2dB
-90dB	-14.6dB	-11.0dB	-6.25dB
Dithered, Resolution @ -60dB	-0.01dB	-0.06dB	-0.06dB
-80dB	-0.29dB	-0.05dB	-0.05dB
-90dB	-2.55dB	-0.80dB	-0.80dB
-95dB	-1.50dB	+1.10dB	+1.10dB
-100dB	+1.30dB		
Peak Output Level, L	1.900V		
R	1.918V		
Relative Output Level	-0.40dB		
Output Impedance	205ohm		
Radio Frequency Spurious	8.1mV @ 11.3MHz		
1Hz Noise Modulation	+2.3dB		
CCIR IMD, 0dB	-83.3dB		
Suppression of stop-band IMD	55.2dB		
De-emphasis Accuracy, 1kHz	-0.18dB		
5kHz	-0.11dB		
16kHz	+0.08dB		
S/N Ratio (A-wtd), w emp, 0LSB	97.6dB		
w/o emp, 0LSB	95.6dB		
w/o emp, 1LSB	95.7dB		
Digital Output	Coaxial		
Crystal Clock Accuracy	+18.8ppm		
Track Access Time (99)	4.9secs		
Typical Retail Price	£170		



# Philips CD850MkII

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



Caught napping by the success and potential of its own BitStream technology, it took Philips about a year to really get its corporate act together and create the CD850, a cracking player that gave established contenders like Arcam's *Alpha* a real run for their money at £400.

However, Philips' brochure at the time showed a picture of this player alongside a later-generation chip, the so-called BS DAC or SAA7350. Only now, with the launch of *son-of-850* do we find a player from Philips that does actually use this DAC.

It's pretty obvious that Philips hasn't felt the need for wholesale cosmetic revisions, even if the insides are all brand spanking new. Hence the CD850MkII looks suspiciously like a CD850 with a little gold badge on its drawer. Otherwise you're faced with the same baffling array of features including two ITS memories, full alphanumeric titling, personal presets, shuffle, repeat, program and auto-play, direct track access and the biggest, boldest display you're ever likely to come across.

Remote index cueing and an eight step thick-film hybrid volume control are provided too, plus switchable optical and coaxial digital outputs that make the best of Philips' composite CDM4 mechanism and newish PCF3523 ADOC (audio digital output circuit).

## Lab report

Those who are interested in such things might care to look up the Arcam *Delta 70.3* (issue 95) because the CD850MkII is based on the same combination of SAA7310 decoder, SAA7321 (as four times oversampling filter) and SAA7350 PDM DAC. Many of the results are similar, including the huge bump of ultrasonic quantisation noise caused by the 256 times oversampling and third order SSN.

This is obvious enough on the -70dB plot but it also tends to submerge much of

the stop-band detail on the 3D plot taken at peak level. Hence distortion at higher frequencies (0.022 per cent at 0dB rising to 11 per cent at -60dB) is more a measure of noise than anything else. All this grief could so easily have been avoided had Philips run the SAA7350 at 384 times oversampling - the rate for which the chip was originally optimised.

## Sound quality

The spacious and even-handed sound of this player contrasts with the poorer integration but crisper and more transparent quality of the original CD850. Our listeners certainly felt that the reproduction of deep and strong bass notes was detailed if not especially rugged or, indeed, memorable.

On the other hand Mary Black's voice was heard to grow convincingly, adding drama, scale and pace to music which might otherwise have lacked a sense of purpose and conviction.

There was the suggestion that percussion, especially with our rock tracks, could sound a little too bright or even strident at times, and vocal sibilance was often emphasised as a knock-on effect. Otherwise the player would seem a model of decorum; indeed in this respect it was judged to be a little superficial.

So although the 850II was not truly disliked, neither did it have our panel bubbling with enthusiasm. Somewhere along the line the grip and vitality that lent the original CD850 its enthralling character has somehow been lost.

## Conclusion

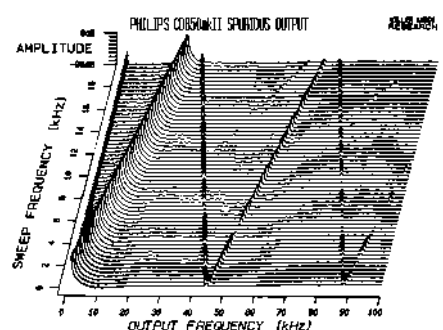
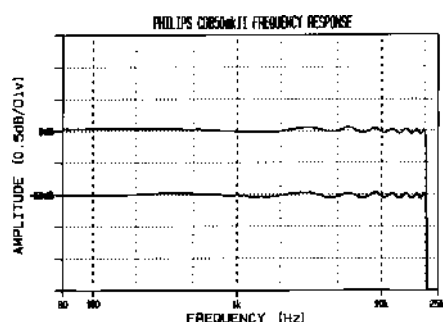
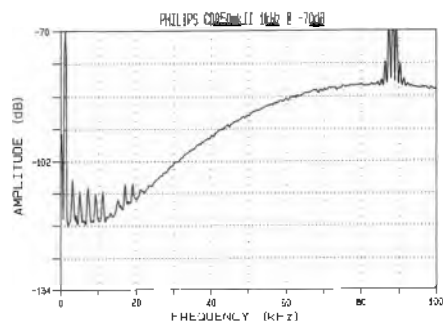
In reality this is no mere revision of the original CD850, but an entirely new player plonked into an old and familiar chassis. Anyone expecting to recognise the sound of the CD850MkII will come away confused, especially as the great splurge of out-of-band noise may well have unforeseen subjective repercussions with differ-

**Recommended**

ent amplifiers. Recommended, but really only for old times' sake.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.05dB	0.05dB	0.05dB
Channel Separation	114.5dB	111.5dB	97.2dB
THD vs Level, 0dB	-101.9dB	-101.1dB	-73.0dB
-30dB	-71.4dB	-72.7dB	-50.1dB
-60dB	-52.4dB	-50.0dB	-19.2dB
-80dB	-27.1dB	-34.8dB	-0.55dB
Dithered, -90dB	-17.7dB	+21.0dB	+9.15dB
Resolution @ -60dB	+0.05dB	+0.01dB	+0.01dB
-80dB	+0.25dB	-0.02dB	
-90dB	+0.15dB	+0.09dB	
-95dB	+0.40dB	+0.45dB	
-100dB	+1.15dB		
Peak Output Level, L	1.955V		
R	1.945V		
Relative Output Level	-0.22dB		
Output Impedance	1990 $\Omega$ m		
Radio Frequency Spurious	23mV @ 33.9MHz		
1Hz Noise Modulation	+2.6dB		
CCIR IMD, 0dB	-96.1dB		
Suppression of stop-band IMD	55.1dB		
De-emphasis Accuracy, 1kHz	-0.01dB		
5kHz	-0.02dB		
16kHz	+0.04dB		
S/N Ratio (A-wtd), w emp, 0LSB	106.6dB		
w/o emp, 0LSB	101.5dB		
w/o emp, 1LSB	100.3dB		
Digital Output	Opt/Coax		
Crystal Clock Accuracy	+28.8ppm		
Track Access Time (99)	5secs		
Typical Retail Price	£400		





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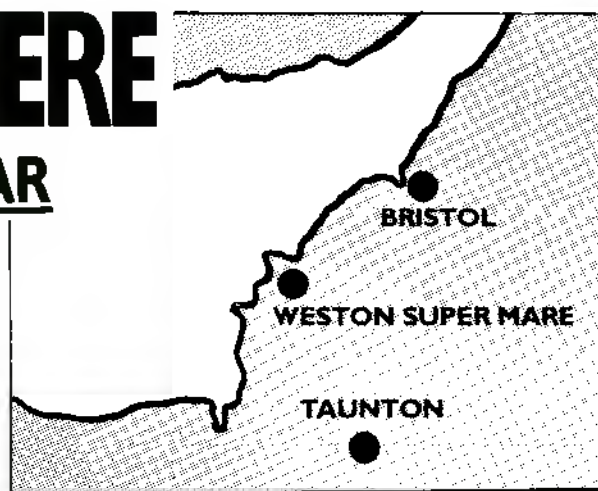
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# Pioneer PD-7700

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Much to the irritation of its competitors, Pioneer is on something of a high at the moment. Indeed, the much publicised success of the A-400 amplifier looks set to be re-enacted by a CD player or two. There are seven new players in total, each equipped with Pioneer's own 1-bit 'Pulseflow' DAC in either a single-ended or differential configuration. The top four players, including the PD-7700 featured here, are also distinguished by Pioneer's 'Stable Platter Mechanism'.

Hit the eject button and a mini-turntable platter, complete with its own little rubber mat, slides into view. The CD is loaded silver-side up while a motor spindle engages the platter from above, driving both platter and disc in unison. Conceptually it's claimed to be a good idea because the increase in rotational inertia plus the added support of the rubber mat will cut down on motor noise and other vibrations that could disturb the disc. On the other hand, this does place added stress on the CLV (constant linear velocity) servos, especially as there's no guarantee that the CD and platter are precisely concentric.

Still, there's a host of other gadgets to keep you busy. A 24-track memory is aided by a direct access keypad while other facilities like repeat and random play, peak search, hi-lite scanning, auto and manual tape editing plus fade-edit modes complete a very comprehensive package. Unfortunately, the digital output is optical only, so we'll never know the true mettle of the player's novel CD transport mechanism.

## Lab report

Since Pioneer is deploying its own PD2026A DAC, many of the measurements are very specific. Distortion, for instance, is much lower at 20kHz than it is with other PDM DACs (0.0058 rather than typically 0.03 per cent) though its performance at low and mid frequencies is

on a par with other bitstreamers. The lower HF distortion is evident from the 3D plot as are the V-patterns of innocuous (-64dB) stop-band noise. (You can thank the primary stage of Pioneer's digital filter for this.)

Still, with a composite oversampling rate of 384 times, the PDM DAC operates over a wide 17MHz spectrum so the quantisation noise (see -70dB plot) is better distributed than it would be in, say, a Philips PDM system. In terms of audio signal-to-noise, however, the PD-7700 offers no advantage over an SAA7321-based player. The 0.5dB frequency response dip is unlikely to be inaudible.

## Sound quality

All our listeners responded with enthusiasm to the impressive and, ironically enough, very 'stable' sound of this player - a sound that combines drive with an appreciation of the subtlest musical detail. This was not the biggest or most expressive sound to greet our panel, yet it provided a very tight and confident view, free of fatiguing nasties but still very often penetrating and sharply articulate.

Several listeners did recognise a mellow and often sonorous character, yet this simply reflects the satisfying combination of talents that ensure this player is musically involving as well as dynamically impressive.

Indeed, there's an up-beat but very wholesome spirit about the music that maintains a strong grip on reality rather than sounding artificial or typically 'hi-fi'. Compared to its stablemate it does lack stereo depth, but tempers this with a sound that's tighter and more exciting.

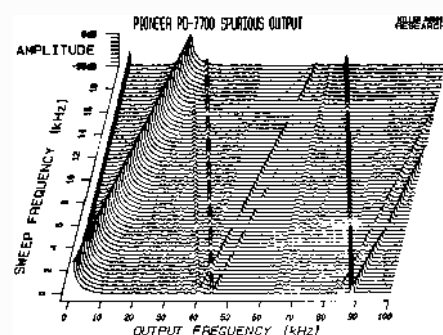
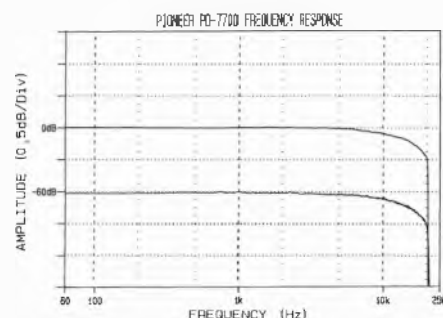
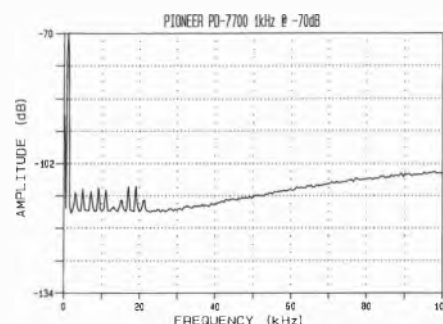
## Conclusion

With a keen and lively outlook, Pioneer's PD-7700 will bring an astringent freshness to the dustiest of systems. This it achieves without recourse to a hard or relentless style; it is simply very positive,

very confident and, all things considered, very good value. Put to the vote our listeners demanded that the PD-7700 be 'seriously Recommended'. So be it.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.05dB	0.05dB	0.04dB
Channel Separation	135.2dB	111.3dB	86.3dB
THD vs Level, 0dB	-96.7dB	-96.9dB	-84.7dB
-30dB	-94.8dB	-79.9dB	-70.0dB
-60dB	-86.8dB	-51.2dB	-40.6dB
-80dB	-28.5dB	-30.5dB	-21.2dB
Dithered, -90dB	-18.2dB	-18.6dB	-11.2dB
Resolution @ -60dB	0.00dB	0.00dB	-0.02dB
-80dB	-0.14dB	-0.13dB	-0.13dB
-90dB	-0.55dB	-0.55dB	-0.65dB
-95dB	-0.35dB	-0.35dB	-0.51dB
-100dB	-0.21dB	-0.21dB	-0.21dB
Peak Output Level, L	2.023V	2.036V	2.036V
R	2.036V	+0.13dB	+0.13dB
Relative Output Level		+0.13dB	+0.13dB
Output Impedance		1.08kohm	1.08kohm
Radio Frequency Spurious		<1mV broadband	<1mV broadband
1Hz Noise Modulation			+2.1dB
CCIR IMD, 0dB			-96.9dB
Suppression of stop-band IMD			63.8dB
De-emphasis Accuracy, 1kHz			+0.01dB
5kHz			-0.02dB
16kHz			-0.27dB
S/N Ratio (A-wtd), w emp, 0LSB			120.7dB
w/o emp, 0LSB			120.7dB
w/o emp, 1LSB			98.7dB
Digital Output			Optical
Crystal Clock Accuracy			+235ppm
Track Access Time (99)			4.2secs
Typical Retail Price			£250



# Sansui CD-X311MkII

SANSUI UK, 93/95 GLOUCESTER PLACE, LONDON  
W1H 3PG. TEL: (071) 487 4844

**Recommended**



Earlier on in the year Sansui's cheapest player, the CD-X211L, romped home to a Best Buy. This time we're concentrating on the next model up, which, despite similarities in its styling, is a completely unrelated product. In this instance Sansui has opted for a standard Sony transport with RF, decoder and signal processing ICs from the same stable. Meanwhile the crucial number-crunching is performed by Technics' budget MASH/PWM DAC, even though Sansui refers to this as 'our one bit MASH system'.

The player is no heavyweight but is equipped with a modest range of useful gadgets. There's a 20-track memory that ties in with the music calendar on the main display, while synchronised editing and taping is possible using one of Sansui's matching cassette decks. Otherwise there's a choice of direct track access, music scan, random and repeat play in addition to a couple of volume keys on the accompanying remote. This gives the user fine control over the top 20dB of the player's output, including the headphone socket but not the coaxial digital output.

## Lab report

This player might use Sony support ICs and a proprietary analogue stage but it's Technics' MN6474 PWM DAC that dominates most of the measurements. Once again CCIR intermodulation distortion is a very low -96dB but the third order products clock in at a much higher -71dB. Likewise, THD achieves a minimum of 0.0006 per cent (1kHz, 0dB) but increases to a typical 0.044 per cent by 20kHz.

The second and third harmonics are clear enough on the 3D plot, as is the characteristic streak of stop-band noise: just compare this with Technics' SL-PG200A (see page 45). Sansui has given its player a slight +0.18dB treble boost yet the DAC still produces its customary hiccup at 10-11kHz on the -60dB trace. Nevertheless its linearity remains a model for

other players to emulate.

Differences? Well, Sansui's ultrasonic filtering is not quite so effective (-70dB plot) though RF output is gratifyingly low. The analogue op-amp also produces a lot of third order distortion at 20Hz (typically 0.011 instead of 0.0014 per cent), but at least Sansui has had the good manners to disable the DACs' 'cheat mode', enabling truly representative signal-to-noise measurements to be obtained.

## Sound quality

Our listeners praised this player for a lush and involving sound that had weight and warmth even if it did lack 'concrete' solidity. Vocals were generally very clear and expressive while Mary Black's *Columbus* also benefitted from what seemed, subjectively at least, a very quiet background. Similarly our Pachelbel selection was also neatly resolved, capitalising on a fine sense of depth even if the bass did tend to drone slightly.

The music did seem to retain a good sense of structure, enabling us to hear subtle tonal variations in strings, for instance, without there being any added hardness or emphasis. It was particularly free of the hard and edgy colorations that plague the vocal quality of many lesser players. On the other hand there was a fuller and fatter brass sound than with similar MASH-based players while it also tended to sit on higher, timbral harmonics. All this added up to a very pleasant and undemanding sound albeit one that lacks the most incisive detail.

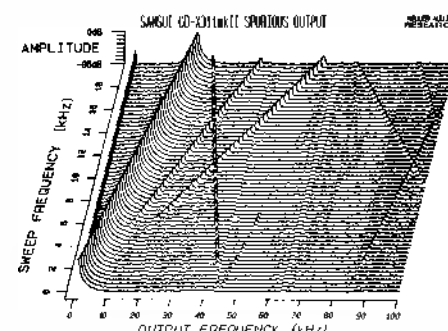
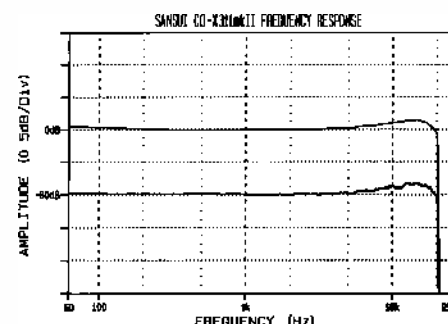
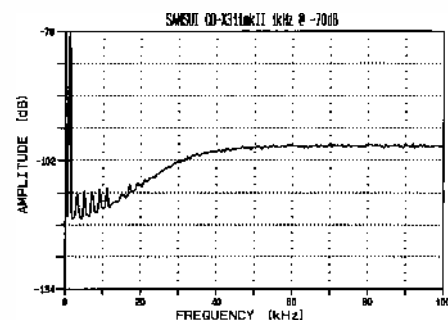
## Conclusion

This is not the most accurate or neutral of players, yet its warm and friendly balance struck a chord with our listeners. Because the player doesn't try too hard it never ends up over-stretching itself and this, in the panel's opinion, was a justifiable compromise. Still, the CD-X311MkII is not particularly cheap at £250 and so is un-

likely to have the commercial impact of its cheaper stablemate, the CD-X211E. A rather cautious Recommendation seems most appropriate.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.08dB	0.08dB	0.17dB
Channel Separation	108.3dB	102.9dB	69.9dB
THD vs Level, 0dB	-79.0dB	-104.3dB	-67.1dB
-30dB	-90.4dB	-81.5dB	-59.3dB
-60dB	-56.7dB	-52.0dB	-33.5dB
-80dB	-28.3dB	-32.0dB	-11.9dB
Dithered, -90dB	-18.2dB	-20.0dB	-4.15dB
Resolution @ -60dB		-0.01dB	-0.01dB
-80dB		+0.03dB	-0.20dB
-90dB		-0.35dB	-0.47dB
-95dB		-0.19dB	-0.48dB
-100dB		-0.08dB	
Peak Output Level, L		2.139V	
R		2.116V	
Relative Output Level		+0.54dB	
Output Impedance		1.403kohm	
Radio Frequency Spurious		2.1mV @ 11.3MHz	
1Hz Noise Modulation			+3.1dB
CCIR IMD, 0dB			-95.9dB
Suppression of stop-band IMD			83.3dB
De-emphasis Accuracy, 1kHz			+0.11dB
5kHz			+0.05dB
16kHz			-0.15dB
S/N Ratio (A-wtd), w emp, 0LSB			105.7dB
w/o emp, 0LSB			100.6dB
w/o emp, 1LSB			100.2dB
Digital Output			Coaxial
Crystal Clock Accuracy			+48.8ppm
Track Access Time (99)			4.5secs
Typical Retail Price			£250





# Yamaha CDX-450

**Recommended**

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



'Featuring Yamaha S-Bit Technology', declares the brochure accompanying the CDX-450E. However, Yamaha's new budget machine shares neither the original S-Bit technology of previous players nor the S-Bit Plus of costlier models like the CDX-750. In reality Yamaha has opted for a new hybrid DAC that combines a conventional 10-bit converter with a PWM bitstream output. This offers some of the advantages of pure bitstream operation but at lower cost.

The matt fascia, with its gently contoured profile and soft orange display, looks very attractive indeed. Furthermore, a basic remote control adds a direct access keypad and index facility to the standard array of widgets found on the player itself. Yamaha has even included a digital level control which operates through the headphone and main output phono, offering some 34dB of adjustment before ending in a full mute.

## Lab report

There's a token improvement in linearity over a budget 16- or 18-bit DAC and low-level distortion is improved (typically four per cent at -80dB). Nevertheless the multi-bit heritage begins to show through at higher levels where, at -30dB for instance, THD is some ten times higher than it would be with a decent bitstreamer, while noise modulation is up to +11dB. Even at -70dB the pattern of distortion and ultrasonic noise is closer to that of a multi-bit DAC in character (see -70dB plot).

Yet it's the YDC101 eight times oversampling filter (which also houses the volume control) that has the biggest problems. The little +0.45dB bump in its response is harmless enough but the ineffectual 20dB stop-band rejection most certainly is not. Hence the vast swathes of stop-band images that clutter the 3D plot, intense signals that are likely to give rise to audible IM distortion with some partnering amps and speakers.

## Sound quality

Oh dear, this turned out to be rather messy. There was little disagreement over its general balance, character and resolution of detail; it was simply the player's presentation of this detail that prompted contrasting views. All complimented its clarity and fine sense of proportion, though some listeners felt its natural demeanour provided no barrier to the heart of the music, whereas others were dismissive of its bland and superficial staging.

Its supporters felt the player was neither clinically detailed nor warm in a euphonic sense, instead it simply got down to the business of providing as much detail as possible in a thoroughly undemanding and unforced manner. They conceded that there was not quite the full drive behind Chris Rea's voice, for instance, yet this seemed almost peripheral in importance compared to the busy and beautifully integrated character of the associated instruments.

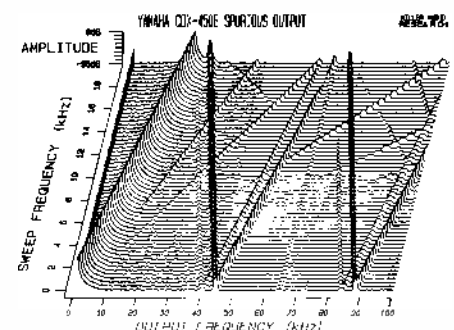
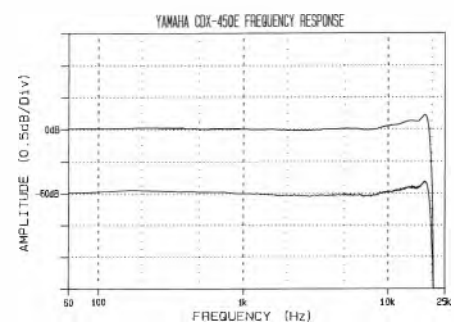
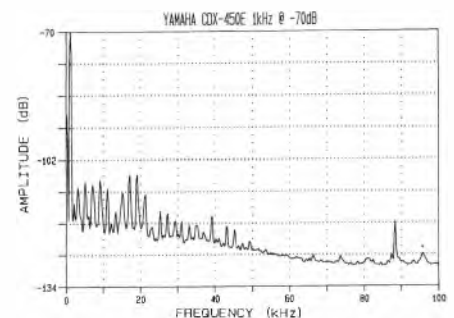
Ducking balls of waste paper, the antagonists emerged to suggest that although the player's rendition of individual instruments was actually very good, the interplay between them was less definite. So much so, they countered, that many pieces of music failed to gel convincingly. They thought the 450 was surprisingly detailed but its presentation was less clear, more bunched and certainly less transparent than competing budget models.

## Conclusion

This player prompted a divergence of subjective opinion, making it all the more important to document the impressions of the opposing 'camps' as clearly as possible. Over two blind listening sessions we ended up with a pair of panellists nominating the CDX-450E for a Best Buy while five others were left distinctly unimpressed. Hardly ideal, but sufficient for me to slap on a Recommended sticker and leave you to make the final decision.

## TEST RESULTS

	20Hz	1kHz	20kHz
Channel Balance	0.01dB	0.01dB	0.10dB
Channel Separation	105.2dB	108.2dB	74.7dB
THD vs Level, 0dB	-93.3dB	-93.5dB	-72.8dB
	-30dB	-61.0dB	-63.4dB
	-60dB	-33.9dB	-46.4dB
	-80dB	-22.4dB	-27.8dB
Dithered, -90dB	-17.9dB	-19.6dB	-24.2dB
Resolution @ -60dB		+0.01dB	-0.01dB
	-80dB	+0.11dB	-0.40dB
	-90dB	+0.56dB	-1.10dB
	-95dB	-0.02dB	-4.25dB
	-100dB	-1.85dB	
Peak Output Level, L		2.045V	
		2.042V	
Relative Output Level		+0.19dB	
Output Impedance		1.04k $\Omega$	
Radio Frequency Spurious		2.8mV @ 85MHz	
1Hz Noise Modulation		+11.2dB	
CCIR IMD, 0dB		-90.7dB	
Suppression of stop-band IMD		19.9dB	
De-emphasis Accuracy, 1kHz		+0.01dB	
	5kHz	+0.09dB	
	16kHz	+0.06dB	
S/N Ratio (A-wtd), w emp, 0LSB		109.5dB	
	w/o emp, 0LSB	109.6dB	
	w/o emp, 1LSB	109.6dB	
Digital Output		None	
Crystal Clock Accuracy		-2.5ppm	
Track Access Time (99)		5.8secs	
Typical Retail Price		£170	



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*The Classic System*



# CD and DAT personals

*The last couple of years have seen the digital format moving out of the home and cropping up in personal CD players. This year they were joined by the first DAT personals.*

**B**ack in the May issue of *Hi-Fi Choice* we decided to take a look at digital audio on the move, in the shape of nine of the latest CD personals and three of the first portable DAT recorders.

Although Aiwa was the first company to get a DAT personal onto the market it was Sony which stole the honours in our reviews, the *TCD-D3* clearly benefiting from Sony's decision not to pioneer the market. Although neither the Aiwa *HD-S1* or Kenwood *DX-7* was deemed worthy of Recommendation, the Sony machine received a Best Buy rating.

Part of the reason for the success of the Sony machine was its price, a mere £500 including a built in analogue to digital convertor. The other main reason was the sound quality which was judged to be significantly better than the other two models, although the player was still considered to be less than a match for the best stationary CD players.

## CD on the move

On the CD personal front we uncovered a pair of Best Buys, the £200 Philips *AZ 6897* and the £130 Technics *SL-XPI*. Considering its asking price the Technics is an exceptionally well specified unit, made all the more remarkable by the fact that the cost includes not only the player itself but also a pair of AA size rechargeable batteries, headphones, AC main adaptor, carrying case and a 3.5mm to twin phono plug interconnect.

The unit proved to be one of the most portable in the entire test, a fact we found somewhat surprising given its lack of both weight and bulk. In previous tests we had found there to be a clear relationship between the mass of a player and its resistance to shock but this appeared to be turned on its head during our latest test with both of the Best Buy players being exceptionally light.

The Technics' rechargeable batteries were a real boon and environmental considerations aside, will save you money and last for a very respectable 75 minutes from a single charge. The Technics was also judged to be of the best sounding

players in the group with a comparatively tight bass and good control of the middle and upper registers which managed to avoid the rather bland impression given by some of the other CD personals.

The other Best Buy was awarded to the Philips *AZ 6897*, a rather unusual looking player which was described as looking rather like the lid of a deep fat fryer. The Philips machine is also rather unusual in that it was the only player in the test to include both a clock and a radio, although the performance of the latter is obviously limited by the need for the headphone lead to serve dual purpose as an aerial.

The Philips proved to be the most portable of all the machines in our test and was capable of withstanding a quite remarkable degree of physical abuse before giving up the ghost. We rated the machine at above average in terms of sound quality although it was judged to have one of the worst bass boost circuits, the lower frequencies wallowing all over the place when this facility was engaged. The unit comes complete with a separate, wired, remote control and this is a real advantage, particularly when the unit is being used on a crowded tube or train.

The other unit to emerge from our test with honours was Sony's £180 *D-66* which was judged to be worthy of Recommendation. The unit was judged to be quite capable in terms of producing sound on the move and presented music in an open and relaxed manner which was judged to be extremely suitable for long term listening. The unit also comes supplied with an internal, rechargeable battery pack which is

capable of a respectable two hour playing time and extra battery packs can be purchased for longer journeys. The headphones are also slightly better than average and come fitted to a headband which helps to prevent the premature fall out so common with the intra-aural units.

## Conclusion

Although the above machines are something of an exception, in general we judged the standard of CD personal performance to be rather poor, both in terms of sound quality and portability. When it comes to ultimate sound a decent full size machine will see off a personal with ease, although the gap has closed somewhat in the last year or so. The DAT players proved to be something of a revelation and might provide an interesting alternative for those seeking a state of the art personal sound system. Although they are fairly expensive they are significantly better than the best CD portable player we reviewed and far less prone to problems when used on the move.





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At the heart of every hi-fi system there is an amplifier, the one component that links everything together. As well as providing the interface between source and loudspeaker, the amplifier also acts as a switching centre, allowing you to copy from CD or vinyl onto tape for instance. A simple task you might think but in reality it is one dominated by extremes, from handling the minute voltages produced by a moving-coil cartridge all the way up to the power demanded by an inefficient and power hungry loudspeaker, levels which can be as much as 100,000 times higher.

Just how adequately an amplifier copes with these extremes is reflected in both its technical and subjective performance, though these two arbiters are not

you the clout you're after without recourse to an electronic band-aid. That's what system matching and upgrading is all about.

Once again, this is not to say an amplifier with sensibly tailored tone controls cannot sound respectable. Indeed many popular models include a tone defeat facility in an attempt to offer the best of both worlds. Even the Japanese majors like Pioneer, JVC and Sony are getting in on the act, providing minimalist amplifiers especially for us in the UK! Furthermore with the inevitable decline in vinyl sales some new amplifiers are being offered with or without MM/MC disc stages. After all these are the most difficult stages to engineer, so why waste money if the amp is destined for life in a CD-based system?

# Choosing and Using ... Amplifiers

*Unless you're into active loudspeakers, there is an amplifier at the heart of every hi-fi system. Paul Miller explains what to look for when investing in this vital link in the hi-fi chain.*

mutually dependent. For instance the higher-powered amplifier with vanishingly low levels of distortion will not necessarily sound better than a weaker model with crate loads of unwanted harmonics in tow – otherwise the small but hotly contested market for valve amplifiers would have dried up long ago.

## A solid state

Nevertheless the bulk of amplifiers made today are solid-state in design, because these are simply more efficient, flexible and reliable in execution than their valve forefathers. But even here there is a broad canvas of style and design, including the archetypal feature-laden and button-strewn amplifier which continues to dominate the mass market.

Still, you rarely see a graphic equaliser or dubious power display on an amp these days, and a good thing too because these superfluous widgets do nothing to enhance the sound. After all, every bit of extra electronics cannot avoid adding a little smudge of its own. And all these smudges add up to obscure the natural colour and vibrancy of the music itself.

It was this sort of thinking that kick-started the specialist amplifier market, minimalist designs devoid of bass and treble controls, loudness contours or even a balance control. Their brief is a simple one with all efforts concentrated on circuitry that's absolutely crucial to the music signal.

Is this the sort of amplifier for you? Well, be honest with yourself, do you really need tone controls or other widgets? If you do then perhaps the imbalance lies within the system itself. Don't buy an amp just to tweak the bass control, choose one instead that gives

## One or two boxes

But whatever their origin, all amplifiers must tackle the extremes we mentioned in the opening paragraph. A conventional integrated amplifier has the toughest job because the sensitive MM/MC stage and rugged power amp are both beaver away within the confines of a single case. It's easy to imagine how the dynamics swings in current demanded by the speaker might effect the delicate, low-level signals being offered-up by a phono cartridge. Rather like trying to perform micro-surgery in the middle of an earthquake!

Preamplifiers separate the job of signal processing from the heavy-duty power amp which provides the muscle needed to control the speaker. Each gets on with its allotted task without influencing the other via the common power supplies, earth tracks and casework shared in an integrated amplifier. Pre/power amps do offer the promise of higher quality sound but then they occupy a price bracket well above the ordinary integrated product.

Nevertheless, simply looking at an amplifier will give you very little clue to its prowess, whether it be a pre/power combination or budget integrated model. So the first rule is to find yourself a good and patient dealer willing to let you hear a variety of different models. The second rule is not to worry overmuch about 'matching' the nominal output of the amp to the power rating of your speakers. If the boxes have 50W slapped on the back this does not prohibit the use of a 30W or even a 100W amplifier, for instance.

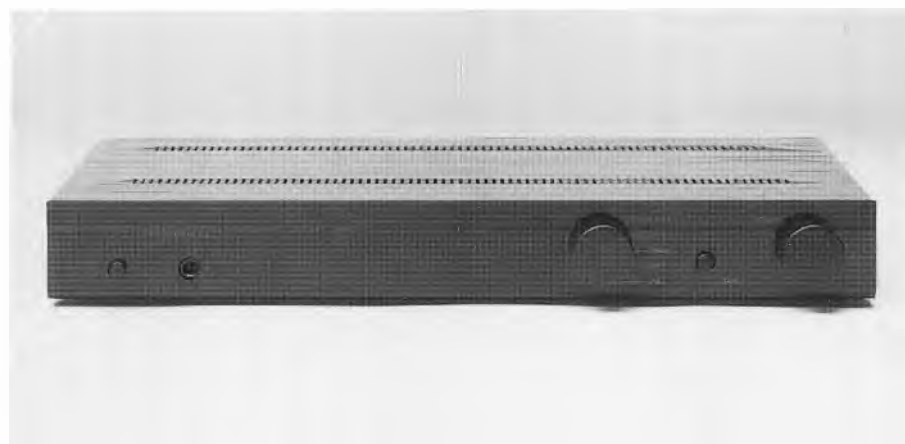
If it sounds right then it is right, after all you're the one that has to live with the decision, not your dealer. In fact it's easier to damage your speakers by pushing an under-powered amp too hard than blasting out the occasional clean peak from a monster amp. Don't get hooked on power though, because more power does not necessarily mean more quality.

So what's all this fuss about peak current? Well, current comes into the equation because a certain number of Amps (or milliamps) are required to maintain the voltage across the speaker load, and the lower the load the more current is demanded for any given power level. Wind up the wick too far and the current runs dry, causing a massive increase in distortion which, in turn, screws up the speaker. However, if this happens you can always turn to the loudspeaker section to track down a replacement!

# Aura VA-50

B&W LOUDSPEAKERS, UK SALES LTD, MARLBOROUGH ROAD, LANCING, WEST SUSSEX BN15 8TR. TEL: (0903) 750 750

**Best Buy**



This review should serve as a salutary lesson to all those manufacturers who are nervous of how their pride and joy will stack up in a fair and blind listening test. We nearly missed out on Aura's £200 VA-50 for this reason, yet it turned out to be one of the star performers of the test.

In essence this VA-50 is a polished version of the cheaper VA-40, itself based on an amplifier known as the MA-80 which was manufactured by ITL. The company and the rights to this design were bought by B&W, who then formed the Aura brand that we know today. The VA-50 shares the same sleek appearance as its forebears, with little to disturb the glossy fascia but a volume control and input selector.

One tape, four line and MM vinyl disc sources are accepted while a single pair of speakers are accommodated via a set of very chunky binding posts. There's also a new tape monitor facility, but inside it's clear that plenty of effort has gone into tidying-up the layout and choice of components. The Hitachi power MOSFET's are unchanged, for instance, but the driver stage is a simpler and more elegant affair.

Furthermore, the old RC5532 op-amps have been swapped for decent Signetics devices in the disc stage. The shunt-feedback RIAA equalisation topology remains unchanged, but the Signetics chips sure sound a whole lot better!

## Lab Report

The VA-50's power supply has not been 'beefed up' so much as refined. The upshot is that the 8ohms power figure increases from 55W (VA-40) to 65W although the dynamic headroom is reduced to just +0.4dB. Peak current delivery remains unchanged 10A.

The output impedance has increased by a factor of three, stereo separation has improved but channel balance, noise and distortion (particularly via MM disc) have

all deteriorated. Vinyl disc headroom has fallen from 27.4dB to 25.9dB though sensitivity is largely unchanged.

Much of this is reflected in the 3D plot, which shows a similar spread of multiple-order IM mechanisms to those found with the VA-40 (see issue 80). One effect of this 'carpet distortion' may be to disguise the audible effects of RF IMD, should this occur due to spurious activity in the 100-250MHz region.

## Sound Quality

Aura's policy of 'tweaking by ear' has been rewarded by the reaction of our panel. Listeners were especially impressed by a liquid and easy style that reinforced the sense of weight and body behind Chris Rea's voice - a very expansive sound, utterly free of strain, if not quite as dynamic as possible.

This unforced and subjectively clean (though not uncoloured) quality extended from the bass right through to the treble, the VA-50 managing to strike a good balance between percussion, vocals and the overall rhythm of the piece - rather like the difference between a good and bad conductor, suggested one listener.

The vinyl disc input produced a sound of similar balance, and also seemed less critical of surface noise than many competitors. There is a slight congestion of notes in the upper bass, a mild thickening that was most noticeable on our jazz piece, but this is no serious drawback. Indeed Aura's VA-50 turned out to be the most listenable and engaging amplifier of the day.

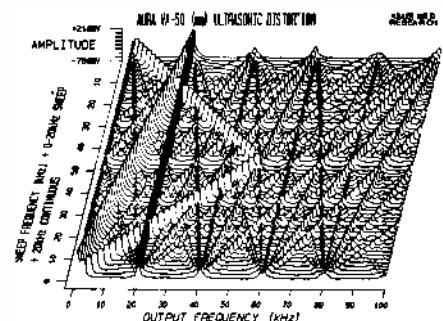
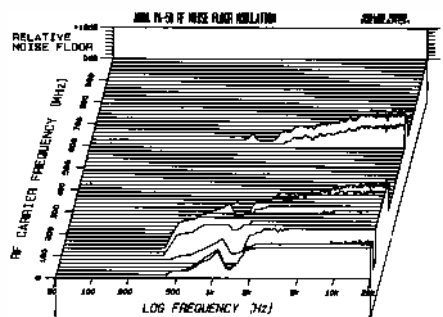
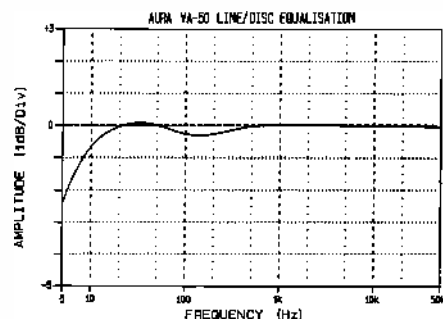
## Conclusion

By hook or by crook the lads at Aura have managed to claw back much of the magic that infused the original ITL MA-80, leaving the VA-40 somewhat high and dry as the poor relation. Many of the measurements suggest the 50 might be

speaker and system-sensitive, but the fine results obtained in the listening tests thoroughly justify a Best Buy rating.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	60.2W	64.5W	54.4W
4ohms	69.0W	72.7W	66.6W
Dynamic Headroom (IHF)	+0.44dB (71.3W)		
Peak Current (5msec, 1% THD)		10.0A	
Output Impedance	0.099ohms		
Damping Factor	80.1		
	CD/Aux	MM	
Stereo Separation (1kHz)	69.4dB	67.8dB	
(20kHz)	45.5dB	45.1dB	
Channel Balance (1kHz, -20dBV)	0.96dB	0.84dB	
(-60dBV)	4.04dB	3.85dB	
Total Harmonic Dist. (0dBW)	-77.6dB	-77.8dB	
(Two-thirds power)	-56.2dB	-56.1dB	
CCIR Intermod. Dist. (0dBW)	-77.1dB	-70.9dB	
(Two-thirds power)	-60.2dB	-59.2dB	
Noise (A-wtd, 0dBW)	-83.7dB	-65.8dB	
(Two-thirds power)	-95.4dB	-69.6dB	
Residual noise (unwtd)	-53.4dBV	-53.4dBV	
Input Sensitivity (for 0dBW)	29.6mV	417uV	
(for full output)	240mV	3.49mV	
Disc Overload (1kHz)		97.9mV	
(20kHz)		874.0mV	
(50kHz)		1017mV	
Tape Output/Impedance	6.93V (disc)/109ohms		
Input loading	45.6kohms/80pF	46.7kohms/160pF	
DC offset, left/right		9.1mV/-28.6mV	
Retail Price			£200





# Dual CV5600

**Best Buy**

RAM PROJECTS, UNIT 27, STRETFORD MOTORWAY EST., BARTON  
DOCK RD, STRETFORD, MANCHESTER M32 02H. TEL: (061) 866 8101



Nothing out of the ordinary, or an amplifier with a skeleton in its cupboard? From the front panel you'd never guess anything was afoot - the bass, treble and balance controls look harmless enough as does the large volume knob. Dual has also provided connections for two tape decks, three line sources and a MM phono input while a separate CD-direct facility enables you to bypass all these twiddly bits. The music signal still has to be routed via a naff speaker selection switch, however.

So why all the fuss? Well, look at the rear of the amp and you will discover that the CV5600 is a dead-ringer for any Rotel amplifier - same phonos, same casework, same 4mm terminals. In fact the CV5600 is built by Rotel, apparently to Dual's specification. But if the results of our listening are any guide, Rotel would appear to have done rather too good a job! Oddly enough a cursory internal examination reveals a few Rotel trademarks but nothing that would suggest the CV5600 is a rip-off of the RA-820AX or 810A for instance.

There are none of the selected components you'd expect to find in a Rotel amp and no low-noise Signetics op-amps in the disc stage. NEC IC packages are used as drivers for the power amp and there's even a pucker Zobel network at the output. So why does the CV5600 sound every inch the Rotel amplifier? The only clue I've got concerns the power amp itself which uses the same Sanyo transistors preferred by Rotel.

## Lab report

Plenty of juice on tap here, the 57W/82W (8/4ohm) specification exceeding any of Rotel's sub-£200 amps. The hefty 14A current reserve also bodes well for driving difficult speakers, but don't forget to take into account the phase-inversion (brought about by the tone circuitry). Channel balance is great but THD reduces

markedly from 0.038 per cent at 1W to typ. 0.0018 per cent at two-thirds output, suggesting a hint of low-level crossover distortion.

All line-level RF is blocked by a series of input RC filters while, back under closed-loop conditions, the 3D plot betrays the merest hint of second-order distortions. This looks more like the RA-820AX's spectrum than the 820BX4, for instance. The MM disc response is all 'Dual' too, extending well into the subsonic bass with a mild +1dB lift at 50kHz. Disc input sensitivity is normal at 3.1mV, headroom satisfactory (+28.7dB) and noise suitably low (-83dB, A-wtd).

## Sound quality

The stylus had barely traversed its first circuit of Sting's *Fragile* before a smile of satisfaction spread across the faces of our listeners. The crisp, articulate quality of vocals and delightful string tone of the guitar were immediately apparent. There may not have been the weight of our bigger amps but the depth of detail was unmistakable.

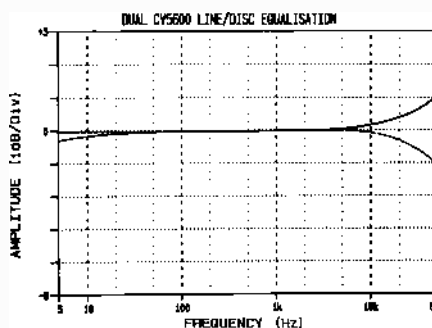
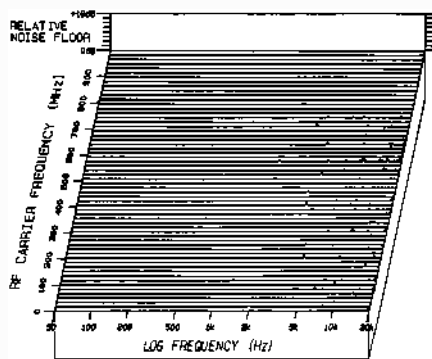
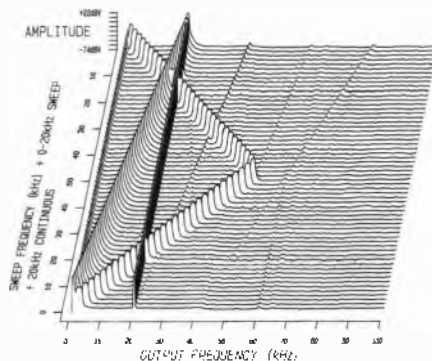
Whether via CD or MM disc, the amplifier sounded very clean and nimble just as it enjoyed an excellent sense of stereo focus. Detail and control sum up this amp's capabilities as everything dovetailed together both in proportion and balance. The liquid and deeply musical quality of the PDM DAC made an all-too-brief appearance with the CV5600 in play, revealing a string tone and quality of brass that was quite superb, rich, vibrant and communicative.

## Conclusion

Clearly the best sub-£200 amp in our test and more than good enough to put the shivers up the spine of our established hierarchy. However lucrative it considers such OEM commissions, Rotel may end up kicking itself.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	54.4W	57.0W	51.3W
4ohms	77.5W	82.4W	75.8W
Dynamic Headroom (IHF)		+1.1dB	(73.5W)
Peak Current (5msec, 1% THD)			14.1A*
Output Impedance			0.127ohm
Damping Factor			63.2
		CD/Aux	mm
Stereo Separation (1kHz)		67.2dB	67.1dB
(20kHz)		43.0dB	42.5dB
Channel Balance (1kHz, -20dBV)		0.36dB	0.38dB
(-60dBV)		0.31dB	0.33dB
Total Harmonic Dist. (0dBW)		-68.8dB	-68.5dB
(2/3 power)		-96.2dB	-94.2dB
CCIR Intermod. Dist. (0dBW)		-70.8dB	-68.5dB
(2/3 power)		-96.8dB	-74.2dB
Noise (A wtd, 0dBW)		-84.5dB	-80.5dB
(2/3 power)		-96.9dB	-82.7dB
Residual noise (unwtd)		-75.3dBV	-75.5dBV
Input Sensitivity (for 0dBW)		31.0mV	412uV
(for full output)		236.6mV	3.13mV
Disc Overload (20Hz)			15.25mV
(1kHz)			136.9mV
(20kHz)			1225mV
(50kHz)			2732mV
Tape Output Impedance		9.920V (discy) 2.49kohm	
Input loading		47kohm/590pF	45.5kohm/450pF
Absolute Phase			Inverting
DC offset, left/right			+0.08mV / +0.55mV
Retail Price			£150



# Kenwood KA-3020

**Best Buy**

TRIO-KENWOOD UK LTD, KENWOOD HOUSE, DWIGHT ROAD, WATFORD, HERTS WD1 8EB. TEL: (0923) 816 444



After the success of the 5020 (see page 87), which delivered a successful combination of power, facilities and sound quality, it seemed a good idea to take a look at the 3020 budget model for this issue. The amplifier is equipped with a standard array of features including tone, loudness and balance controls, all of which may be defeated via the Source Direct option.

In typical Kenwood style, the black alloy fascia is dominated by a large rotary volume control. There are also separate input and record-out selectors for two tape, CD, tuner, aux and MM disc sources. The internal design and layout is straightforward enough, using an integrated Class A stage to drive a discrete, Class B power amp. Like Yamaha, Kenwood makes much of the 'Logical Flow' construction, which is supposed to keep all signal runs as short as possible.

## Lab report

In practice, however, any Logical Flow topology is completely undermined by the lengths of ribbon cabling that travel across the amplifier to the A/B speaker selection switches, and then back again to the 4mm binding posts! Local relay switching is used as part of the protection circuit (limiting peak current to 8.3A), but not in the main selection circuit. A healthy 66W output might be sustained across the full 20Hz-20kHz bandwidth, but the output impedance is quadrupled to around 0.13ohm.

Noise is very low (around -82dB at 1W), input sensitivities are fine and disc headroom is more than adequate (28.8dB at 1kHz). Distortion suffers with increasing level and frequency, and both second and third-order intermodulation distortions are clearly visible on the 3D plot - all of which are linked to the integral power amp, rather than the MM vinyl disc input. THD increases from 0.0028 to 0.02 percent from 1W to two-thirds output.

The RF IMD plot may look spectacularly clean, but this has more to do with Kenwood slugging the inputs than the inherent open-loop linearity.

## Sound quality

Bog-standard stuff by all accounts, yet the 3020 was still sufficiently well judged to prompt a very enthusiastic reaction from our panel. All praised the solid, methodical and weighty sound which, in the words of one listener, constructed a substantial foundation for the music's roots. For instance the cellos from the Vivaldi concerto were more menacing than usual, growling with a fulsome resonance. This bolstered the tension of the piece and created a level of anticipation that hooked our listeners, introducing a sense of occasion rather than simply impressing with exaggerated dynamics.

On the debit side Chris Rea's voice was a little gravelly while the accompanying cymbals sounded slightly edgier and harder than usual. Nevertheless, the panpipes and guitar from our Mosaic CD were superbly separated, if lacking the full, natural woodiness that distinguished models like the Aura VA-50.

Switching to MM vinyl disc did not dampen our enthusiasm; there was a genuinely delicate touch to Sting's guitar, the whole piece taking on an evenness and fluidity that was missing on many other presentations. The Rachmaninov *Dance* bounded along at a fair old pace, led by the brilliance of the strings and reinforced by the ensemble of brass and percussion: a bit rough about the edges perhaps but stirring stuff nonetheless.

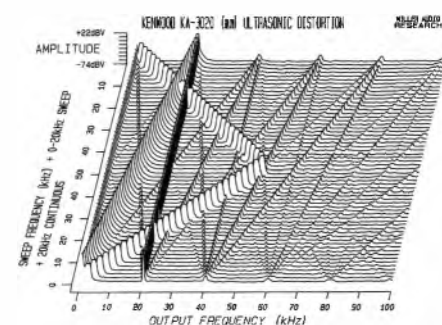
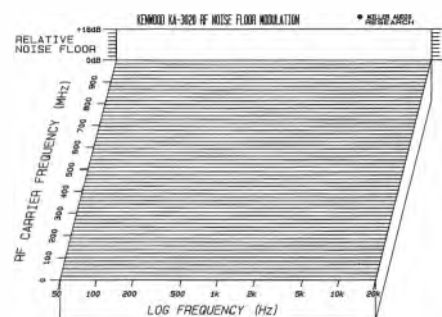
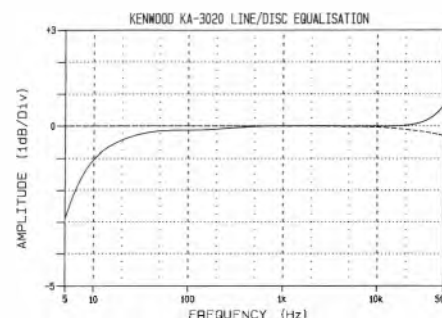
## Conclusion

There is nothing outwardly special or tweaky about the design of the KA-3020 but the music it makes has an uncluttered and genuinely unpretentious feel that cannot fail to communicate. All this plus

good build quality and sensible features at a realistic price makes up the necessary ingredients for a Best Buy.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	65.9W	65.5W	64.6W
4ohms	87.5W	91.2W	88.1W
Dynamic Headroom (1HF)	+1.5dB	(91.8W)	
Peak Current (5msec, 1% THD)		8.3A*	
Output Impedance	0.129ohms		
Damping Factor	62.0		
		CD/Aux	MM
Stereo Separation (1kHz)		70.5dB	70.6dB
(20kHz)		45.4dB	45.9dB
Channel Balance (1kHz, -20dBV)		0.23dB	0.01dB
(-60dBV)		1.80dB	1.63dB
Total Harmonic Dist. (0dBW)		-90.6dB	-92.0dB
(Two-thirds power)		-73.1dB	-74.9dB
CCIR Intermod. Dist. (0dBW)		-95.6dB	-75.6dB
(Two-thirds power)		-73.4dB	-73.9dB
Noise (A-wtd, 0dBW)		-83.8dB	-80.5dB
(Two-thirds power)		-98.3dB	-82.1dB
Residual noise (unwtd)		-76.9dBV	-76.8dBV
Input Sensitivity (for 0dBW)		34.2mV	436uV
(for full output)		276.5mV	2.21mV
Disc Overload (1kHz)			137.9mV
(20kHz)			1242mV
(50kHz)			2685mV
Tape Output/Impedance		10.95V (disc) / 508ohms	
Input loading		55.6kohms/870pF	4.7kohms/300pF
DC offset, left/right		-0.7mV/-4.1mV	
Retail Price			£140



# Mission Cyrus One

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

**Best Buy**



From time to time it does no harm to reevaluate some old favourites. The stalwart *Cyrus One* from Mission is an immensely popular amplifier constructed on a rugged cast alloy chassis and finished in either matt black or a grey Nextel material. A small power-on LED has replaced the illuminated 'Cyrus' logo of older models while the rather fiddly miniature headphone socket has finally been dropped altogether, and a good thing too.

The facilities are basic but sufficient, comprising a detented volume control with peripheral balance adjustment and independent record-out/input selection for four line sources as well as both MM and MC disc. The latter are selected by a small switch on the rear of the amplifier which adjusts the gain (but not the loading) of an internal NE5534N headamp.

All other inputs and outputs are easily accessible, the line sources being routed directly to the volume control before passing to a high gain quasi-complementary power amp. The devices, manufactured for Mission by SGS, are firmly clamped to an internal cast alloy heatsink for efficient cooling.

The universal PCB has been relaid in recent times and particular attention paid to its earthing pattern. Furthermore, polypropylene caps are now used throughout the amp, with some polyester types being employed when higher values are required. This, a new 100VA toroid and slit-foil reservoir capacitors, completes the *Cyrus One's* evolution to date.

## Lab report

This is a solid enough performer offering low distortion (0.0019 per cent via line), a lowish 0.07 ohm output impedance and very low -85dB A-wtd noise via MM disc. The MC input is a little noisier and its 20kHz phase shift a common NE5534 op-

ampattwo alternative gain (and therefore feedback) settings.

Power output holds up well between 8 and 4 ohm (+2.0dB), bolstered into lower impedances by a substantial 12.8A current delivery.

## Sound quality

The calibre of this amp was evident from the outset of our listening, all panellists being struck not only by the powerful, almost 'meaty' solidity of the sound but also by its effortless fluidity. The CD input was the best we had heard in this particular test, inherently musical and quite capable of retrieving the subtlest of musical nuances.

Not only did the *Cyrus One* possess this wonderful lightness of touch and poise but it was also remarkably solid and confident in its presentation - firm and tightly focused but not forward or aggressive. It certainly hit an emotional chord with our listeners who were able to sit back, relax and enjoy the sound of music without being bothered by niggling shortfalls in its performance.

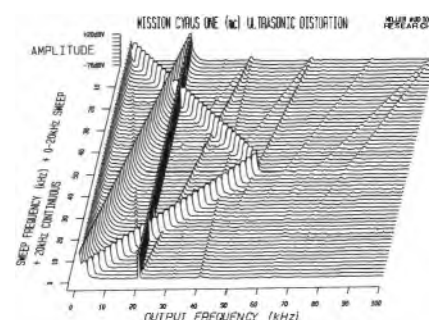
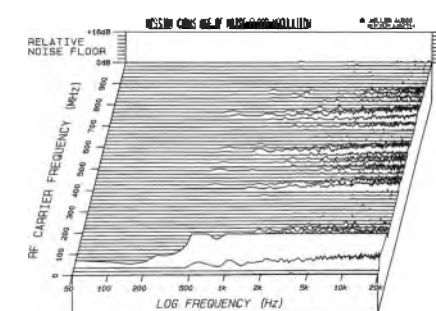
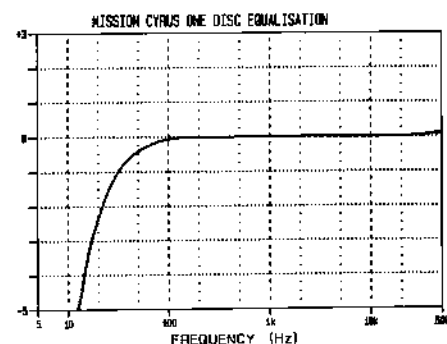
Switching to the disc input brought about a slight loss in clarity, vocal articulation and stereo focus even though the overall balance of the phono stage was warm and eminently comfortable. Crisp bass transients were now reproduced with a vaguely spongy texture though it is true to say that in a lesser amplifier these subjective differences would be less easy to discern.

## Conclusion

The *Cyrus One* appears to have added yet another string to its bow, a string that can only hone its razor-sharp competitiveness. Notwithstanding the disc input, which only just fails to make the top grade, the exemplary performance of the *Cyrus One's* CD input ensures a continued Best Buy rating.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	32.0W	33.8W	32.8W
40hms	46.5W	54.1W	51.7W
Dynamic Headroom (IHF)		+1.04dB (43.0W)	
Peak Current (5msec, 1% THD)			12.8A
Output Impedance	0.075ohm	0.074ohm	0.066ohm
Damping Factor	106.3	108.3	120.5
CD/Aux		MM	MC
Stereo Separation (20Hz)	55.1dB	53.8dB	52.8dB
(1 kHz)	54.9dB	54.5dB	54.4dB
(20kHz)	50.9dB	49.9dB	49.6dB
Channel Balance (1kHz)			
-20dBV	1.11 dB	1.07dB	1.02dB
-60dBV	13.5dB	14.9dB	16.3dB
Total Har. Dist. (0dBW)	-94.5dB	-90.4dB	-88.1dB
(2/3 power)	-90.1dB	-86.7dB	-84.2dB
CCIR Intermod. Dist. (0dBW)	-95.8dB	-85.3dB	-84.7dB
CCIR IM Dist. (2/3 power)	-92.9dB	-84.6dB	-82.9dB
Rise Time			6.1secs
Squarewave linearity			-107.3dB
Absolute Phase			Non-inverting
Noise (A wtd, 0dBW)	-89.4dB	-83.8dB	-65.8dB
(2/3 power)	-99.9dB	-85.3dB	-66.1dB
Residual noise (unwtd)	-77.8dBV	-77.5dBV	-77.6dBV
Input Sensitivity (for 0dBW)	63.8mV	451.1V	45.4V
(for full output)	376.7mV	2.617mV	202.9mV
Disc Overload (20Hz)		11.20mV	1.115mV
(1kHz)		82.84mV	8.318mV
(20kHz)		771.2mV	74.95mV
(50kHz)		1034mV	102.7mV
Tape Output/Impedance		11.79V (disc)/157.5ohm	
Input loading		13.4kohm/110pF	47kohm/270pF
DC offset, left/right			-0.5mV/+10.6mV
Typical retail price			£230





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A hippy - fresh from presenting Open University - resplendent in corduroys and sandals, shuffles over to you.  
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You assume that it is asking you if you need guidance to inner peace and reply that, "No thanks, I'm looking  
for a member of staff".

It informs you that it is indeed a sales assistant, and that you are very fortunate to have passed through the  
portals of this emporium of electro-sonic software/end-user interface systems.

Before you can make another utterance, it is rambling on in a mix of archaic *lingo* to preach it's dogma  
about a front-end free of eigentonal drift and bull-ka-ka about products from the New World (missing out the  
fact that they cost less than half price in their country of origin).

Through the fog of words it is showing you a number of pieces of equipment that resemble agricultural  
machinery, designed and hand-crafted by an audio guru who resides under a grassy knoll, well away from the  
urban sprawl of Dingly Dell, just around the corner from a Mr Bilbo Baggins.

Before you know it, you've had an earful of 'The Kodo Drummers Play Mantovani' in the Single Speaker  
Demonstration Studio (carefully furnished to represent the abode of a complete twat), and re-mortgaged your  
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# Pioneer A-400

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

Best Buy



And now for something very slightly different - the Pioneer A-400. Yep, it looks just like the A-300 and it even uses the same switches, circuit board, star-earthing pattern, three-core mains lead and casework as the A-300. But closer inspection unveils a succession of detailed revisions, subtle differences which propel the A-400 into a league of its own!

From the outside, only its extra MC input selector hints at any change - another, remotely-controlled switch that engages a discrete, very-low noise headamp. After this comes the active MC/MM RIAA network, very similar to that found in the A-300 but equipped with a superior two-channel op-amp and near-imperceptible differences in the selection of passive components.

Step a little further back and the larger mains transformer pops into view as do the 10,000uF audio-grade reservoir caps, replacing the 6,800uF electrolytics found in the A-300. Of course, the A-300 is rated at a nominal 30W whereas the heavyweight A-400 offers 50W.

Once again, Pioneer's proprietary 'SuperLinear Circuit' topology is used, pitching the non-linearities of one transistor against the opposite but equal non-linearities of the other. Meanwhile, in order to satisfy the demands of a higher output, Pioneer has substituted higher-current Toshiba transistors into the A-400.

## Lab report

Close parallels exist between the A-300 and its bigger brother in terms of THD, IMD, stereo separation, output impedance and, as far as the MM network is concerned, noise, input sensitivity and disc overload (+30.1dB). Of course, there's an MC input added here and this features a fine sensitivity (0.25mV), low noise (-78dB, A-wtd) and extended response even if the headroom's a mite low at +28.7dB.

Power output is up to 71W (8ohms)

and 110W (4ohms), while available current clocks in at an impressive 16A. Channel balance is much improved, by the way, as is the RF susceptibility which shows a mild leak around 60MHz.

## Sound quality

Once again we began by listening via the MM input but now the difference between the '300 and '400 seemed quite vast, this latter model stripping through the murk that fogged-up the '300. This unearthed an explicitly detailed treble, not bright or aggressive but very light, free and bubbling with detail. There was an excellent sense of stereo space, the freedom from compression having everyone tapping their feet within seconds!

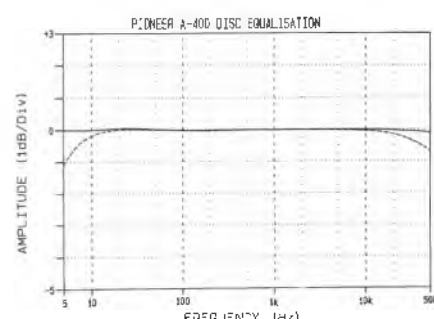
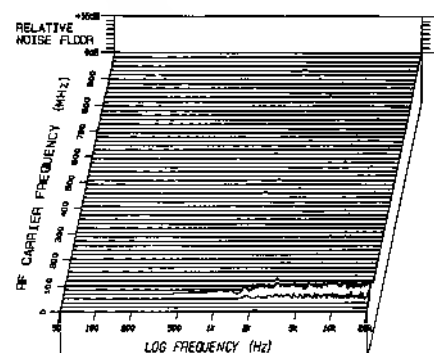
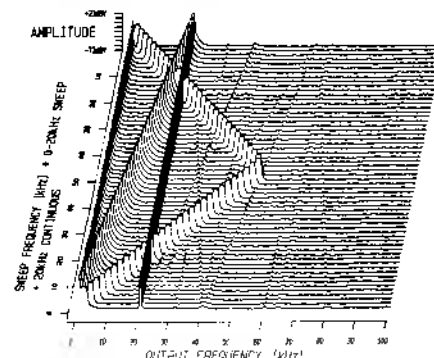
Furthermore, this amplifier showed a real command of music and so deep bass growled without clouding midband detail. It was very weighty and enjoyed excellent separation, just as brass had a naturally tangy quality that was raw but not cold or ascerbic. There was certainly not the 'editorialising' heard with the '300, instead the '400 sounded sharp and detailed, honest but captivating. Duff recordings are going to sound, well, duff, just as a good recording will surely shine. After all, accuracy is rarely sympathetic.

## Conclusion

Throughout the blind listening tests the A-400 emerged as a highly polished performer, though not necessarily as a blatantly obvious winner. Unaware of its manufacturer or price, it was considered to match the weight and punch of Mission's *Cyrus Two*, the exquisite string tone of the Dual CV5600 and flighty transparency of the HK6500, all the while enjoying a tangible 'rightness' that was all its own. Once informed of its price, the members of the panel voted the A-400 a unanimous Best Buy. So who am I to argue?

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	66.9W	70.9W	70.7W
4ohms	101.7W	110.2W	112.3W
Dynamic Headroom (IHF)		+0.92dB (87.6W)	
Peak Current (5msec, 1% THD)		16.1A	
Output Impedance		0.059ohms	
Damping Factor		135.4	
	CD/Aux	MM	MC
Stereo Separation (1kHz)	75.4dB	76.1dB	75.8dB
(20kHz)	49.4dB	49.9dB	49.5dB
Channel Balance			
(1kHz, -20dBV)	0.21dB	0.20dB	0.21dB
(-60dBV)	0.69dB	0.72dB	0.73dB
Total Harmonic Dist.			
(0dBW)	-85.5dB	-86.2dB	-87.0dB
(2/3 power)	-73.9dB	-74.2dB	-75.0dB
CCIR Intermod. Dist.			
(0dBW)	-87.7dB	-85.3dB	-81.3dB
(2/3 power)	-71.3dB	-73.6dB	-73.6dB
Noise (A wtd, 0dBW)	-81.8dB	-81.4dB	-76.5dB
(2/3 power)	-95.4dB	-91.8dB	-78.0dB
Residual noise (unwtd)	-75.8dBV	-75.8dBV	-75.8dBV
Input Sensitivity			
(for 0dBW)	20.16mV	352uV	29.7uV
(for full output)	171.3mV	2.97mV	248uV
Disc Overload (20Hz)		17.85mV	1.45mV
(1kHz)		160.2mV	13.6mV
(20kHz)		1211mV	103.3mV
(50kHz)		1141mV	96.5mV
Tape Output/Impedance		9.18V (disc)/2.61kohms	
Input loading		70kohms/100pF 52kohms/350pF 100ohms/12nF	
Absolute Phase			Positive
DC offset, left/right		+21.7mV / +15.3mV	
Retail Price			£230



# Acoustic Research A-05 Recommended

ENTEL LTD. VIENNA COURT, LAMMAS ROAD, GODALMING,  
SURREY GU7 1JG. TEL: (0483) 425 702



Previous AR amplifiers have had a rather rough ride in past *Choice* reviews, but the mid-market A-05 looks like being third time lucky. And with good reason too, for the A-05 draws on both the partnering A-03 and A-07 for inspiration while managing to avoid many of their pitfalls.

For instance, it shares the same Sanyo power amp circuit as AR's A-07 and offers but a whisker less output to boot, while avoiding the latter's convoluted speaker-switching facility; yet at the same time it suffers far lower distortion than the cheaper A-03.

None of this is evident from the outside, of course, where the slanted alloy fascia, logic-controlled input selection and rotary volume knob allow the A-05 to blend seamlessly with all other AR separates. As usual you'll find bass, treble and balance controls hidden away behind a flap, while the MC cartridge step-up amplifier is selected via a small switch on the rear of the case.

Both MC and MM vinyl disc inputs use series-feedback RIAA equalisation around a standard NE5532 op-amp. AR has also used decent Signetics op-amps in the line stage though an equivalent JRC IC has to suffice for the tape monitor loop. Elsewhere there are no fancy components or crafty circuit techniques to talk of: the A-05 is unadventurous but solid stuff.

## Lab report

The 67W rating obtained here is only fractionally below the 75W recorded for the £300 '07 model, while at the same time this less expensive amplifier has the advantage of a lower 0.04ohm output impedance and healthy 16.3A peak current capability. Furthermore this A-05 seems to be operating at a richer bias than either A-03 or A-07, and distortion (at 1W) is certainly lower at 0.0025 per cent instead of 0.023 and 0.0061 per cent respectively. The 3D plot simply shows traces of second

order IM distortion while the clean RF IMD spectrum pays tribute to the effective input filtering.

Both MM and MC disc inputs have plenty of headroom (+30.5dB and +28.4dB respectively), and LF responses are unusually extended (-3dB at 1.4Hz and 5Hz respectively). Noise and input sensitivities are all fine too, though the rec-out option is hampered by a high 3.4kohms output impedance.

## Sound quality

Instead of the thin and hazy balance of its stablemates, the A-05 came across as a slightly dry but confident and well-controlled amplifier, especially via the MM vinyl disc input. With CD in play it was mercifully free of sibilance and edginess all panellists agreeing that the sound of the panflute was both smooth and richly detailed. However, strings and percussion did not live and breathe with quite the right vitality and crispness.

There was an occasional forwardness to its presentation, affecting its imagery rather than the tonal balance of certain instruments (harpsichord, for example). It was less impressive on our jazz LP where individual instruments became slightly muddled, and there seemed a rigidity in its soundstaging that may explain why it was more successful with some types of music than others.

As if to reinforce this point, we were treated to a marvellously integrated, powerful and involving rendition of Rachmaninov's *Symphonic Dances*. In this instance it certainly makes sense to audition the amplifier with the music of your choice!

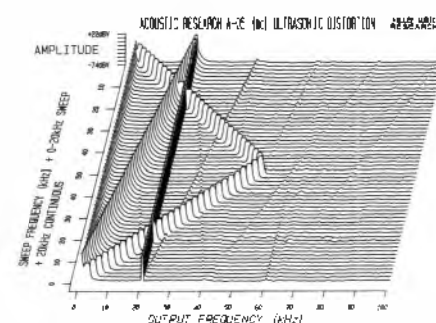
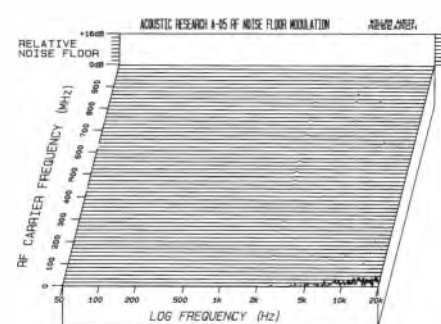
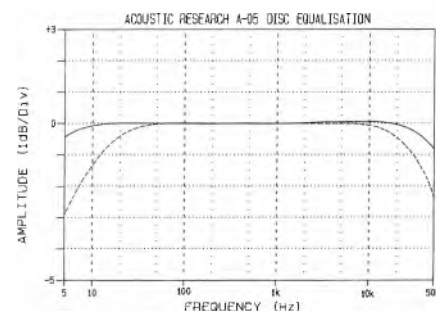
## Conclusion

The fine technical performance, sound and build quality of the A-05 thoroughly justifies its £230 price tag, whilst also somewhat undermining the more costly A-07.

All in all, this amplifier was greeted with considerably more enthusiasm than previous models from AR and deserves hearty Recommendation.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	57.5W	66.9W	61.8W
4ohms	87.5W	96.1W	94.1W
Dynamic Headroom (IHF)	+1.0dB	(84.3V)	
Peak Current (5msec, 1% THD)		16.3A	
Output Impedance	0.043ohms		
Damping Factor	186.3		
	CD/Aux	MM	MC
Stereo Separation (1kHz)	71.4dB	69.8dB	67.8dB
(20kHz)	46.9dB	46.7dB	46.5dB
Channel Balance			
(1kHz, -20dBV)	0.27dB	0.28dB	0.29dB
(-60dBV)	1.19dB	1.10dB	1.08dB
Total Harmonic Dist.			
(0dBW)	-92.2dB	-88.4dB	-86.6dB
(Two-thirds power)	-91.6dB	-88.1dB	-86.0dB
CCIR Intermod. Dist.			
(0dBW)	-97.0dB	-89.9dB	-87.9dB
(Two-thirds power)	-96.2dB	-87.6dB	-85.5dB
Noise (A-wtd, 0dBW)	-85.1dB	-83.7dB	-71.2dB
(Two-thirds power)	-98.7dB	-87.4dB	-71.5dB
Residual noise (unwtd)	-71.6dBV	-71.6dBV	-71.6dBV
Input Sensitivity			
(for 0dBW)	29.7mV	457uV	35.4uV
(for full output)	232mV	3.52mV	267uV
Disc Overload (1kHz)		168.0mV	13.1mV
(20kHz)		529mV	123.8mV
(50kHz)		2166mV	190.5mV
Tape Output Impedance	10.25V (disc) / 3.37kohms		
Input loading	22kohms/450pF	31kohms/330pF	100ohms
DC offset, left/right		-5.5mV/-6.0mV	
Retail Price			£230





# Audio Innovations Series 300 MkII

AUDIO COMPONENTS, ALBANY COURT, ALBANY ROAD, GRANBY INDUSTRIAL ESTATE, WEYMOUTH, DORSET. TEL: (0305) 761 017



"I've just bought one of the worst amplifiers in the world" is a quote from JB's review in issue 63 soon after he had awarded the original Series 300 a Best Buy ticket. Well the 300 has just got worse, er, better. Audio Innovations was recently sold as a going concern (without affecting any existing policies) while the tin-pot 300 has been transformed with rugged new casework, a beefed-up power supply and a price rise to £500.

Not only does the 300 MkII now look much more the professional product, but it's also more user-friendly with decent rotary controls, inputs for MM vinyl disc, CD, tuner and aux, plus a set of tasty 4mm terminals round the back. The background noise has been successfully reduced by replacing an ECC83 with an ECC82 double-triode in the line stage while the entire (passive) disc network relies on a single ECC83 to bump-up the gain. A pair of push-pull ECL86 pentodes provide the muscle via a newly-revised transformer with a nominal 60hms output tapping.

## Lab Report

The 3D plot is like something out of the *Boys Own Book of Technical Horrors*, with every conceivable distortion mechanism represented in generous quantity. Still, it's as well to consider that these distortions (adding up to around 0.18 per cent on CD and 2.5 per cent via MM vinyl disc) are very consistent over much of the available power range.

Not that this will set any records at just 9W into 8ohms. Severe slewing limits power at higher frequencies, so THD increases from two per cent at 2.4W to five per cent at 4.3W (20kHz). I couldn't even measure a sensible peak current output.

Input sensitivities are rather low, stereo separation is awful at HF (just 20dB),

channel balance nonexistent at -60dB and the disc headroom an almost laughable 12.9dB. Hence the vast 35 per cent IM distortion recorded as the MM input is plunged into clipping. The disc response has a nice, warming subsonic 'bump' while the premature treble cut matches the old Series 300.

## Sound Quality

This amp was auditioned blind on more than one occasion, each time without any true consensus being achieved. One listener announced confidently that it was the best he'd heard all day, while others adamantly refused to accept its various colorations.

Nevertheless it seems this is not your archetypal lush-sounding valve amplifier, but one that extends its grasp into the furthest reaches of the treble, pulling out the finest percussive detail from a broad and delightfully airy acoustic. A metallic tinge coloured the sound, however, and became more obvious with busier pop and rock tracks. The balance here was less even, perhaps lacking a little in weight and "mildly under-exposed, fogged or defocused" in the view of one listener.

Still, for all its foibles most listeners felt that this was an inherently musical and communicative amplifier with a broadly involving and warm sound, albeit one that proved to be more open and spacious on CD than vinyl disc.

## Conclusion

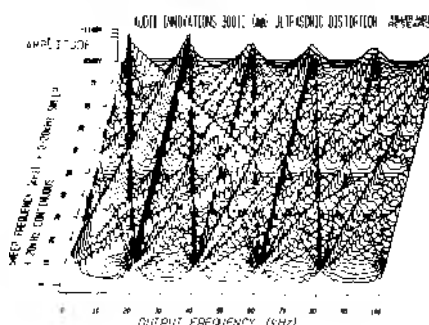
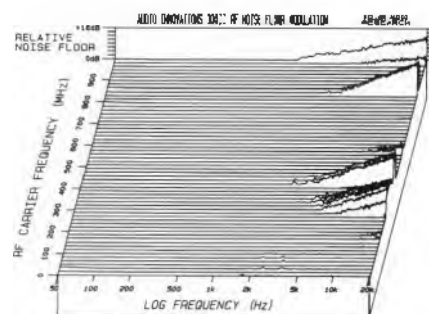
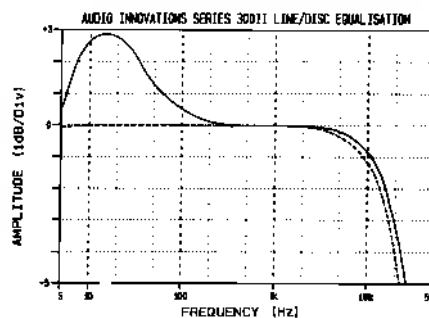
This is not necessarily the right product for someone with a wedge burning a hole in their pocket and in the market for an amp - any amp - at £500. Nevertheless, it is probably the only amp for the enthusiast with a genuine desire to get to grips with the ongoing renaissance of valves without

being stung for a second mortgage. Please note that sensitive speakers and an open mind are prerequisites.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	4.4W	9.2W	1.4W*
40hms	3.2W	6.4W	0.64W*
Dynamic Headroom (IHF)	+0.51dB (10.3W)		
Peak Current (5msec, 1% THD)	-		
Output Impedance	0.31ohms		
Damping Factor	25.5		
Stereo Separation (1kHz)	42.3dB	44.5dB	MM
(20kHz)	20.1dB	19.1dB	
Channel Balance (1kHz, -20dBV)	1.59dB	1.11dB	
(-60dBV)	34.8dB	32.8dB	
Total Harmonic Dist. (0dBW)	-70.1dB	-32.2dB	
(Two-thirds power)	-54.7dB	-32.1dB	
CCIR Intermod. Dist. (0dBW)	-56.9dB	-9.1dB*	
(Two-thirds power)	-46.6dB	-9.0dB*	
Noise (A-wtd, 0dBW)	-86.8dB	-67.5dB	
(Two-thirds power)	-92.7dB	-69.5dB	
Residual noise (unwtd)	-63.7dBV	-63.7dBV	
Input Sensitivity (for 0dBW)	200mV	151uV	
(for full output)	625mV	4.59mV	
Disc Overload (1kHz)	22.3mV	111.3mV	
(20kHz)	142.2mV		
Tape Output Impedance	1.4V (disc) / 20.7kohms		
Input loading	91kohms / 75pF / 47kohms / 120pF		
DC offset, left/right	0mV / 0mV		
Retail Price	£500		

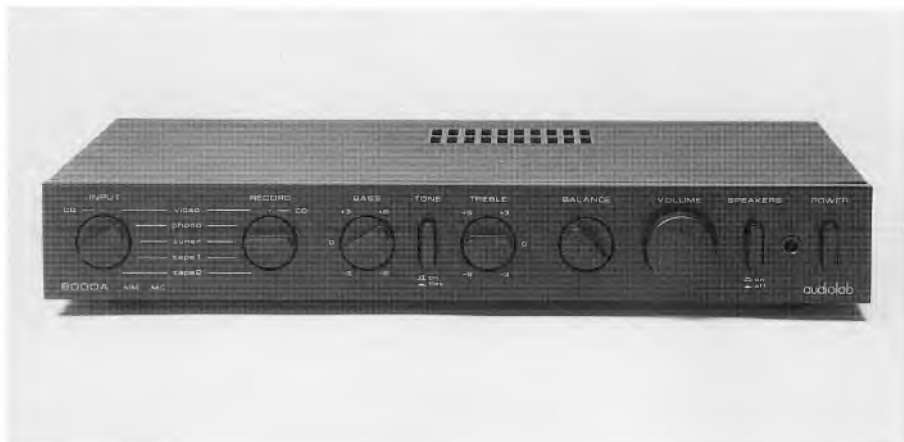
\* Refer to lab report



# Audiolab 8000A

**Recommended**

CAMBRIDGE SYSTEM TECHNOLOGY LTD, 26 ROMAN WAY INDUSTRIAL ESTATE,  
GODMANCHESTER, HUNTINGDON, CAMBRIDGESHIRE PE18 8LN. TEL: (0480) 52521



Designing an award-winning amplifier is one thing; maintaining the competitiveness of such a product year in and out is something else altogether. Audiolab's successful 8000A integrated amplifier has achieved this by the implementation of regular and ongoing, if subtle, improvements.

One of the most recent changes is much more obvious, with a change in the basic colour of the amp from bronze/grey to a satin black - ironically, perhaps, just as fashion seems to be moving the other way. The layout of controls remains as before, but a further tape input, labelled 'video' in this instance, has been added, independent rec-out and input selectors now catering for three VCR/tape decks, tuner, CD and both MM and MC vinyl disc cartridges.

Audiolab has employed a new CAD (computer aided design) system to reorganise much of the circuit board, paying particular attention to the earth layout and HF compensation networks. Either way it's hard to criticise the construction, and it's also a joy to operate.

## Lab Report

How have these changes affected the technical performance? Power is up by nearly 10W to 81W into 8ohms and 134W (+2.2dB) into 4ohms, as a result of improved regulation, though dynamic headroom is correspondingly somewhat reduced. Relay-operated protection limits the peak current output to 7A, which is far too conservative in my view.

Stereo separation is now an almost unprecedented 71dB at 20kHz (MC), though the channel balance error on our sample has deteriorated to 3dB at -60dB (a function of the volume control). Distortion has been reduced, from typically 0.003 to 0.0018 per cent via CD, though the amplifier is now more susceptible to RF noise which causes broad changes in the

noise floor from 200Hz to 20kHz. In consequence, the new 8000A is likely to be more player-dependent than before.

MC vinyl disc is noisier than before (-74dB instead of -80dB) and has less headroom at high frequencies (22.1dB instead of 26.1dB); IMD is therefore higher via MC than either MM or CD.

## Sound Quality

The panel immediately recognised this as a very classy product; its pronounced and distinctive sound is packed with detail and held together with an excellent sense of stereo focus. The panpipes sounded very neutral on this occasion, the instrument's natural exuberance being contained with impressive conviction.

At the same time it could be both tranquil and delicate when required, reproducing the subtle tonal colours of the harpsichord without exaggeration or unnatural colour. All but one of our listeners praised the 8000A for its very clean, precise and refined sound, though another chose to interpret this lack of character as itself 'intrusive'.

Still, a consensus was reached for the MM vinyl disc input. There's a certain uniformity between all the inputs, but the MM disc struck the most appropriate balance with its extra touch of warmth. There was a real power and weight behind the low strings on our Rachmaninov LP, interspersed with the delicate tinkling of triangles. The guitar on the Sting LP was resolved in a similarly intricate fashion, just as his voice appeared open and civilised without sounding bland.

## Conclusion

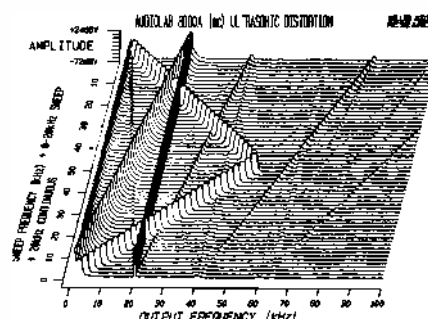
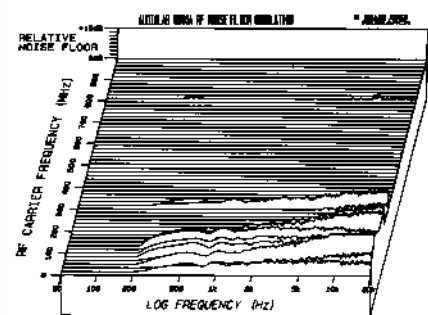
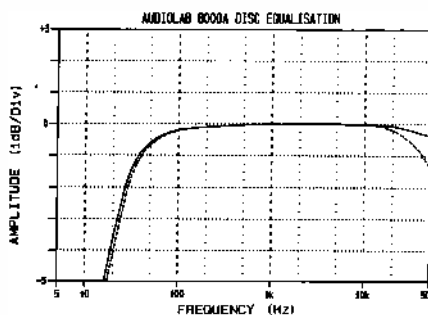
Audiolab has been refining the popular 8000A for many years, though these recent improvements are perhaps the most significant to date. So much so that today's 8000A offers a crafty blend of atmosphere, refinement and clarity without the

harshness or blandness for which earlier examples were sometimes criticised. It's expensive at over £400, but nevertheless warrants strong Recommendation.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	78.1W	81.3W	79.4W
4ohms	125.9W	134.4W	128.7W
Dynamic Headroom (IHF)	+0.86dB (99.1W)		
Peak Current (5msec, 1% THD)	7.1A*		
Output Impedance	0.036ohms		
Damping Factor	220.1		
	CD/Aux	MM	MC
Stereo Separation (1kHz)	73.3dB	76.6dB	72.4dB
(20kHz)	57.0dB	65.8dB	70.6dB
Channel Balance (1kHz, -20dBV)	0.32dB	0.29dB	0.28dB
(-60dBV)	3.09dB	3.07dB	3.05dB
Total Harmonic Dist. (0dBV)	-94.5dB	-94.3dB	-93.7dB
(Two-thirds power)	-96.1dB	-96.8dB	-96.1dB
CCIR Intermod. Dist. (0dBV)	-96.0dB	-70.8dB	-66.7dB
(Two-thirds power)	-96.1dB	-70.4dB	-66.6dB
Noise (A-wtd, 0dBV)	-80.9dB	-77.7dB	-73.0dB
(Two-thirds power)	-94.2dB	-82.1dB	-74.0dB
Residual noise (unwtd)	-68.3dBV	-68.3dBV	-68.3dBV
Input Sensitivity (for 0dBV)	16.1mV	318uV	16.9uV
(for full output)	145mV	2.74mV	152uV
Disc Overload (1kHz)		185.6mV	9.78mV
(20kHz)		1570mV	63.5mV
(50kHz)		1690mV	102.5mV
Tape Output Impedance	9.3V (disc) / 1.52kohms		
Input loading	24kohms/130pF	39kohms/90pF	107ohms
DC offset left/right		-1.3mV/+0.5mV	
Retail Price		£410	

\* Refer to lab test



# Creek CAS4040 S3

CREEK AUDIO SYSTEMS, UNIT A1, HAZELTON INDUSTRIAL PARK,  
HORNDEAN, HANTS. PO8 9JU. TEL: (0705) 597722

**Recommended**



Creek's 4040 integrated amplifier has a family tree stretching way back to the days of the original budget wonders from NAD and Rotel. The amp, like the company, has witnessed numerous changes since its introduction, though the *Series 3* version of today is less the 'economy' model it once was. Since its acquisition by Mordaunt Short, Creek has found the time to consolidate and improve existing products. So it is with the 4040 S3 which looks roughly the same as the S2 version but features plenty of internal revisions to improve performance.

It's now equipped with an IEC mains inlet instead of captive lead while the gain of its various amplifier stages has been re-arranged to improve overload margins. Inadequate disc headroom has been a particular gripe of previous *Choice* reports, so it's good to see Creek getting to grips with the problem.

All the rotary controls, including volume, balance, bass and treble, are milled from alloy to match the matt black fascia while over to the right you've a selection of pushbuttons for input selection, tape monitor, mute and mono operation. Only MM cartridges are catered for, though the decision not to over-stretch the amp with a MC input is probably a wise one. Both direct and switched loudspeaker connections are provided, by the way, the latter operating in conjunction with the headphone socket.

## Lab report

All things considered, the S3 revisions may be considered a success even if one or two bugbears, like the 6.6dB low-level channel balance error, still persist! Creek's output protection puts a limit on the maximum available current, but with 41W into 8ohm and 63W into 4ohm it should be happy enough with most sensitive, budget speakers.

The MM disc response is tailored at

low frequencies, falling off a little sharply below 100Hz so that it's some 4dB down at 20Hz. By contrast, the CD input is nominally flat to 5Hz but begins to roll-off above 10kHz (-1.7dB @ 20kHz). Hence the improved rejection of RF noise, leaving just a small break at 240MHz.

Creek has improved the power amp's constant-current sources in an effort to reduce distortion. Certainly the CD/MM THD of 0.008 per cent is more than acceptable though IMD is compromised via the disc input just after the actual RIAA section - even though MM headroom has risen to a fine +28.6dB.

## Sound quality

Following on the heels of some rather ragged performers, the 4040 acquitted itself with great decorum. All our listeners thought it a competent and tidy-sounding design, slightly dry perhaps but nicely controlled nonetheless. The sense of stereo depth can appear slightly shallow at times and there's also an increase in muddling when pushed too hard, but kept within its limits, it offers an otherwise very purposeful, gutsy sound.

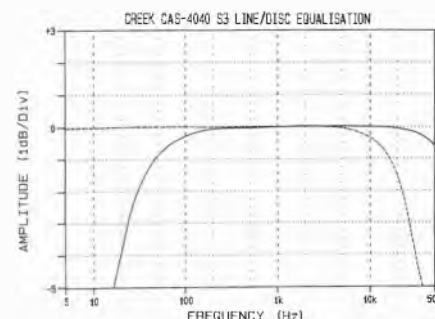
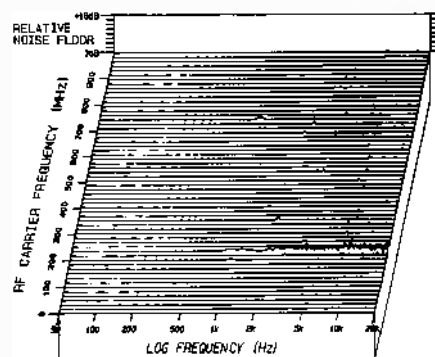
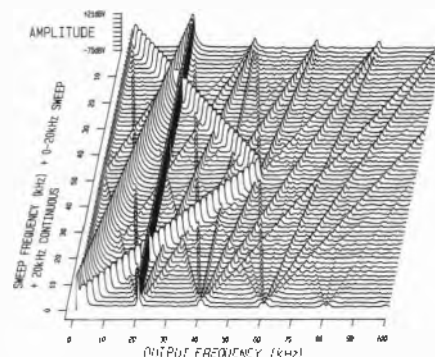
It seems marginally leaner and also better focused via the CD input, yet it still lacks the ability to resolve subtle musical detail in the fashion of the larger Creek amps. Clearly, finesse comes at a premium. This is not to imply that the 4040 is crude, in fact it's quite refined in a cautious sort of way. It doesn't hold back but then neither is it aggressive or forward.

## Conclusion

This *Series 3* is perhaps not as punchy nor as obviously lively as its predecessor, but then its revisions have prompted a more secure and mature sound that will ensure all-round compatibility. So, Creek is to be applauded for its development of the 4040 theme even if, at £200, it is beginning to err on the expensive side.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	38.7W	40.9W	39.0W
4ohms	53.5W	62.6W	60.4W
Dynamic Headroom (IHF)		+1.25dB	(34.5W)
Peak Current (5msec, 1% THD)			0A
Output Impedance			0.042ohm
Damping Factor			190.1
	CD/Aux		mm
Stereo Separation (1kHz)	77.1dB		77.8dB
(20kHz)	45.7dB		54.7dB
Channel Balance (1kHz, -20dBV)	0.20dB		0.03dB
(-60dBV)	6.58dB		6.68dB
Total Harmonic Dist. (0dBW)	-84.8dB		-82.8dB
(2/3 power)	-80.4dB		-81.2dB
CCIR Intermod. Dist. (0dBW)	-95.6dB		-74.5dB
(2/3 power)	-94.6dB		-74.3dB
Noise (A wtd, 0dBW)	-83.0dB		-79.4dB
(2/3 power)	-91.3dB		-81.4dB
Residual noise (unwtd)	-64.4dBV		-64.2dBV
Input Sensitivity (for 0dBW)	63.4mV		422uV
(for full output)	408.3mV		2.72mV
Disc Overload (20Hz)			22.4mV
(1kHz)			134.7mV
(20kHz)			1213mV
(50kHz)			2083mV
Tape Output/Impedance		9.622V (disc)/1.12kohm	
Input loading		44kohm/50pF	46kohm/110pF
Absolute Phase			Inverting
DC offset, left/right			+7.9mV / +4.5mV
Retail Price			£200





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# Denon PMA-350

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ST PETER, BUCKS. SL9 9EW. TEL: (0753) 888447

**Recommended**



Ever the masters of overstatement, Denon's release of its new PMA-350 integrated has been accompanied by a fanfare of bold and challenging claims. This amplifier has resulted from a collaboration between Denon's UK and Japanese staff in addition to a - and I quote - 'noted UK amplifier designer', whoever that might be. Anyway, Denon feels sufficiently confident to suggest that this baby will outperform industry light-weights like the Arcam *Alpha*, Mission *Cyrus Two* and Pioneer *A-400*. There's nothing like setting your sights high!

The layout of the fascia with its bass/treble tone controls, 6-way input selector, balance and tape monitor facilities do not immediately suggest this is a specialist product. Inside, however, it's a different matter with the shielded toroidal mains transformer, chunky Cerafine electrolytics and hi-current Sanken output transistors scoring full marks.

The RIAA EQ section is based around a dual-channel op-amp but discrete, localised regulation and quality polystyrene capacitors are further points in its favour. The passive tone controls are sensibly designed too, plus there's the option of CD direct to route high level signals straight into the power amp via the volume control.

## Lab report

On the bench this amp clocked up some 88W into 8ohms and 116W into 4ohms, yet there was evidence of slew-limiting restricting its power output at higher frequencies. The output impedance is also a touch high at 0.1ohm but stereo separation, hum and noise, input sensitivities and MM disc overload margins are all just fine.

Distortion is dictated by the power amp section and though its numerical value is pretty constant at 0.032 per cent, the nature of the distortion actually

changes with level. At low power levels the second harmonic dominates just as the third harmonic takes over through mid to high power outputs.

The Ultrasonic Distortion plot also reveals a number of very interesting and rare mechanisms in addition to the second and third order IM routes that track through the audio band. Add to this the fact that second harmonics all suffer additional second-order IMD while the third harmonics are joined by third-order IMD and you've got one weird amplifier! The strong susceptibility to RF noise in the densely-populated 80-140MHz region is also a little worrying.

## Sound quality

This is not the sort of amp to leap out and grab your attention, rather it'll lull you with its laid-back and relaxed demeanour. Whether you choose the CD or MM input, this amplifier offers a sweet and unfatiguing view of events.

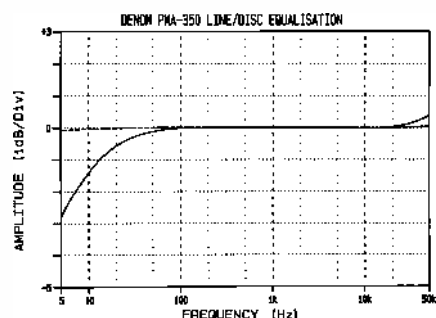
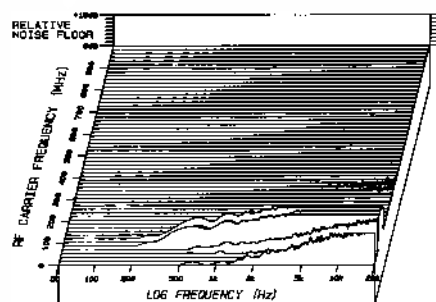
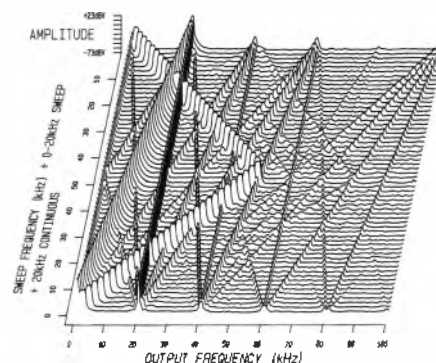
Perhaps as a result there was criticism of it rounding-off the sharpest of transients, the inoffensive sweetness of the amp reducing the natural urgency, sparkle and excitement of the recording. Yet there were other listeners, myself included, who viewed this same 'character' in a more positive light. The very unfatiguing lushness of the '350 enabling us to hear through into the music without having abrupt detail forced upon us. In all, it's just too syrupy for some, but suitably mellifluous for others!

## Conclusion

By general consensus, the PMA-350 is not on a par with either the *Cyrus Two* or Pioneer *A-400* amplifiers but then most rational individuals would consider this an unrealistic comparison anyway. Hype aside, the PMA-350 is a fine amplifier, a solid performer that will suit a wide range of budget ancillaries.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	78.6W	87.7W	80.0W
4ohms	107.1W	115.5W	99.0W
Dynamic Headroom (IHF)		+1.4dB	(120.2W)
Peak Current (5msec, 1% THD)			11.0A
Output Impedance			0.100ohm
Damping Factor			79.9
Stereo Separation(1kHz)		CD/Aux	mm
(20kHz)		81.1dB	80.1dB
Channel Balance(1kHz, -20dBV)		58.9dB	57.9dB
(-60dBV)		0.01dB	0.05dB
Total Harmonic Dist.(0dBW)		0.30dB	0.35dB
(2/3 power)		-69.6dB	-70.2dB
CCIR Intermod. Dist.(0dBW)		-72.1dB	-71.4dB
(2/3 power)		-72.0dB	-68.5dB
Noise (A wtd, 0dBW)		-76.3dB	-77.3dB
(2/3 power)		-80.3dB	-70.1dB
Residual noise (unwtd)		-89.4dB	-82.8dB
Input Sensitivity (for 0dBW)		-74.9dBV	-74.7dBV
(for full output)		19.7mV	328uV
Disc Overload (20Hz)		186.7mV	3.08mV
(1kHz)			17.9mV
(20kHz)			161.3mV
(50kHz)			1475mV
Tape Output/Impedance		9.73V (disc)/121ohm	
Input loading		47kohm/120pF	46kohm/220pF
Absolute Phase			Positive
DC offset, left/right			+3.8mV/-14.4mV
Retail Price			£170



# Hafler SE100/SE120

HW INTERNATIONAL LTD, 3-5 EDEN GROVE, LONDON N7 8EQ.  
TEL: (071) 607 2717



Imagine, if you will, the archetypal American amplifier. A vastly over-engineered crate with an equally over-ambitious pricetag may well come to mind. David Hafler himself has been responsible for one or two humungous designs over the years (the *XL-600* for instance), but compared to much imported US gear these two new Haflers are models of under-rather than overstatement. Such unpretentious, value-oriented kit as the *SE100* preamp and *SE120* power amp is unlikely to appeal to the 'it's expensive therefore it's good' school of hi-fi.

The new *SE100* preamp maintains Hafler's tradition of function taking precedence over form. You'll just have to put up with the solid but mundane fascia, populated with a variety of rotary controls for bass, treble, balance and volume. Still, a full tone defeat option is included, while the volume pot is actually a high calibre item sourced from Noble.

This is the first indication of the quality that lies behind its humdrum fascia, though I should point out that the step in volume between each detent varies from 2.5dB to 7dB up to the 12 o'clock position. Sound quality might be marvellous, but the lurches in volume between each step might be found a trifle inconvenient.

In its most basic form the *SE100* has no vinyl disc stage, which is as much a reflection of vinyl's reduced importance in this digital age as the extra cost of providing this comparatively complex circuitry. However, an optional vinyl disc board is available for about £100, and this can cope with any MM or MC cartridge that crosses its path.

The elegant circuit uses a differential J-

FET input to offer a combination of low noise and high gain (up to +59dB), while quality components such as polypropylene capacitors help make up the part-active, part-passive RIAA equalisation network.

To partner this aesthetic nonevent, Hafler offers the equally sober *SE120* power amp, a mini version of the *SE240/XL280* designs. In fact it's a modernised version of the original *DH120* power amp, complete with bridging option but minus the level controls and 'ambience recovery' facility. Today's *SE120* is a basic no-frills power amp, conservatively rated at 60W but equipped with a substantial power supply. Tweaky components include metalised-film capacitors and a rugged complementary output stage based around Hitachi MOSFET devices.

## Lab report

Hafler always tries to reduce distortion as far as possible without swamping the amp with feedback, and, on the whole, is pretty successful. The *SE120*, for instance, suffers just 0.001 per cent THD at two-thirds its 96W output. This rises to 0.006 per cent at 20kHz (as the influence of feedback declines, a factor that's also reflected in the abrupt increase in output impedance from 0.05ohm, 1kHz to 0.34ohm, 20kHz).

More importantly, the amplifier retains its linearity at lower impedances, as can be seen from the lone second-order IM product on the 3D plot. Don't push the *SE120* with awkward speakers, however, because the peak current rating is hardly generous. Beyond the closed-loop the amplifier does become susceptible to RF noise, particularly around 175MHz,

290MHz and 420MHz as depicted on the RF IMD plot. Conventional THD is low, so any RF IMD is likely to be relatively more audible - the 'wispiess' perhaps?

The decent volume control keeps a tight rein on channel balance down to -60dBV, while stereo separation is better than 50dB until close to 20kHz. The disc card offers a flat and extended response for both MM and MC cartridges, together with low levels of noise (-86dB and -77dB respectively). The overload margins are acceptable, but all inputs are very sensitive indeed, requiring less than 1mV for 1V out via MM vinyl disc, for instance.

THD is about ten times greater via MM/MC vinyl disc than CD, but the nature of this distortion is subjectively pleasing. The 3D plot is a classic: pure second-order harmonic and intermodulation products in perfect balance with one another, and not an odd-order nasty in sight.

## Sound quality

Having compared the *SE100*'s disc and line inputs over an extended period, our panel declared a preference for the latter, offering compliments on the quiet, spacious and generally very transparent sound. This free and airy character has been attributed to other Hafler pre/power amps, so the correlation here was quite gratifying, even if one or two listeners also remarked upon a mild 'wispiess'.

Nevertheless, everyone thought it superior to the Audiolab pre/power combination that had been auditioned a few moments earlier. The Hafler pair seemed smoother and less abrupt, without compromising the music's natural energy



and dynamics. For instance, the guitar line that runs through the Chris Rea track now led the music with more intent, adding a new sense purpose to the music as a whole.

Even at its busiest it was still possible to discern individual players in balance with one another. Via CD at least, this combo delivered a very sympathetic and even-handed style of presentation, rarely permitting one instrument to overwhelm another, except where this was a feature of the music itself. Our panpipe CD created a greater sense of anticipation, each fluttering note decaying with the faintest of previously inaudible echoes.

Yet not all in the Hafler garden is rosy, for along with this open and expressive sound there's also a hint of forwardness. Still this did little to deter the enthusiasm of the panel, which was genuinely moved by the dynamic and involving quality of these amplifiers.

Although lacking the stark 'blackness' and the stop-start precision demonstrated by the Audiolabs, there was something indefinably 'right' and satisfying about the Hafler sound. It's a pity then that these emotive qualities were not realised as successfully when using the MM vinyl disc input.

Here the panel pointed out subtle restrictions in both stereo depth and punch, even though busy interplay between different instruments still heightened anticipation. Brass instruments, for example, sounded a little smaller and perhaps a little more relaxed than usual, building up a superb spread of sound yet without quite the guts and projection to do it justice. Attractive though it was, the sound simply bobbed along without the purposefulness of the CD input.

## Conclusion

Look past the dour exterior of these amplifiers and you'll be rewarded with a surprisingly natural and engaging sound. Flexibility is a key issue too, for if you're snared by the open and unforced quality of the SE120s but are hungry for more power, you can always buy a second power amplifier and operate them in bridged mode. The 200W or so available in this instance should be muscle enough for all but the most insensitive of speakers.

Similarly you are under no obligation to purchase the plug-in disc board, making the line-only SE100 an absolutely ideal choice for the modern CD-based system. As a £750 combination, however, this Hafler pair represents exceptional value and may be heartily Recommended.

## TEST RESULTS

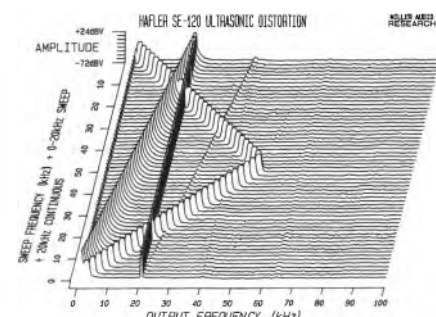
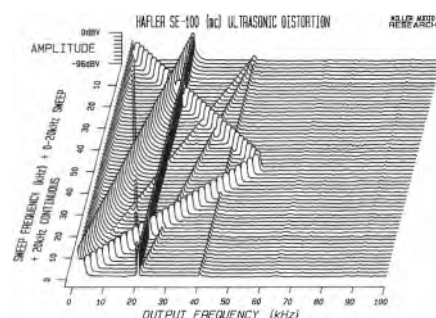
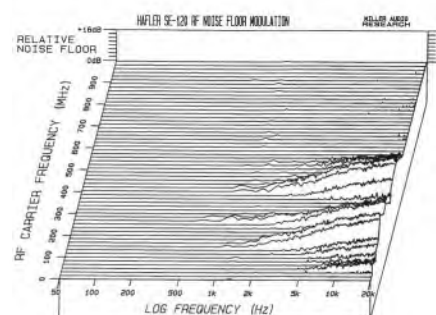
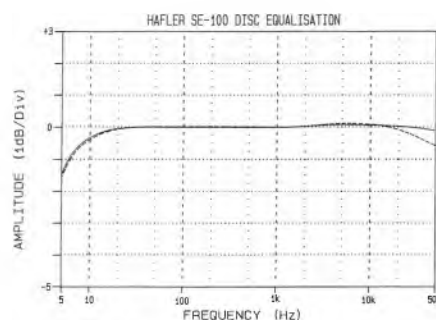
### Preamplifier: Hafler SE-100

	Aux/CD	MM	MC
<b>Stereo separation (20Hz)</b>	80.6dB	80.4dB	80.3dB
(1kHz)	57.4dB	58.6dB	59.1dB
(20kHz)	48.0dB	48.0dB	47.9dB
<b>Channel Balance</b>			
(1kHz, 0dBV)	0.12dB	0.12dB	0.12dB
(-20dBV)	0.36dB	0.36dB	0.36dB
(-60dBV)	0.73dB	0.75dB	0.81dB
<b>Total Harmonic Dist.</b>			
(0dBV, 1kHz)	-86.7dB	-68.3dB	-66.5dB
(20kHz)	-87.2dB	-60.6dB	-57.9dB
<b>CCIR Intermod. Distortion</b>			
(1:1)	-79.6dB	-78.5dB	-77.8dB
<b>Noise</b>			
(A wtd, 20Hz - 20kHz)	-90.9dB	-85.6dB	-78.6dB
<b>Residual noise (unwtd)</b>	-91.0dBV	-90.9dBV	-90.9dBV
<b>Input Sensitivity (for 0dBV)</b>	96.9mV	988uV	95.1uV
<b>Disc overload (1kHz)</b>		95.8mV	9.14mV
(20kHz)		86.7mV	74.7mV
(50kHz)		202.7mV	192.5mV
<b>Input Loading</b>	28kohms/120pF	45kohms/220pF	100ohms
<b>Preamplifier Output</b>		7.4V (disc)/432ohms	
<b>DC Offset, L/R</b>		-41uV/-47uV	
<b>Retail Price</b>		£373 + 100	

### Power amplifier: Hafler SE-120

	20Hz	1kHz	20kHz
<b>Maximum Continuous</b>			
<b>Power Output, 8ohms</b>	95.7W	95.8W	93.0W
<b>4ohms</b>	118.7W	130.9W	120.9W
<b>Dynamic Headroom (IHF)</b>	+1.35dB (130.8W)		

<b>Peak Current (5msec, 1% THD)</b>	9.1A
<b>Output Impedance</b>	0.052ohms 0.052ohms 0.335ohms
<b>Damping Factor</b>	152.9 154.5 23.9
<b>Stereo Separation (0dBW)</b>	136.8dB 97.7dB 72.1dB
<b>Total Harmonic Dist.</b>	
(0dBW)	-97.1dB -95.6dB -88.3dB
(two-thirds power)	-96.7dB -99.7dB -84.5dB
<b>CCIR Intermod. Dist. (0dBW)</b>	
(two-thirds power)	-91.0dB
<b>Noise (A wtd, 20Hz-20kHz) 0dBW</b>	-102.6dB
(A wtd, 20Hz-20kHz) two-thirds power	-118.9dB
<b>Residual noise (unwtd)</b>	-88.8dBV
<b>Input Sensitivity (for 0dBW)</b>	144mV
(for full output)	1413mV
<b>Input loading</b>	23kohms
<b>DC offset, left/right</b>	-33.1mV/-15.5mV
<b>Retail Price</b>	£384



# SONIC LINK



## SONIC LINK DM20 £329.00

'... The results were staggering. (Deborah) Glasgow's voice suddenly assumed an extra dimension of clarity in the midband ...'  
 '... I could now hear detail like inflections in her voice and an interplay of instruments that had previously been glossed over and hidden ...'  
 '... The singer and musicians actually sounded as though they were playing as a mutually dependent group. Bass guitar, drums and horns all worked in harmony rather than discord ...'  
**Kalwinder Singh Rai — High Fidelity, March 1990.**

## SONIC LINK DM20 GOLD £598.00

'... The DM20 Gold does retrieve low level detail unusually well ...'  
 '... Most impressive was the way it enhanced breadth of vocal expression by revealing nuances of delivery. I was quite stunned by this, and by the way it retrieved the sense of atmosphere within which a singer was performing ...'  
**Noel Keywold — HI-FI World, May 1991.**  
 '... The amp has tremendous control, focus and clarity, and has the effect of stripping away a layer of fudge ...'  
 '... Allowed different works like Im Abendron from Strauss's Four Last Songs to really communicate their emotion and impact ...'  
**Alvin Gold — High Fidelity, July 1991.**  
 '... The amps exposition of fine detail was enhanced by its ability to cast a stable and unambiguous soundstage ...'  
 '... The DM20MG was a real toe-tapper, latching on to rhythms and refusing to relinquish its grip, responding to subtle changes therein with dexterity and confidence ...'  
 '... It took great delight in exploring the dividual character of instruments and voices, and the contribution made to their sound by the studio acoustic ...'  
**Malcolm Steward — Audiophile, October 1991.**  
 '... What finally convinced me of the Sonic Link's abilities was its ability to convey the emotionally charged atmosphere of 'What Need Have I For This, What Need Have I For That' on Shakti's first album ...'  
**Dave Wiley — Audiophile, October 1991.**  
 '... Further listening, however, confirmed the Sonic Link's general superiority. Dynamics were for the most part more exciting ... and bass was always more controlled ...'  
**Richard Garlick — Audiophile, October 1991.**

### DEALERS

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**HAMPSHIRE:** Jeffries Hi Fi, 29 London Road, Portsmouth PO2 0BH ..... **Tel: 0705 663604**  
**KENT:** Standens, 92a High Street, Tonbridge, Kent TN9 1AP ..... **Tel: 0732 353540**  
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**NORFOLK:** Speakers Corner, Norwich ..... **Tel: 0603 743457 (Open till 9 pm)**  
**SHROPSHIRE:** Midshropshire Audio, 4 Holland Court, Dawley, Telford ..... **Tel/Fax: 0952 630172**  
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**SCOTLAND:** Audio Suit, Aberdeen ..... **Tel: 0224 625635**

## SONIC LINK AMPLIFICATION

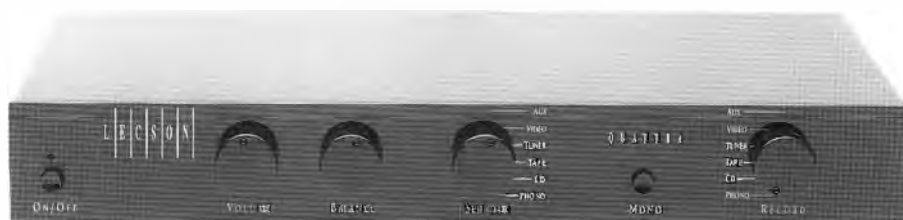
Unit 6, Derwent Business Centre, Clarke Street, Derby DE1 2BU

Tel: 0332 674929 (Answering machine before 5pm)

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"We were all struck by the wonderfully open and deep sound soundstage that seemed large and tactile enough to walk into"  
 Paul Miller -  
 Hi-Fi Choice



Audio Magazine Germany - The Quattro has a higher rating than Linn Intek, Naim Nait, Mission Cyrus Two

"Time shift into four amp drive. Now we began cooking. The presentation opened out giving more insight into the music and the performance"  
 Malcolm Steward for  
 Audiophile, March 1991

"The Lecson Quattro is the most radical & innovative amplifier for years" - Paul Messenger, Hi-Fi Choice, October 1991

Advanced Assembly Service Ltd, B1-2 Edison Industrial Estate, St Ives, Huntingdon, Cambridgeshire, PE17 4LF, 0480 65552

# Harman Kardon HK6500

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



First appearances can be deceptive. After all, a glance at Harman's HK6500 fails to reveal anything particularly special, but listen to the amp and you'll realise it's far from humdrum. It's the mid-ranking model and, ostensibly, little different from either the HK6300 or HK6600 except for its power output. The matt black alloy fascia is dotted with gold lettering and a row of knobs specified for input and rec-out selection, balance, bass and treble tone control. The company has also fitted a hard-wired A/B speaker selector - good as far as it goes but HK should resort to local relay switching.

Inputs are provided for two tape decks, three line sources and both MM and MC disc inputs. Four smaller buttons switch in the phase-correct loudness, subsonic filter, mono and an extra tape monitor loop to cater for a graphic (aargh) or surround-sound processor. Unusually, the HK6500 is not equipped with either a tone-defeat or source-direct option.

Inside there is a clutch of PCBs linked by a wealth of ribbon cabling. It's highly unlikely that the guts of this amplifier have ever seen a CAD system, but HK's use of wholly discrete components (including the MC headamp and RIAA network) is to be commended. So too is its use of high-current Toshiba transistors.

## Lab report

This amp includes an eight and 4ohms selection switch, connecting one of two transformer secondaries to the amp's supply rails. All the measurements were taken in 4ohms mode - thereby optimising the 117W 4ohms output and very substantial 18.7A current delivery. Otherwise there should be little difference - the amp has an inherently good channel balance, low noise (-84dB A-wtd, MM)

and low-ish THD (typically 0.009 per cent MM/CD).

The MM disc response is extremely flat, though the MC stage rolls-off just a little quicker to reach a sensible -2dB at 10Hz. HK's MC inputs are invariably a little quirky and this is no exception. It'll suit the very lowest output MCs (0.1mV for full output!) but there's very little headroom to play with (typically +23.2dB) and so IM distortion climbs to 0.84 per cent. The Distortion plot clearly demonstrates the effect of the MC input's inadequate overload margins, precipitating a rash of second, third and fourth-order IM distortions.

## Sound quality

Powerfully emotive and provoking a very strong reaction from the panel, this amp certainly re-kindled their passion for music near the end of a long session of listening. It demonstrated a strong, authoritative grip over the busiest of pop recordings, its firm hand conjuring up a big and bold sound. So, even though the 6500 was not the very model of clarity, its grand acoustic and full resonant weight came to the fore when reproducing a deep bass drum or rich, grumbling double bass.

Via the CD input the amp was marvellously open and detailed. There was a slight roughness to strong brass, otherwise its unswerving confidence was a sheer delight.

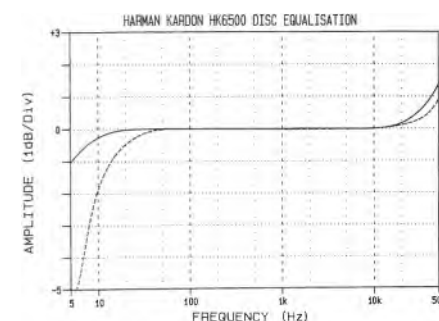
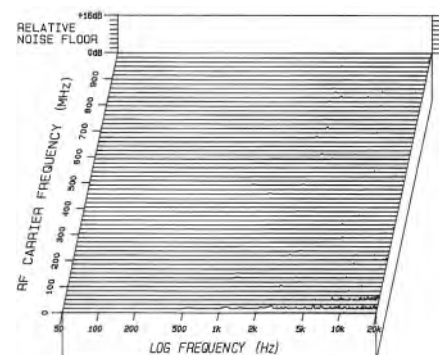
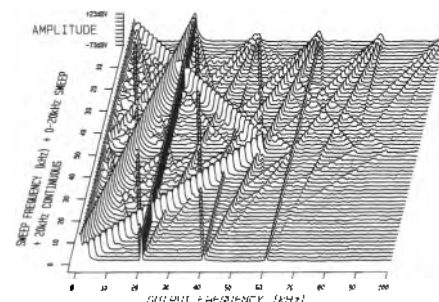
## Conclusion

Likened to the Pioneer A-400 in many respects, the HK6500 received very little criticism from the panel. Yet, technically at least, there are avenues for improvement open to HK. Too expensive for a Best Buy, it nevertheless deserves a hearty Recommendation.

**Recommended**

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	73.2W	74.0W	72.1W
4ohms	114.4W	116.6W	112.3W
Dynamic Headroom (IHF)		-1.2dB (96.9W)	
Peak Current (5msec, 1% THD)		18.7A	
Output Impedance		0.129ohms	
Damping Factor		62.2	
	CD/Aux	MM	MC
Stereo Separation (1kHz)	77.5dB	73.5dB	57.2dB
(20kHz)	54.0dB	48.4dB	48.6dB
Channel Balance			
(1kHz, -20dBV)	0.53dB	0.58dB	0.59dB
(-60dBV)	0.45dB	0.49dB	0.51dB
Total Harmonic Dist.			
(0dBW)	-79.9dB	-76.5dB	-65.6dB
(2/3 power)	-81.9dB	-80.2dB	-65.2dB
CCIR Intermod. Dist.			
(0dBW)	-79.5dB	-71.9dB	-35.5dB
(2/3 power)	-77.7dB	-69.9dB	-35.4dB
Noise (A wtd, 0dBW)	-78.1dB	-78.5dB	-75.2dB
(2/3 power)	-81.5dB	-83.7dB	-78.3dB
Residual noise (unwtd)	-71.4dBV	-71.3dBV	-71.2dBV
Input Sensitivity			
(for 0dBW)	15.6mV	251uV	12.3uV
(for full output)	135.2mV	2.19mV	106uV
Disc Overload (20Hz)		16.3mV	845uV
(1kHz)		152.2mV	7.26mV
(20kHz)		1240mV	18.85mV
(50kHz)		1720mV	15.25mV
Tape Output/Impedance	9.53V (disc)/973ohms		
Input loading	29kohms/260pF	38kohms/100pF	47ohms/4nF
Absolute Phase		Positive	
DC offset, left/right		-118.8mV/-43.5mV	
Retail Price			£380





# JVC AX-A3TN

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

**Recommended**



No-frills amplifiers are appearing thick and fast these days. What was once the preserve of specialist UK manufacturers has now generated world-wide interest, just look at what Pioneer has done! So, in order to swell the ranks still further, JVC has joined the fray with two basic amplifier models, the AX-A2 and AX-A3. Both are available in JVC's attractive titanium finish, hence the 'TN' subscript.

We've reviewed the costlier AX-A3 but there's little to distinguish the models save for the extra power and CD Direct facility of the latter. Both amps are dominated by a large rotary volume control together with balance and 'bass compensator' facilities. This extra widget boosts signals around 100Hz to counteract the ear's insensitivity to bass sounds when listening at low levels.

Otherwise, it's a very straightforward and honest package, the single MM disc input is not particularly fancy but the main power supply is chunky enough and good quality Sanken transistors are employed in the power amp. JVC has even fitted decent, unswitched 4mm binding posts.

## Lab report

An all-round good egg, this one. It comfortably exceeds its 35W rating with a constant 49-50W across the 20Hz-20kHz audioband and even manages to sustain 77-79W across the same bandwidth into 4ohms. Few 35W amplifiers offer this uniformity and fewer still will kick out 11A or more of clean current.

Distortion is vanishingly low too, hovering around 0.001 per cent through both CD and MM inputs. The closed-loop linearity of JVC's circuit is revealed by the Distortion plot which, save for a trace of second-order IMD, is free of coloration. Lack of RF IMD is linked to JVC's input filtering rather than being an indication of the amp's open-loop linearity. An

impressive result, nonetheless.

Equally impressive is the amp's flat and extended disc response, in fact the -3dB point finally clocked-in beyond the published RIAA plot at 2.25Hz! Complaints? Well, perhaps the +27.6dB disc input headroom could be improved and source selection changed to widen the 45dB stereo separation (20kHz).

## Sound quality

This amp does not provide oodles of sharp, tactile detail but neither is there any unnatural spikiness about the sound. As a result the panel found its tidy presentation very comfortable and easy on the ear, regardless of whether a CD or vinyl disc was in play. Yet there was some dissension amongst the ranks. One listener felt there was a loss of ambience, while others were content with its mellow character.

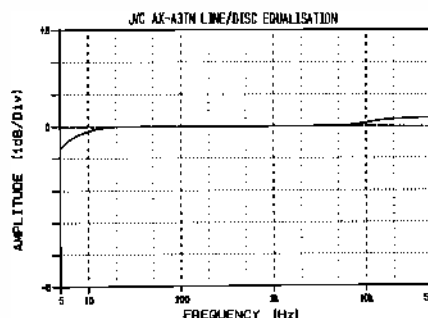
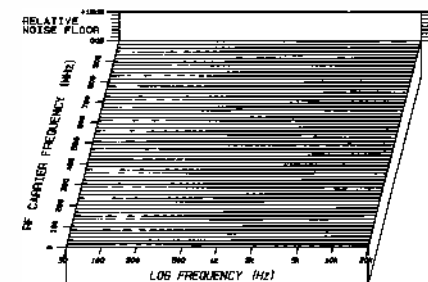
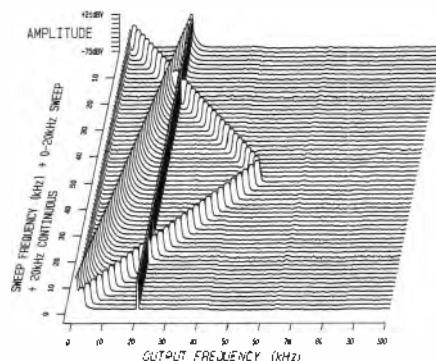
Personally, I considered that all our listeners were describing the same sort of 'sound' and that both opinions related to some subtle restriction in deep bass as well as high treble. Both MM and CD inputs are, subjectively at least, mildly band-limited and this allows the amp to perform confidently yet without overstretching itself. Consequently it succeeds in providing a very pleasant and homely sort of sound that'll suit a wide variety of budget systems.

## Conclusion

JVC has adopted a proven formula in the AX-A3 and, I suspect, in the AX-A2 also. Technically, it's more than competent and should have no difficulty coping with any budget speaker that might happen across its path. Musically it's all there too, though don't go thinking this is a mould-breaker at £140. It is, however, a fairly radical product for a huge manufacturer like JVC and so its efforts should not go unrewarded. Step forward JVC and receive a Recommended flash!

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	49.8W	49.7W	48.5W
4ohms	78.5W	78.4W	76.7W
Dynamic Headroom (IHF)		+1.4dB (68.2W)	
Peak Current (5msec, 1% THD)			11.3A
Output Impedance			0.085ohms
Damping Factor			93.6
Stereo Separation (1kHz)	CD/Aux	MM	
(20kHz)	70.1dB	70.6dB	
Channel Balance (1kHz, -20dBV)	45.9dB	44.9dB	
(-60dBV)	0.77dB	0.70dB	
Total Harmonic Dist. (0dBW)	1.32dB	1.55dB	
(2/3 power)	-99.5dB	-99.3dB	
CCIR Intermod. Dist. (0dBW)	-102.6dB	-100.8dB	
(2/3 power)	-93.1dB	-83.7dB	
Noise (A wtd, 0dBW)	-93.5dB	-84.8dB	
(2/3 power)	-79.1dB	-77.8dB	
Residual noise (unwtd)	-92.3dB	-80.9dB	
Input Sensitivity (for 0dBW)	-82.0dBV	-81.8dBV	
(for full output)	32.0mV	418uV	
Disc Overload (20Hz)	227.8mV	2.95mV	
(1kHz)		12.75mV	
(20kHz)		120.1mV	
(50kHz)		1068mV	
Tape Output Impedance		9.21V (disc) / 816ohms	
Input loading	51.7kohms/170pF	48.1kohms/185pF	
Absolute Phase		Positive	
DC offset, left/right		-8.7mV / -14.7mV	
Retail Price			£145



# Kenwood KA-5020

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

**Recommended**



Over the last few years Kenwood has established a reputation for excellent build quality and, superficially at least, superb value for money. Well, there's nothing superficial about the KA-5020, because at a mite over £200, it's something of a powerhouse on the cheap! Neither is it the largest or heaviest of the company's amplifiers but, in terms of features, it is comprehensively kitted-out.

The centre of the luxurious satin-black alloy fascia is dominated by a huge 6-gang volume control, while over to the right there's access to independent source select and rec-out controls. Inputs for up to three tape decks, three other line sources and both MM/MC disc are provided, though the extra gain and loading for the latter must be switched separately.

Add to this A/B speaker selection, balance, bass and treble tone controls, subsonic, mute and loudness facilities and you've a fun-packed evening ahead. Of course, should you wish to by-pass much of this frivolity then Kenwood has provided a 'source direct' switch!

There's equal attention to detail inside where Kenwood has shortened the signal path by employing localised switches for input selection and logic-controlled relays for the A/B speaker outlets.

## Lab report

All the 5020's inputs are strictly filtered against RF. Consequently the 'perfect' RF IMD plot simply reflects the fact that no RF gets past the input phono and is not a true indication of the circuit's genuine immunity to RF IMD.

Most other results are quite beyond reproach. The amplifier enjoys a healthy 68-70dB stereo separation through the midband, superbly low noise via MM disc (-92dB, A-wtd) while suffering a mere 0.8dB low-level channel balance error. All the input sensitivities are spot-on target though there's slightly less headroom

available via MC (+28.0dB) and the tape output impedance is a trifle high.

Distortion is vanishingly low via all inputs and at all power levels (typ. 0.0011 per cent), though the 3D plot indicates some increase in second-order distortions (harmonic and IM) when driving lower impedance loads. Talking of which, the 5020 has plenty of juice tucked under its bonnet, being able to deliver just under 200W into 4ohm.

## Sound quality

Judging by the punchy, pacy sound of this amp, our panel was left in no doubt of its ability to handle punishing dynamics, particularly via CD. The amp was always very positive and communicative in its delivery, but there was also a tendency for it to gloss over fine musical detail, especially subtle vocal inflections. The diction was clear enough but some of the tonal warmth and stereo presence were thought to be missing.

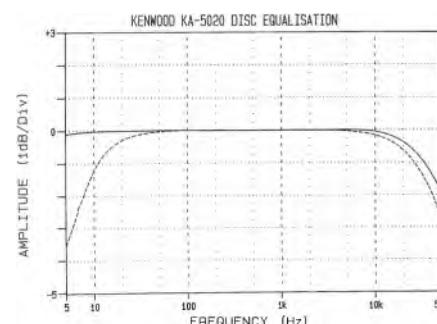
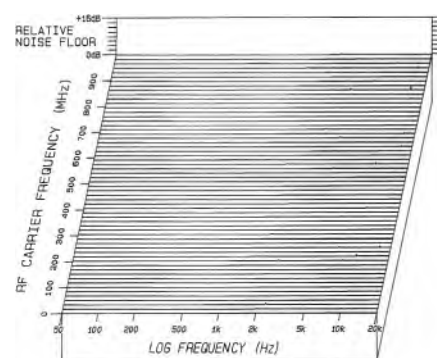
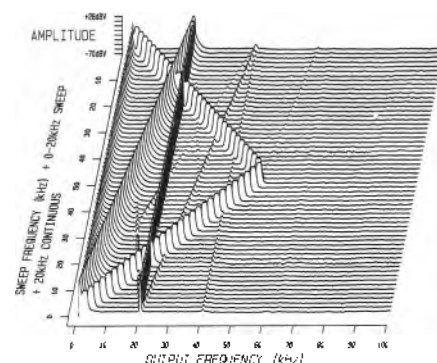
The captivating 'PDM sound' may not have come to the fore, but sax remained as clear and crisp as ever, the instrument appearing both vibrant and alive without compromising its sense of stereo focus and control. By contrast, the MM disc input sounded slightly fuller, offering some extra weight in the bass but perhaps not quite as crisp a top end. A nicely detailed, expressive sound, nonetheless.

## Conclusion

While this is not the most startlingly musical or engrossing of amplifiers, its solid and unmuddled performance was thought to represent something of an 'average' standard for this month's group. Add to this a prodigious power output, magnificent standard of construction and finish and the £210 price tag begins to look positively reasonable. Recommended where the need for muscle is at a premium.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	113.3W	114.7W	109.9W
4ohms	184.5W	197.5W	187.2W
Dynamic Headroom (IHF)		+0.94dB	(142.4W)
Peak Current (5msec, 1% THD)			10.7A
Output Impedance			0.033ohm
Damping Factor			241.5
	CD/Aux	mm	mc
Stereo Separation (1kHz)	70.6dB	67.4dB	68.5dB
(20kHz)	46.3dB	42.9dB	43.3dB
Channel Balance			
(1kHz, -20dBV)	0.12dB	0.15dB	0.20dB
(-60dBV)	0.70dB	0.79dB	0.84dB
Total Harmonic Dist.			
(0dBW)	-99.5dB	-100.6dB	-98.8dB
(2/3 power)	-98.0dB	-99.4dB	-97.0dB
CCIR Intermod. Dist.			
(0dBW)	-92.8dB	-80.2dB	-79.7dB
(2/3 power)	-91.7dB	-80.1dB	-78.5dB
Noise (A wtd, 0dBW)	-81.7dB	-80.9dB	-75.0dB
(2/3 power)	-97.9dB	-91.5dB	-75.7dB
Residual noise (unwtd)	-75.7dBV	-75.4dBV	-75.4dBV
Input Sensitivity			
(for 0dBW)	23.8mV	296uV	23.5uV
(for full output)	257.5mV	3.20mV	251uV
Disc Overload (20Hz)		17.0mV	1.38mV
(1kHz)		159.3mV	12.6mV
(20kHz)		1430mV	115.3mV
(50kHz)		2150mV	212.5mV
Tape Output Impedance	12.75V (disc)/2.62kohm		
Input loading	150kohm/900pF	44kohm/350pF	102ohm
Absolute Phase			Positive
DC offset, left/right		-22.7mV/-13.6mV	
Retail Price			£210



# Uxbridge Audio

Dear Sir

Wembley Park,  
Middlesex.

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

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

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

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

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

Wishing your Company every success

*F. Monteiro*

Mrs. F. Monteiro

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# Lecson Quattrra

ADVANCED ASSEMBLY SERVICES LTD, B1/2 EDISON RD, INDUSTRIAL ESTATE, ST IVES, HUNTINGDON, CAMBS, PE17 4LF. TEL: (0480) 65552

**Recommended**



You may recall the original *Quattrra* amplifier which was manufactured by a company called Inca Tech. Since the demise of Inca Tech this amplifier, now dubbed the Lecson *Quattrra*, is being manufactured and distributed by AAS (Advanced Assembly Services Ltd).

As its name suggests, the *Quattrra* is equipped with no less than four independent power amps, facilitating either bi-amplified or bridged-mode operation. Other than this the operation of the *Quattrra* is perfectly straightforward, AAS having provided separate input select and rec-out controls for the five line and MM/MC disc inputs. Separate volume and balance controls plus a mono switch complete the line-up of facilities. There are no tone controls nor does the amp need adjusting for bridged operation.

Nevertheless, you are required to fumble with a four-pin DIP switch when choosing between MM and MC cartridges, the all-active RIAA network being based around a low noise OP37 op-amp. In fact the technical design of the *Quattrra* has apparently remained unchanged, save for some improvement in the rating of the mains transformer. But ears and spectrum analyser would have us believe otherwise.

## Lab report

As expected there has been the mildest increase in power output to 19W into 8ohms, while dynamic headroom is now +1.1dB (or 25W) and maximum current 8.7A. In bridged mode you can squeeze out some 50W into 8ohms and 57W into 4ohms while THD increases from typically 0.007 per cent to 0.025 per cent across the bulk of the power bandwidth.

So what else is new? Well, the poor 20kHz separation and atrocious low-level channel balance error are still with us but THD and IMD are about ten times lower than before! The most obvious change has

been in the disc network, for not only are the RIAA responses askew between MM and MC but so is the sensitivity and headroom. Some 1.35mV is required for full output via MM which makes it proportionally more sensitive than the MC input which requires 0.39mV.

Similarly the MC stage enjoys a healthy +39.3dB overload margin which contrasts with the +29.8dB available for MM. THD is also much higher (typically 0.24 per cent) via MM as is CCIR IMD (typically 0.5 per cent).

## Sound quality

The panel was really quite engrossed in the warm, deep and rich sound of this amplifier, nodding contentedly until they were rudely awakened by a cackling DJ from a rogue radio station. This mild RF breakthrough was confined to the phono input (the RF IMD test is performed via the CD input) but was also a feature of the original amplifier.

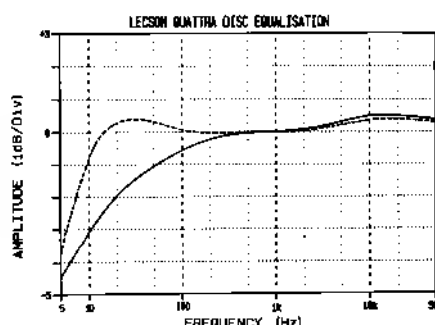
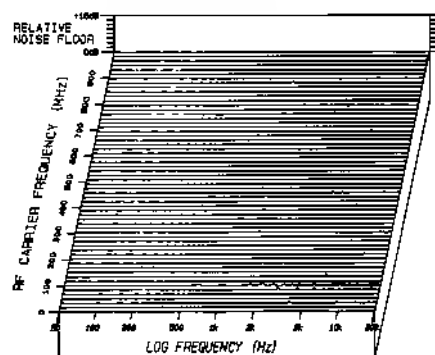
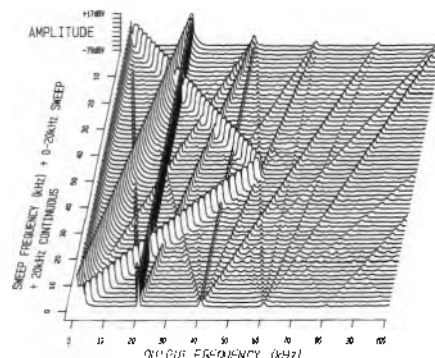
This aside, we were all struck by the wonderfully open and deep soundstage that seemed large and tactile enough for us to walk into, particularly via MM disc! The MC input was cleaner sounding but was similarly lively and thoroughly engrossing. In fact all the inputs rewarded us with a truly three-dimensional picture. A thoroughly enjoyable sound.

## Conclusion

The *Quattrra*'s black perspex fascia lacks the feeling of solidity expected of a product in this price category while the limited power output may also serve as further dissuasion. Ranged against this is the undeniable flexibility of its four-channel operation and, when partnered with suitably sensitive speakers, its inherently musical and communicative sound quality. It is still something of an odd-ball amp but the Lecson *Quattrra* deserves Recommendation.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	19.1W	19.1W	18.9W
4ohms	28.8W	30.0W	28.9W
Dynamic Headroom (IHF)		+1.1dB (24.6W)	
Peak Current (5msec, 1% THD)		8.7A	
Output Impedance		0.081 ohms	
Damping Factor		99.3	
	CD/Aux	MM	MC
Stereo Separation (1kHz)	62.1dB	62.5dB	62.9dB
(20kHz)	36.6dB	36.8dB	37.9dB
Channel Balance			
(1kHz, -20dBV)	0.50dB	0.45dB	0.44dB
(-60dBV)	15.9dB	15.8dB	15.7dB
Total Harmonic Dist.			
(0dBW)	-83.8dB	-52.0dB	-85.1dB
(2/3 power)	-84.6dB	-53.8dB	-83.9dB
CCIR Intermod. Dist.			
(0dBW)	-85.8dB	-42.9dB	-75.2dB
(2/3 power)	-86.1dB	-39.8dB	-73.4dB
Noise (A wtd, 0dBW)	-74.7dB	-73.6dB	-66.8dB
(2/3 power)	-84.1dB	-79.4dB	-67.7dB
Residual noise (unwtd)	-61.9dBV	-61.8dBV	-61.5dBV
Input Sensitivity			
(for 0dBW)	30.40mV	313uV	89.6uV
(for full output)	134.6mV	1.35mV	389uV
Disc Overload (20Hz)		15.35mV	4.67mV
(1kHz)		154.8mV	46.3mV
(20kHz)		1298mV	396.0mV
(50kHz)		1821mV	571.0mV
Tape Output/Impedance		14.86V (disc)/14.7ohms	
Input loading	45kohms/110pF	13kohms/100pF	100ohms
Absolute Phase			Positive
DC offset, left/right			+0.5mV/-0.4mV
Retail Price			£350



# Marantz PM-30SE

MARANTZ HI-FI LTD, KINGSBRIDGE HOUSE, PADBURY OAKS,  
575/583 BATH ROAD, LONGFORD, MIDDX. TEL: (0753) 680868

**Recommended**



Take one good quality amplifier, rip out the tone controls and beef up the power supply and - hey presto - you've got yourself a Special Edition product. Oh yes, and don't forget to slap an extra £30 onto the retail price.

The transformation of Marantz's PM-30 to PM-30SE is not quite such a cynical affair. Indeed, the myriad detail improvements involved have, by all accounts, wrought significant gains in sound quality.

For a start Marantz has uprated the power supply electrolytics and moved from a two-stage to a three-stage Darlington power amp using higher current transistors from Toshiba. So, though the amp's continuous power rating hasn't budged, it is better placed to handle difficult speakers.

The power amp is connected directly to both A and B speaker outlets, a further revision on the '30SE which facilitates quick and easy bi-wiring.

Otherwise the internal design follows the established Marantz practice of symmetrical PCB layouts, centralised earthing and remote source selection (to improve stereo separation). At least it's gotten rid of the hybrid line/driver IC that was included in its earlier generations of amplifiers!

## Lab report

Never having tested the basic PM-30, comparisons with the SE version are difficult, to say the least. As an amplifier in its own right, however, the PM-30SE stood its ground with a very generous 13A current capability and satisfactory +1.3dB dynamic headroom. The output impedance is pleasingly low just as channel balance, input sensitivities and disc input headroom (+30.6dB) are all spot-on target.

I was especially impressed with the low -76dBV hum and 87dB S/N ratio (A-

wtd) of the MM disc input which, by the way, adopts the most recent IEC subsonic tailoring (-3dB down at 20Hz). Distortion is low, too, even though it increases to around 0.008 per cent at higher power levels. Intermodulation is less consistent between inputs because the MM disc stage is less linear at 19/20kHz.

The amp's initial low-MHz RF sensitivity is due to its wide closed-loop bandwidth, though the small blip at 240-250MHz appears linked to a genuine demodulation. Other than this its RF spectrum is fairly clean.

## Sound quality

No sooner had the stylus dropped into the groove than the very fluid and engaging musical quality of the PM-30SE became apparent.

Bustling with detail, its attractive but demanding carriage was made all the more impressive by the marvellous sense of space surrounding individual instruments and performers. This is a very expressive amp, busy, energetic and genuinely dynamic without sounding aggressive or grainy.

Yet our panel were less enthusiastic about the difference in overall tonality between the CD and MM inputs - a difference they observed to be very marked.

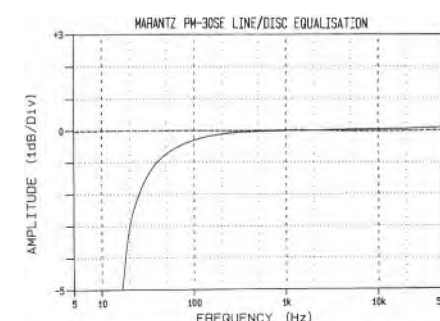
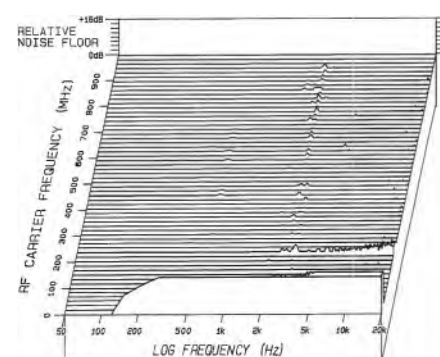
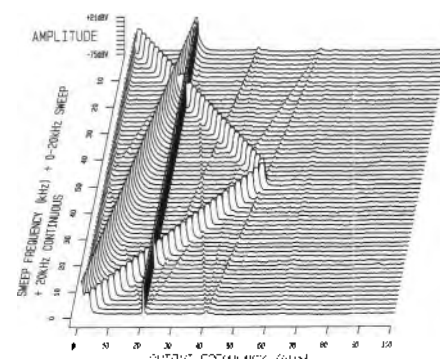
The warmer sound of the disc input lent it a 'quiet' quality, music could be played loud but the big effortless soundstage was free of sharp and fatiguing edges. CD, by contrast, sounded that bit brighter, however it was also better focused with tactile stereo images extending way back into layer upon layer of detail.

## Conclusion

The PM-30SE represents good value for money, and is firmly Recommended, but the Best Buy ticket just eludes its grasp.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	47.9W	49.6W	46.9W
4ohms	66.6W	74.5W	69.9W
Dynamic Headroom (IHF)		+1.3dB (66.3W)	
Peak Current (5msec, 1% THD)		13.1A	
Output Impedance		0.047ohms	
Damping Factor		170.4	
	CD/Aux	MM	
Stereo Separation(1kHz)	94.0dB	90.3dB	
(20kHz)	68.6dB	63.6dB	
Channel Balance(1kHz, -20dBV)	0.22dB	0.25dB	
(-60dBV)	0.38dB	0.35dB	
Total Harmonic Dist. (0dBW)	-96.1dB	-94.1dB	
(2/3 power)	-83.6dB	-80.6dB	
CCIR Intermod. Dist. (0dBW)	-98.5dB	-82.4dB	
(2/3 power)	-96.6dB	-83.1dB	
Noise (A wtd, 0dBW)	-90.1dB	-84.4dB	
(2/3 power)	-99.2dB	-86.7dB	
Residual noise (unwtd)	-76.1dBV	-76.3dBV	
Input Sensitivity (for 0dBW)	28.5mV	493uV	
(for full output)	202.5mV	3.49mV	
Disc Overload (20Hz)		27.89mV	
(1kHz)		170.1mV	
(20kHz)		1433mV	
(50kHz)		1698mV	
Tape Output/Impedance	9.925V (disc)/229ohm		
Input loading	30.8kohms/220pF	49.3kohms/200pF	
Absolute Phase		Positive	
DC offset, left/right		-9.6mV / -10.7mV	
Retail Price		£190	



# Marantz PM-40 SE

MARANTZ HI-FI (UK) LTD, KINGSBRIDGE HOUSE, PADBURY OAKS, 575-583 BATH ROAD, LONGFORD, MIDDLESEX UB7 0EH. TEL: (0753) 680 868

**Recommended**



Not content with upgrading its standard PM-40 amplifier to *Special Edition* status, Marantz has introduced a further twist by changing the reservoir capacitors in recent production.

The SE version is distinguished by a lack of tone controls and speaker selection switching, though the tape copying, balance and MM/MC vinyl disc cartridge options remain as standard. There's the same bold volume control and rotary input selector too, the only facilities left intact once 'Source Direct' is engaged.

The 40SE also features a chunkier power amp stage, using Toshiba transistors and larger 10,000uF electrolytics in the power supply. Which brings us onto the latest mod. Marantz recently 'auditioned' a handful of alternative electrolytic capacitors in an effort to generate a more up-front and sparkling sound. All new PM-40SE's feature these latest reservoir caps, which can be retrofitted to existing models for just £10. (Ask your friendly local Marantz dealer for details.)

The exact differences between the old and new caps are exceedingly small as both share the same specifications. In fact the only differences relate to the internal construction of the devices themselves and specifically the surface areas of the foils.

## Lab Report

There is no measured or indeed subjective evidence to support claims for the superiority of the 'new' Marantz PM-40SE; in fact even the company itself seems to be endeavoring to play the whole thing down.

Both old and new versions turn in very respectable figures, including a substantial 18A peak current capacity to support the 61W (8ohms) and 97W (4ohms) power outputs.

The slight bursts of RF IMD at 250MHz

and 450MHz should be harmless enough, while distortion as a whole is typically better than 0.003 per cent. IMD is up slightly on MC vinyl disc (see 3D plot) though the 30.7dB headroom is very generous. The MM vinyl input's -92dB noise figure is especially impressive.

## Sound Quality

This Marantz' big and generous sound made a lasting impression on our listeners. Its hearty balance can pull out strong and clean bass lines from rock and pop Compact Discs without sounding overly deep or heavy. Still, the abiding impression was that this amplifier exerted real grip on the music, sounding controlled but not forced.

The amp did not labour at its task, suggested one listener, and sounded both natural and fresh. The panpipe CD seemed especially atmospheric on this occasion, and the amp picked out tonal shades that had been glazed over by many others. The MM disc input was equally well received, though it was perhaps a little cooler in its portrayal of our classical LP's.

The conviction of Marty Paich's jazz recording, on the other hand, was all the more tangible. Instead of just bobbing along, the rhythm seemed bolstered with added drive and solidity. Far from being smothered, low-level detail remained as vibrant and alive as ever.

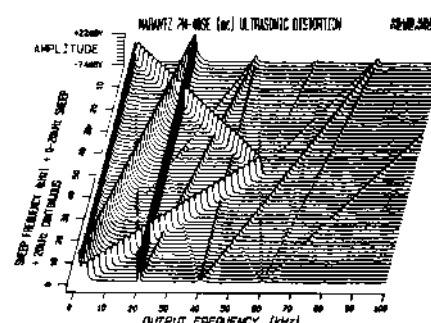
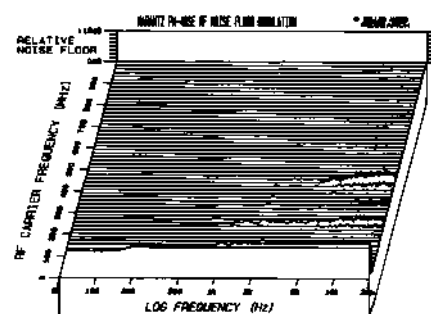
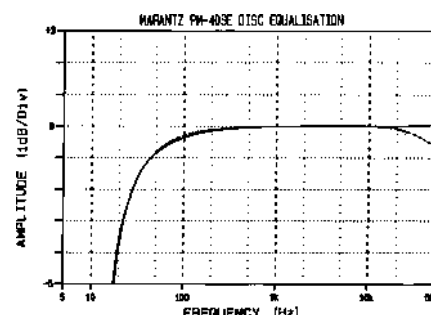
The only real criticism from our panel - mild though it was - concerned a bias towards pop and jazz material rather than the warmth and fullness of our classical selection.

## Conclusion

In its latest form the PM-40SE has emerged as a very fine amplifier indeed, certainly the best that Marantz has ever produced and a most promising sign for the future of the brand.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	59.6W	60.7W	59.6W
4ohms	92.2W	97.0W	95.1W
Dynamic Headroom (IHF)	+1.15dB (79.1W)		
Peak Current (5msec, 1% THD)		17.8A	
Output Impedance	0.047ohms		
Damping Factor	169.0		
Stereo Separation (1kHz)	92.1dB	89.5dB	87.4dB
(20kHz)	67.7dB	65.5dB	63.7dB
Channel Balance (1kHz, -20dBV)	0.20dB	0.45dB	0.48dB
(-60dBV)	0.68dB	0.65dB	0.68dB
Total Harmonic Dist.			
(0dBW)	-95.8dB	-95.7dB	-95.4dB
(Two-thirds power)	-91.1dB	-92.2dB	-90.2dB
CCIR Intermod. Dist.			
(0dBW)	-95.0dB	-87.9dB	-84.7dB
(Two-thirds power)	-85.2dB	-82.5dB	-80.5dB
Noise (A-wtd, 0dBW)	-89.1dB	-86.2dB	-74.5dB
(Two-thirds power)	-98.4dB	-91.8dB	-74.5dB
Residual noise (unwtd)	-76.8dBV	-76.7dBV	-76.7dBV
Input Sensitivity (for 0dBW)	23.7mV	359uV	38.5uV
(for full output)	184mV	2.75mV	296uV
Disc Overload (1kHz)		160.9mV	17.1mV
(20kHz)		1312mV	145.0mV
(50kHz)		1813mV	208.9mV
Tape Output Impedance	10.7V (disc)/221ohms		
Input Loading	29kohms/220pF	45kohms/390pF	100ohms
DC Offset, left/right		-7.7mV/5.5mV	
Retail Price			£240





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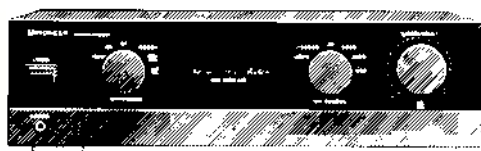
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# Mission Cyrus Two

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

**Recommended**



It's always a good idea to keep tabs on old favourites and, indeed, since *Choice* last examined Mission's *Cyrus Two* there have been a number of improvements. Despite its compact dimensions the *Two* is a surprisingly heavy amplifier due, in no small part, to the diecast chassis, integral heatsink and solid alloy casework that holds the thing together. Gone are the illuminated 'Cyrus' logo and miniature headphone socket, leaving the modest range of controls intact.

Two adjacent rotary controls enable independent selection or recording from any of four line sources together with either MM or MC disc. A mute position is also provided. To the left, you'll find the dual-concentric volume and balance control but there are no tone, loudness or other twiddly bits to speak of.

The basic design of the *Cyrus Two* follows that established for the *Cyrus One* though the former does benefit from a much improved MC disc stage. Whereas the *One* uses a single op-amp with a variable gain to cope with either MM or MC cartridges, the *Two* features an entirely independent MC head amp based around a low-noise two-transistor package (LM394) and NE5534A op-amp from Signetics.

## Lab report

The technical performance of the *Cyrus 2* bears a close resemblance to that of the *Cyrus 1* (see page 73). Obvious departures include the higher 60W per channel rating and generous 15.2A current capability but the low-ish 0.079ohm output impedance and 55dB midband separation are almost identical. So too is the 0.0016-0.0035 per cent spread of THD from 0dBW to two-thirds output, though improvements to the disc circuitry have brought THD in line with that of the CD input.

The RIAA responses show a comparable -3dB IEC tailoring at 20Hz,

though the uprated MC input enjoys a higher sensitivity (180uV), much lower noise (-78dB A-wtd) and lower THD than the MC stage on Mission's *Cyrus 1*. The only drawback is its reduced headroom which has fallen from +21.3dB - too low for comfort in my opinion.

## Sound quality

From the outset, our panel recognised the classy and richly detailed sound as that belonging to an 'expensive amplifier'. There was a faintly clanky or mechanical feel to strong treble sounds via MM disc, but the amplifier was otherwise universally praised for its extremely confident and solid performance. There's certainly a purposefulness and tactility about the sound of this amp that escapes the attention of much of its competition.

You are never left in any doubt that the *Two* is firmly in control of its music-making, for it enjoys a boldness and conviction that's absolutely riveting to hear. Bass is exceptionally solid without suffering a hint of excess, for instance.

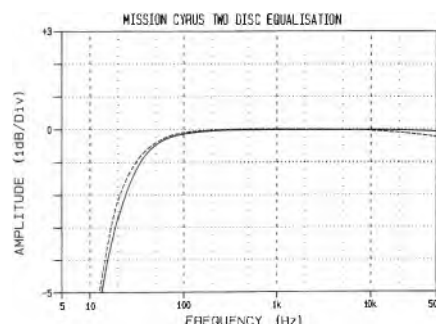
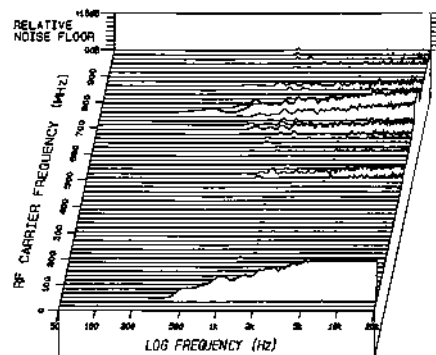
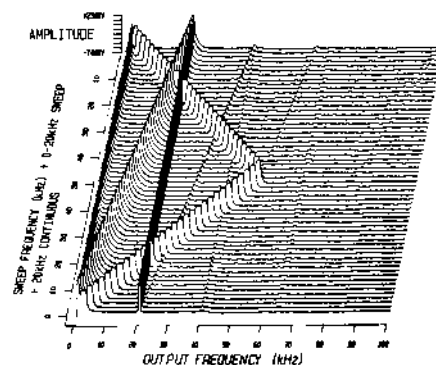
Do take the trouble to check out its reaction to your chosen CD player, however. There is no fundamental incompatibility at work but the *Two* is susceptible to a broad spectrum of RF noise and can offer some undue emphasis of strident treble sounds as a result. Powerful, detailed and beefy: these are qualities you can rely on. But hook it up to a mildly bright or forward-sounding CD player and its heroic soundstaging will be tempered by a splash of acid sibilance.

## Conclusion

A firm and very self-possessed sound from an equally firm and well-built package. The *Cyrus Two* continues to hold its own, then, even if its performance is not quite as impressive as that of the cheaper *Cyrus One* at £230. Recommended.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	56.3W	59.1W	59.1W
4ohms	87.5W	93.2W	93.2W
Dynamic Headroom (IHF)		+1.2dB (78.4W)	
Peak Current (5msec, 1% THD)		15.2A	
Output Impedance		0.079ohm	
Damping Factor		100.1	
	CD/Aux	MM	MC
Stereo Separation (1kHz)	56.7dB	56.3dB	55.7dB
(20kHz)	51.5dB	48.7dB	48.5dB
Channel Balance			
(1kHz, -20dBV)	1.41dB	1.41dB	1.42dB
(-60dBV)	3.63dB	3.95dB	3.98dB
Total Harmonic Dist.			
(0dBW)	-95.9dB	-96.4dB	-95.9dB
(2/3 power)	-89.1dB	-92.6dB	-92.9dB
CCIR Intermod. Dist.			
(0dBW)	-95.8dB	-87.5dB	-86.5dB
(2/3 power)	-95.6dB	-85.8dB	-84.6dB
Noise (A wtd, 0dBW)	85.4dB	-80.5dB	-76.8dB
(2/3 power)	-100.3dB	-84.7dB	-78.0dB
Residual noise (unwtd)	-72.9dBV	-72.9dBV	-72.8dBV
Input Sensitivity (for 0dBW)	47.5mV	331uV	23.3uV
(for full output)	369.4mV	2.59mV	180uV
Disc Overload (20Hz)		11.95mV	785uV
(1kHz)		83.55mV	5.82mV
(20kHz)		783.5mV	54.75mV
(50kHz)		1091mV	125.5mV
Tape Output Impedance		12.1V (disc)	157ohm
Input loading	13kohm/100pF	47kohm/100pF	100ohm
Absolute Phase			Positive
DC offset, left/right			-11.5mV -3.9mV
Retail Price			£350



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# Pioneer A-300

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

**Recommended**



Pioneer UK has been badgering its masters to design and build a no-frills integrated amplifier to compete with the likes of Arcam, Mission, etc. Typically, though, the UK ends up with pretty fascias dotted with party lights and unwanted facilities. Until now. The launch of Pioneer's two new integrated amps - the A-300 and the A-400 has created a hubbub no enthusiast could have failed to pick up on.

You see the A-300 and A-400 have genuinely been designed for UK-consumption so there are no tone controls, loudness, mono or speaker-switching facilities. Even the volume control is a dual-concentric affair to do away with the need for a separate balance control. The two remaining knobs simply cater for input and rec-out selection of the phono (MM only on the A-300), three line and two tape inputs. These selectors are wholly independent of one another and use remote switches mounted up near the input terminals - reducing unnecessary track runs and improving stereo separation to boot.

The effects of vibration are reduced by Pioneer's honeycomb chassis and heatsink construction, while the main PCB is actually suspended midway in the box. The layout of the line and power amp circuit is totally symmetrical between left and right channels, while conventional feedback has been reduced in favour of Pioneer's own compensation scheme.

## Lab report

This is one beefy 30-watter! In fact, it's closer to 55W in specification with a decently low output impedance of 0.064ohm(20Hz). Stereo separation holds up well through the midband (typ. 75-78dB), but this sample had a dodgy volume pot so the error in channel balance increased to a poor 7.4dB @ -60dB. Distortion increases to a consistent 0.015 per cent or so at moderate levels.

The equally impressive MM disc response is not actually a carbon-copy of the A-400's, by the way, for it peaks to +1.5dB(1.41Hz) before falling off to -3dB at 0.8Hz. The RF IMD spectrum is also peculiar to the A-300, highlighting an abrupt break near the top of its extended closed-loop bandwidth (1MHz) in addition to a mild resonance at 310MHz.

## Sound quality

First impressions were not of spontaneous delight because the panel was initially exposed to the A-300's MM disc input, a refined and polite-sounding design but one that's neither as crisp, immediate or dynamic as either the Dual CV5600 or the Mission Cyrus Two. There was no denying the tidiness and subtlety of the overall sound but the resolution of brass instruments, for instance, was compromised by a lack of tonal richness or freshness. Good, certainly, but the MM input nonetheless failed to shine in the view of our panel.

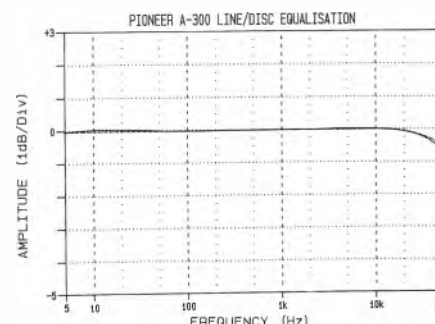
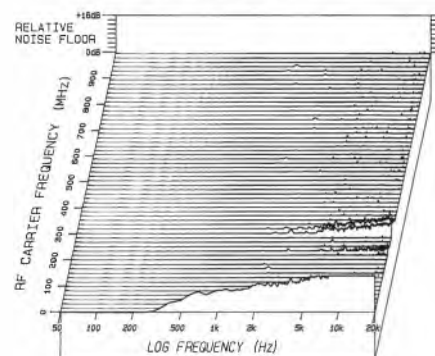
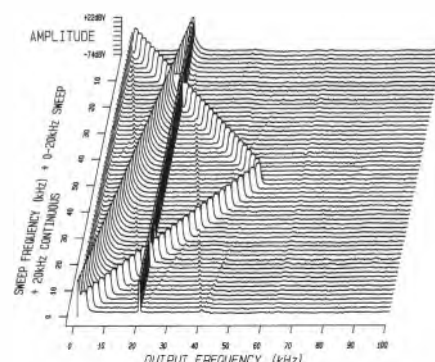
However, switching to CD brought about an instant change of opinion as the amplifier began to breathe musical detail in a most natural and revealing way. There was certainly some 'editorialising' going on as one panellist referred to it, but this did little to dampen the panel's new-found enthusiasm! It was certainly very successful with busy pop tracks that might otherwise have sounded confused or aggressive, trading the nth degree of crisp, transient detail for a very agreeable overall balance.

## Conclusion

Not the wholesale success we might have been led to expect then, if only because of the contrast in subjective performance between the MM and CD inputs. If your listening is CD-oriented, however, you'll not fail to be delighted by the ingratiating, if slightly mellow sound of the A-300.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	51.3W	54.6W	51.8W
4ohms	76.7W	80.2W	80.2W
Dynamic Headroom (IHF)	+1.1dB (70.1W)		
Peak Current (5msec, 1% THD)	9.1A		
Output Impedance	0.064ohm		
Damping Factor	125.4		
	CD/Aux	mm	
Stereo Separation(1kHz)	75.3dB	78.0dB	
(20kHz)	49.3dB	51.7dB	
Channel Balance(1kHz, -20dBV)	0.29dB	0.30dB	
(-60dBV)	7.35dB	7.37dB	
Total Harmonic Dist.(0dBW)	-94.1dB	-89.5dB	
(2/3 power)	-76.6dB	-76.0dB	
CCIR Intermod. Dist.(0dBW)	-91.6dB	-84.3dB	
(2/3 power)	-72.0dB	-73.1dB	
Noise (A wtd, 0dBW)	-83.4dB	-81.9dB	
(2/3 power)	-95.6dB	-86.9dB	
Residual noise (unwtd)	-78.6dBV	-78.6dBV	
Input Sensitivity(for 0dBW)	24.2mV	393uV	
(for full output)	180.0mV	2.85mV	
Disc Overload (20Hz)		17.1mV	
(1kHz)		158.3mV	
(20kHz)		1114mV	
(50kHz)		1048mV	
Tape Output/Impedance	9.73V (disc)/2.73kohm		
Input loading	69kohm/100pF 47kohm/120pF		
Absolute Phase	Positive		
DC offset, left/right	+24.6mV/+6.8mV		
Retail Price	£160		







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# QED A270CD/PA

QED AUDIO PRODUCTS LTD, UNIT 12, ASHFORD INDUSTRIAL ESTATE, SHIELD ROAD, ASHFORD, MIDDLESEX. TEL: (07842) 46236

**Recommended**



Since QED's beefy A270 amplifier was last auditioned, the longstanding SA (Super Analogue) vinyl disc board has been superseded by a PA (Premium Analogue) version. Meanwhile QED has also launched its C300/P300 pre/power combination.

Nowadays the A270 and P300 share the same circuit board, power supply and Darlington output stage, and today's A270 now matches the 300 for output power and peak current, though the integrated model is perhaps a little less sophisticated in some areas.

This makes the basic £300 A270CD model, equipped with an elementary MM disc stage, a lustier beast than it once was, while an extra 4mm pair of speaker sockets have been fitted to facilitate bi-wiring.

The same friction-locked volume control, input and record-out selection knobs occupy the fascia but the 'DAT' legend has been quietly replaced with 'Tape 2'. There's still the choice of five line inputs, while opting for the PA upgrade maximises MM and MC vinyl disc performance too. (The original A270 can be upgraded from SA to PA through a generous part-exchange scheme.)

## Lab Report

The PA disc board still relies on a single-rail power supply, but thanks to decent LM317 regulators, low-noise FETs and quality metalised polyester capacitors the A-wtd noise has improved from -72dB to -79dB (MC). The 20Hz response 'bump' has also been ironed out, but the slew-limiting that plagued the SA board has not been entirely banished.

Although headroom on the MC input has increased from 18dB to 19.3dB (20kHz), this still influences THD (0.07 per cent) and IMD (0.63 per cent). Many of the second to fourth order distortions tracking across the 3D plot are linked to this vinyl input as well as the integral

power amp - which, incidentally, suffers the same 200MHz RF resonance detected on the P300.

## Sound Quality

This latest A270 delivered a smooth and spacious sound that is clearly evolved from the larger-than-life enthusiasm of earlier 270s. Listeners detected a glint of sibilance exaggeration alongside Chris Rea's voice, but the command of the music's natural dynamics and soundstaging seemed a fair trade-off.

This may not be the most linear amplifier in the world, but it does seem able to dig down and retrieve detail that's often concealed. It separated the component parts of our Vivaldi Concerto more effectively than much of the competition, for instance, conveying a sense of space and ambience. All listeners applauded its ability to generate a real feeling of anticipation, genuinely musical 'silences' helping to maintain the tension.

The MM disc input (PA board) was smoother and warmer still and also lost a little of the air and freshness that kept the CD input bubbling with enthusiasm. The double bass, piano, trombone and vibes from our jazz LP were all nicely split across the soundstage, unmuddled despite a narrower soundscape than we sometimes encountered. It's a very likeable sound, very sweet and involving, but perhaps not as crisp as possible - more akin to the older QED sound in fact.

## Conclusion

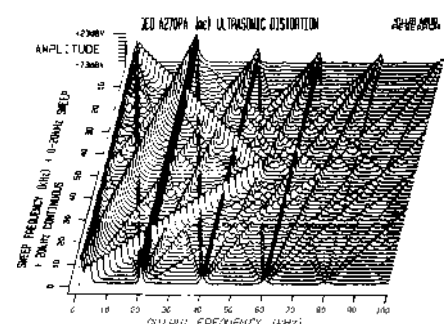
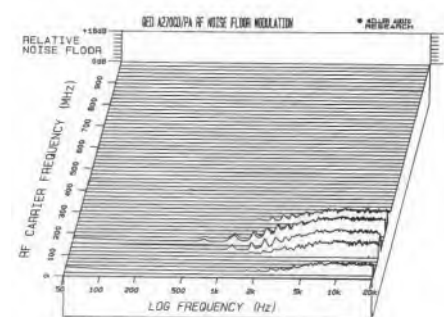
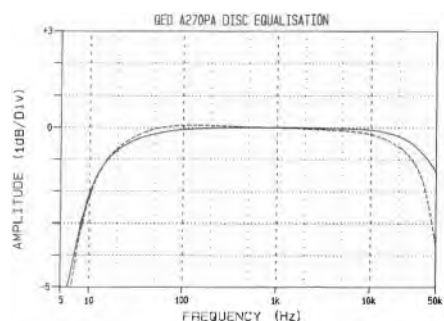
Today's A270 has an extra 20W on hand, together with a real belt of current to keep the most unruly speakers firmly in check. The amp is not as coloured as before, the sound seeming cleaner and drier in a way that helps paint a more neutral and descriptive picture of the musical event. The basic A270CD could form the heart of a cracking CD-based budget system,

though the full PA package is less obviously good value. Fortunately QED does offer a choice, so the A270CD retains its Recommended status.

## TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output, 8ohms	54.9W	60.7W	55.9W*
4ohms	81.1W	100.0W	92.2W*
Dynamic Headroom (IHF)	+0.78dB	(72.7W)	
Peak Current (5msec, 1% THD)		17.0A	
Output Impedance	0.018ohms		
Damping Factor	434.9		
	CD/Aux	MM	MC
Stereo Separation (1kHz)	77.9dB	81.9dB	76.4dB
(20kHz)	53.7dB	57.3dB	56.1dB
Channel Balance (1kHz, -20dBV)	0.24dB	0.22dB	0.27dB
(-80dBV)	1.08dB	1.03dB	1.05dB
Total Harmonic Dist. (0dBW)	-81.0dB	-80.0dB	-63.1dB
(Two-thirds power)	-71.9dB	-70.5dB	-60.8dB
CCIR Intermod. Dist. (0dBW)	-67.9dB	-50.4dB	-37.6dB
(Two-thirds power)	-49.5dB	-45.0dB	-38.7dB
Noise (A-wtd, 0dBW)	-77.3dB	-76.1dB	-75.1dB
(Two-thirds power)	-91.1dB	-83.3dB	-78.9dB
Residual noise (unwtd)	-56.7dBV	-56.3dBV	-56.3dBV
Input Sensitivity (for 0dBW)	47mV	838uV	38.2uV
(for full output)	364mV	6.4mV	269uV
Disc Overload (1kHz)	229mV	10.2mV	
(20kHz)	1585mV	46.3mV	
(50kHz)	1000mV	36.2mV	
Tape Output/Impedance	8.0V (disc) / 4.88kohms		
Input loading	12.7kohms/50pF	65kohms/280pF	670ohms
DC offset, left/right		+4.1mV/+8.4mV	
Retail Price		£300/£400	

\* Refer to lab report





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*Oscar Wilde*

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**T**he first step on the road to choosing your loudspeakers is to specify your personal and particular requirements. Those buying just loudspeakers will have a pretty good idea of the money they have available, which as ever is the fundamental bottom line of any purchasing decision. But there is - and always has been - controversy over the proportion of a budget that should be devoted to loudspeakers, vis a vis that spent on the other components.

When setting the loudspeaker budget, it is vital to allow sufficient funds for a decent stand or support, and good quality connecting wire. From £200, for example, one should probably allocate £140 for the speaker itself, £50 or so for stands, and maybe a tenner for the cables.

Where one listener may be barely conscious of the subtleties of stereo imagery, another will take particular pleasure in pin-pointing musicians within a

the speakers you like in the shop and then move them around at home until they sound to your taste.

The end result comes from a complex interaction between the loudspeaker, its support, its site, the acoustics of the room, and the general characteristics of the driving system. That is rarely entirely predictable. For those intending to spend a fair amount of money, it is not unreasonable to expect the luxury of a home demonstration, and/or the option to return and change a pair which do not suit after a day or two.

For any given budget there is an obvious choice between large or small loudspeakers. One instinctive reaction is to favour the big one, particularly if it has lots of drive units, but others will plump for a miniature or compact on aesthetic grounds. In fact, the differences and trade-offs are much more far reaching.

### Bass extension

Fundamentally, the larger the box the more extended the bass is for the same specific loudness. Ultimately a good big'un is going to beat a good littl'un on loudness and bass extension, hands down. But it is also going to cost a great deal more. The large enclosed volume remains the route to extended bass, and this in turn adds 'weight' and 'scale' to the sound. But it can also reveal the low frequency inadequacies of the sources be they the equipment or the recordings themselves.

Big speakers suffer from several innate disadvantages. Large box enclosures are expensive to build and ship, and represent an undesirably large surface area of unwanted radiation, which can colour the sound and blur stereo precision. Extra drive units do increase power handling, but bring problems of crossover complexity and unit integration.

Little speakers can prove more fragile if used for the occasional party, and are certainly not at their best when trying to recreate the power and drama of rock or a full concert hall acoustic.

Given the excessive number of different models competing for attention, manufacturers are inclined to make much of the uniqueness of their particular brew. As a result the industry has become riddled with buzz words to describe any single type of engineering solution, and this leads to the sort of stereotyping which entirely misses the point of loudspeaker engineering.

Examples are legion, from the bextrene bass/midrange cones of the early Seventies through to the latest metal dome tweeters which are currently springing up everywhere. The result is that people talk of a 'metal dome sound' as something desirable (or not) per se, whereas in fact there will be a whole range of different metal dome sounds, in all probability some distinctly more 'equal' than others.

The underlying axiom is that great loudspeakers are not created by adopting a quick technological 'fix'. Indeed, history has often shown that the 'radical innovation' has benefits in one area which are more than offset by unforeseen penalties elsewhere.

Technology has steadily improved the performance of loudspeakers over the years, and some innovations have proved very worthwhile. But the whole is much greater than the apparent sum of the parts, and the buyer would do well to bear that in mind.

# Choosing and Using ... Loudspeakers

*Thinking of buying some speakers but don't know where to start? Paul Messenger guides you through the maze of loudspeaker selection.*

recorded acoustic. Likewise those who listen predominantly to electronic rather than acoustic instruments are liable to sacrifice coloration in favour of dynamic impact.

While a magazine can assist in presenting these alternatives, it is only through skilled demonstration that an individual can be confronted with the different but equally valid options to make an educated choice for himself. At the time of writing I am temporarily living with a £1,000 system which suits me very well, but which certainly represents one extreme. It consists of a £600 turntable with £200 amplifier and £80 loudspeakers on £100 stands. At the other extreme, another audiophile could enjoyably combine a £500 remote control multisource midisystem with £500 worth of high performance, low coloration loudspeakers and stands. But unless one actually has the opportunity to hear the difference between these two very distinct approaches, how can one possibly have any basis for making a choice?

### Siting

The site chosen for loudspeakers is often as influential as the choice of loudspeakers themselves. Over the years I have used open stand locations, both with conventional box speakers and panel types, and also stand-mounted wallbacked designs. Each has its own strengths and weaknesses and imposes its own characteristics on the sound, so again personal preference enters into the equation.

Having chosen the siting, one may then choose the loudspeakers and stands to suit. Alternatively, choose

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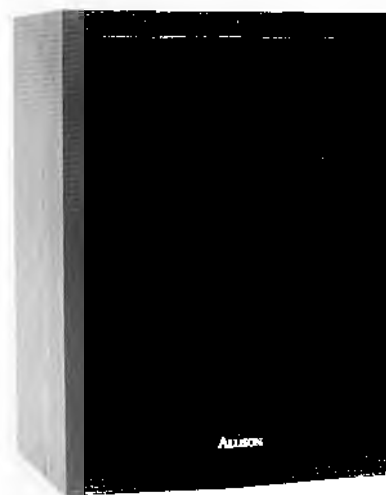
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# Allison AL100

ALLISON ACOUSTICS, 20 CLEVELAND WAY, SHELLEY,  
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**Best Buy**



Roy Allison built a formidable reputation as a loudspeaker engineer back in the glorious past of Acoustic Research. Much of that tradition is reflected in the models that his own company has been building for the past decade or more, albeit modified by Allison's particular perception of low frequency room interaction. In that respect the brand must be acknowledged as the pioneer of close-to-wall sitting, a trend that a number of the newer British brands have followed with significant success in recent years.

Hardly surprising in view of the shipping involved, American speakers tend to cost a little more than their British counterparts in the UK. However, thanks no doubt to the current state of the US dollar, that's not the case with these. The £109 AL100 is rather bigger and heavier than its obvious UK price rivals. That said, the half-a-dozen high performance miniatures that dominate the UK scene establish a remarkable standard of performance for the money. A US interloper is not going to find it easy to compete on the same terms.

Not surprisingly, presentation is prosaic, with a certain amount of painted chipboard edging around the rear. Still, the standard of finish is very good, and the grille is a neat shaped section of perforated plastic, better left in place as the heavily doped main driver cone is not particularly pretty.

The box feels pretty solid, helped by its squat shape and 19mm wrap, though the baffle is rather thin, and the rebated main driver uses woodscrews directly into chipboard only 5mm thick. The screws were reasonably tight, but I wouldn't have liked to try and tighten them properly.

The main driver has a small (115mm)

heavily doped fabric cone, and apparently has extra mass loading to lower its free air (and in-cabinet) resonant frequency. Such a technique is also liable to lower the natural HF rolloff of the driver, but Allison uses a lowish (2.5kHz) crossover point, so no matter. The tweeter is a simple plastic dome/annulus under a phase compensator, while the crossover is pretty minimal, barring a protection thermistor, hardwired and tag connected.

## Test report

The basic parameters show unusually good bass extension for such a modest loudspeaker. Part of the reason is found in the combination of slightly below average sensitivity (on our estimate, which cannot be precise given the response unevenness), and a resolutely low impedance characteristic. Choose a partnering amplifier with good current capability.

The overall balance is decidedly uneven, the exposed and forward midrange being the most striking characteristic. This tends to be less obvious when the speaker is fairly close to a wall, though it should not be placed too close or the midbass gets too strong; the lower mid remains lean throughout, and there's a clear discontinuity at the crossover with some loss of presence. The treble response is far from smooth.

## Sound quality

The AL100 did indecently well for a model of humble aspirations in the blind tests, albeit with some dissenters in the panel. A contributing factor might have been that the basic response defies attempts to match levels precisely with flatter designs, but in fact the actual setting used was

lower than most, so this is unlikely to have helped it.

The balance does tend to emphasise vinyl surface noise somewhat, the sound is a little heavy and uneven in the bass, with a rather forward and mildly mangled midband. But all bar one listener found the overall result fundamentally enjoyable. Timing is impressively coherent, and although the bass isn't genuinely defined, it doesn't waffle either, delivering a satisfyingly juicy 'thwack' that gives a surprisingly good sense of scale.

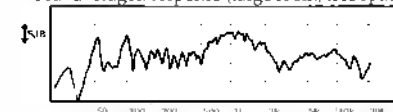
## Conclusion

Not the most neutral or polite of the £110 miniatures, the AL100 is nevertheless most enjoyable in its rather rude and crude way. It beats most or all price rivals in its ability to give a very fair (if somewhat misleading) impression of a full size model, and that factor certainly merits a Best Buy rating.

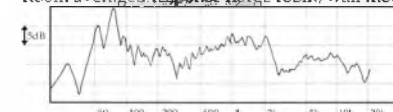
## TEST RESULTS

Size (hwxwd)	33.5x24x21.5cm
Weight	5.5kg
Recommended amplifier power	15-75W
Recommended placement	stands 30cm from wall
In room averaged response limits 50Hz-10kHz	+/-6dB
Large room/space LF rolloff (-6dB ref midband)	40Hz
Large room/wall LF rolloff (-6dB ref midband)	30Hz
Large room output at 20Hz (ref midband)	-11dB
Estimated sensitivity (ref 2.83V, 1m)	87dB
Impedance characteristic (ease of drive)	current hungry
Typical price per pair (inc VAT)	£120

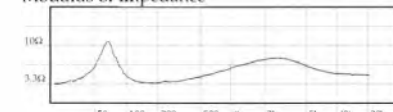
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



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# Great Hi-Fi Stories... No. 3



## The Customer is always right (sometimes).....

"I'd like to buy the best double cassette player you've got," he said, striding into the shop. Without hesitation, I recommended the Yamaha KXW900. "What sort of system will you be using it with, sir?" "Oh, the best of course." How stupid of me; I should have known.

My recommendation must have brought out his impulsive side: he said he'd take it straight away. Later that day he phoned.

"That Yamaha cassette player I bought from you - it's not making a sound. My son's an expert on hi-fi, and he can't hear anything either!"

"I'm very sorry to hear that, sir - are you sure the loudspeakers are properly connected?"

"Well, all I know is that the cassette player isn't working..."

"How about the amplifier - is that properly wired up?" He sounded confused by my question. I tried another one.

"Sir, you do have an amplifier and speakers, don't you?"

"Er, no - would that make a difference?"

### Yamaha - Hearing is Believing

Jason Moran - Audio T, 173-175 Station Road, Edgware, Middlesex. Tel: 081 952 5535



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# Arcam Alpha

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

**Best Buy**



A&R has made Arcam speakers for several years now, though it's fair to say that these have not yet achieved the commercial success of the company's amplifiers, such as the budget *Alpha* model.

*Alpha* started life as an amplifier, but the marketing concept has steadily evolved, adding first tuner, then CD player and now loudspeakers, linked cosmetically by a rather sombre appearance enlivened by bright blue highlights. Hey presto: a complete Arcam *Alpha* system; just add the turntable and cassette deck of your choice!

Whether or not the *Alpha* speaker achieves sonic as well as aesthetic symbiosis when operated on the end of an *Alpha* system I know not. For the present the loudspeaker will be treated as just that - a standalone product that competes in the marketplace with all the others.

£200 for a box this size is the match of any of the recognised loudspeaker specialists, so the perceived value part of the equation starts off favourably enough. However, large bookshelf speakers are amongst the hardest of all to get right, especially if built to a price.

Sombre it may be, it's also a little bulky and squat, being quite shallow and wide for the height, though it's a shape that is well suited to the intended close-to-wall site. This severity is reinforced by the solid, thick, square, cover-all grille that is (sometimes) retained by magnetic attraction to the baffle. These stayed on all right if left undisturbed but kept falling off as the speakers were moved around. Since the *Alpha* looks much prettier without a grille, I eventually just gave up though its design is clever enough to introduce no sonic penalties.

Most of the baffle is covered by a plastic

moulding trim, that visually integrates the drivers, extends a slight horn flare on the tweeter and permits the latter to be spaced forward of the baffle proper by a few millimetres, presumably to assist crossover integration and/or time alignment.

Neath the trim, the drivers are secured by some rather small woodscrews, but these were properly tightened up, which makes a pleasant change, and bite decently into the substantial 18mm MDF baffle too.

Elsewhere the sealed box is 15mm chipboard, with a figure-8 brace around sides, top and base while a small strip of wadding provides the lightest of damping. The PCB six-element crossover with integral terminals uses good quality cables hardwired to the drivers, specifically a 25mm soft dome tweeter and a bass/mid driver with a generous (150mm) polypropylene cone.

## Test report

Sensitivity is a generous 89dB/W or thereabouts, and the load is nice and easy, so even modest amplification will generate decent sound levels, though the sensitivity is achieved partly by sacrificing bass extension. Power handling should be pretty generous too.

The room responses look well balanced and reasonably smooth, wall reinforcement clearly helping achieve optimum low frequency alignment. The grille has very little negative influence, and off-axis responses are impressively well maintained considering the largish baffle area.

The vertical listening axis is uncritical, while best HF balance is achieved at about 30 per cent off-axis horizontally, which is about right for a wall-mount design.

## Sound Quality

The *Alpha* gave a fine account of itself in the listening tests, balancing well when wall mounted, and sounding nicely open and quick, with good basic timing. Even though the bass is not particularly extended, the *Alpha* manages to generate a surprising impression of scale, and the sound is refreshingly free of boxiness, even though the bottom end does sound a shade 'fruity'.

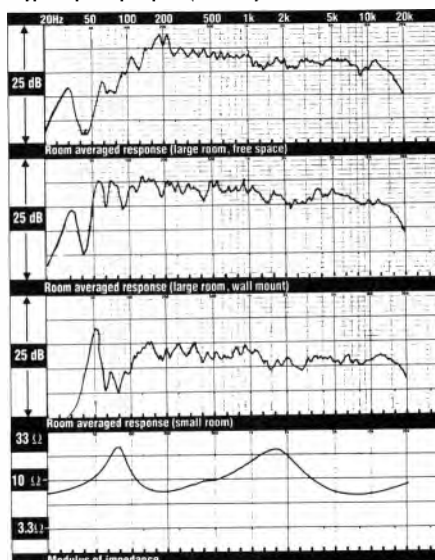
Treble detail is clear and sparkling, if a little attention grabbing, and several listeners at the end of a long day commented that enthusiasm for the programme was reawakened. Stereo images are well formed, with fine acoustic space and fair depth, while the mid-range communicates emotion and subtle tonal colours most effectively, even though vocals are slightly recessed. Such discrimination is less effective in the bass, though even here the *Alpha* just about passes muster.

## Conclusion

A box this size that sounds this good for £200 is a Best Buy, period. It can sound a little coarse and rough around the edges, and the bass could do with a bit more speed and authority, but that's carping when confronted by such a big-hearted and agile speaker at such a modest price. Best of all, it will go loud enough to keep most people happy without over-stressing the likes of the little *Alpha 2* amplifier.

## TEST RESULTS

Size (h x w x d) 46 x 26.5 x 26 cm  
Weight 9 kg  
Recommended amplifier power 10-80 W  
Recommended placement on stands close to wall  
In room averaged response limits 50 Hz-10 kHz  $\pm 4$  dB  
Large room/space LF rolloff (-6 dB ref midband) 50 Hz  
Large room/wall LF rolloff (-6 dB ref midband) 30 Hz  
Large room output at 20 Hz (ref midband) -15 dB  
Estimated midrange sensitivity (ref 2.83 V, 1 m) 89 dB  
Impedance characteristic (ease of drive) very good  
Typical price per pair (inc VAT) £200





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# Great Hi-Fi Stories... No. 7



## The Tramp and the Amp.....

I was in the shop one rainy November day when my colleagues disappeared and I suddenly found myself alone. Looking up, I realised why. Standing in the doorway was a rather smelly tramp.

He asked if he could look around. Assuming he was just sheltering from the weather, I said "Of course, please do." After a few minutes I asked if I could help. He said he wanted to upgrade his turntable and possibly the rest of his system!

Over the next hour I demonstrated combinations of Mission speakers and a Mission CD player, with a Cyrus amp and power supply (frequently going outside for fresh air... ). He was impressed. "Can you arrange finance for me, mate?"

Filling out the forms, I was still sceptical.

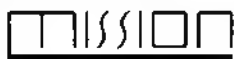
"What's your occupation Sir?"

As I handed him a receipt for £3,500 he said: "I'm a refuse collector - sorry, that's why I'm in a bit of a state."

I swore to myself that I would never judge anybody by their appearance again.....

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# B&W 620

B&W LOUDSPEAKERS LTD, MARLBOROUGH ROAD, CHURCHILL INDUSTRIAL ESTATE, LANCING, W. SUSSEX. TEL: (0903) 750750

**Best Buy**



Halfway through the listening tests for issue 94, when the 620 had already acquitted itself with honour, we received a message to the effect that this quite substantial speaker was to cost nearer to £300 than the anticipated £400.

Even at the original price it looked a pretty good deal; at £310, if the performance matches up, it could be a steal. One wonders whether the change was stimulated by the current recession, though the official justification is that it was made in order to even up the steps on the price ladder with its four siblings, that start with a £150 600 and extend upwards to a £599 640.

The 620 is a floorstanding speaker, which itself is something of an achievement at the price, whilst also saving customers the necessity of finding another £50 or £100 for a pair of stands. One rather reprehensible economy is that no provision has been made for fitting

spikes into the base of the speaker itself, which is certainly the most cost-effective way of holding things still. I used Michell cones, very successfully as it turned out.

Presentation is nice and modern, if a little cautious with it. The visible baffle is a large moulding in textured grey plastic, chamfered vertical edges being continued in the shape of the moulded frame grille. Gold-plated bi-wire terminals are fitted on the rear, an extravagance in such a model that might have been better directed towards properly engineering the floor coupling.

The box itself is built from 19mm chipboard, stiffened by a large vertical figure-of-eight brace and filled with plenty of carefully placed foam damping. The plastic baffle, which is part hollow but extensively ribbed, adds an extra 20mm of thickness to the front, presumably further contributing to the total stiffness.

What looks on the surface like a three driver array is a straightforward two-way, the lower of the two bass units being just a 'drone cone' auxiliary bass radiator (ABR), which functions in exactly the same way as a reflex port (with the extra luxury of mass control).

Both the generous magnet main driver and the ABR have 150mm plastic cones and cast frames, held in by six rather feeble-looking woodscrews, four biting into only 8mm of plastic but certainly holding very tightly. The 32mm metal dome tweeter is built on to a plastic chassis.

## Test report

Although the 620 has an above average sensitivity rating of 89dB, at least 2dB of this is achieved by sucking extra current from the amplifier by using lowish impedance voice coils. However, let's not be churlish: most amplifiers are only too happy to deliver the extra amperes, and the bass extension is pretty generous too (for the price rather than the size, it must be said).

Kept well clear of walls, the response is remarkably well balanced and surprisingly smooth, all the way up to 1kHz. There's a mild discontinuity as the curve slopes down a few dB from 1kHz to 3kHz, whereupon the treble continues as smooth and flat as before, if perhaps a trifle too well maintained at very high frequencies.

## Sound quality

The 620 did extremely well in the blind tests - a fact which says as much about blind listening tests as it does about B&W 620s. Certainly it would seem to confound

our own acknowledged prejudices against large low cost speakers.

The 620 is indeed an impressive performer in many ways. The sound is smooth, balanced and fundamentally free of any unwelcome nasties. The bottom end is quite impressively weighty, if a bit woolly, but it hangs on in there with some evenness and consistency, and doesn't boom. The slowed midrange is audible as coloration, but the sound is altogether quite coherent, with unusually well-focused stereo for a large box.

The other side of the coin is that it is also fundamentally rather slow and boring. Despite reasonable transparency, there's no real impression of solidity, authority or power. Leading edge detail and emotional content gets lost, while the bass never really manages to assert itself properly.

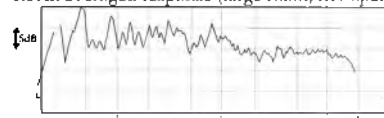
## Conclusion

Though my personal preference would certainly still be for something smaller and more nimble, I can't argue with the value for money on offer here, nor with the engineering subtlety that has achieved unusual smoothness and coherence from such a large low cost enclosure. As a fine cost-effective all round performer with wide general appeal, the 620 deserves a Best Buy rating.

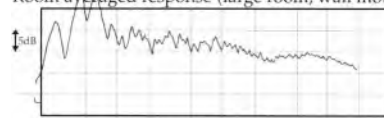
## TEST RESULTS

Size (h x w x d)	74 x 23.5 x 30cm
Weight	14kg
Recommended amplifier power	15-100W
Recommended placement	on cones well clear of walls
In room averaged response limits 50Hz-10kHz	+/-5dB
Large room/space LF rolloff (-6dB ref midband)	25Hz
Large room/wall LF rolloff (-6dB ref midband)	25Hz
Large room output at 20Hz (ref midband)	-13dB
Estimated midrange sensitivity (ref 2.83V, 1m)	89dB
Impedance characteristic (ease of drive)	current hungry
Typical price per pair (inc VAT)	£310

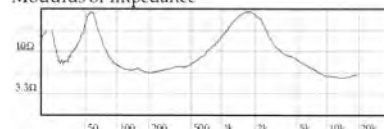
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



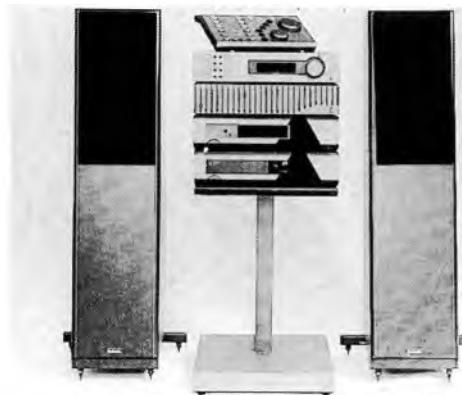
Modulus of impedance



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# Castle Chester

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**Best Buy**



Few British hi-fi companies would seem less likely to come up with something truly radical than this traditional Yorkshire operation. However, Castle recently introduced a most unusual large floorstanding model, the £1,250 *Winchester*, reviewed and Recommended in issue 90.

Hot on its heels comes this half-size *Chester*, much more domestically acceptable in bulk and price (£600) but with the same exceptional standards of real veneer finish and presentation. Amongst twenty five pairs of speakers, this is the one that oozes craftsmanship and class, boring back panel apart.

It weighs a solid 17kg, and sits on four really substantial spikes, a couple of whose sockets loosened themselves, which Castle is rectifying in production. Given the high centre of gravity, the footprint could be larger, but I gather an optional frame extension is on the way for loony

audiophiles like me.

Most loudspeakers use either a sealed or a reflex ported box to load the bass. The *Chester* employs something quite different, known as tapered quarter wave loading. Operating a bit like a cross between a horn and a tuned column, it's actually a very old technique, going back to the legendary Voigts and the popular Baldock DIY *Paralines*. But that was all of a quarter of a century ago, since when the approach has lain dormant in hi-fi terms, waiting for Colin Walker and Castle to revive it.

The main driver has a lovely cast chassis and massive magnet with 110mm paper cone, while the tweeter uses a 25mm metal dome, both properly mounted with bolts and T-nuts that could have been tighter. The main driver sits at the top of the box, one third of the way along the folded horn that exits through a smallish slot in the front at floor level. Internal partitioning and additional bracing stiffens an already truly substantial box built from 20 and 25mm MDF, while the inside is carefully damped by a complex cocktail of carefully chosen fillers.

## Test report

Sensitivity is just about average, and the load will pose no problems for the driving amplifier. However, bass extension is disappointing for a floorstander as large as this - the measured behaviour is closer to that expected of a normal bookshelf size model.

Room matching is rather better than the *Winchester*, though optimum placement is difficult to predict; try 30cm or so clear of the rear wall for starters. Although the overall mid and treble balance stays within quite tight limits, there's also some unevenness along the way, with minor peaks at 1.5-2kHz and 5kHz.

## Sound quality

Controversial is one way to describe a sound which strongly polarised the panel, the more perspicacious correctly identifying it as the best of the day, while others (myself included) found it difficult to adjust to its differentness from both the norm and its immediate predecessor.

Subsequent hands-on listening helped sort things out. It took about five minutes to get over my initial surprise at the balance quirks, at the fact that it sounds more like a miniature than a large floorstander, and to begin accommodating some initially irritating colorations. Then the penny dropped.

This speaker has quite extraordinary

powers of midrange resolution, rendering voices, percussion and stringed instruments of all kinds (struck, plucked or bowed) with great subtlety, delicacy, coherence and transparency, and without resorting to a hyped, forward balance. Stereo is superb.

The sound remains a little coloured and hard (though tightening up the tweeters helped), and there's no avoiding the limited bass extension. But it's also exceptionally agile, with fine dynamics and uncannily convincing transients, thanks I suspect to a bass which is essentially resonant in the traditional sense, and to the pressure control the loading exerts on the main driver.

In fact it's so goddamn involving, I sat up half the night re-exploring my record collection instead of getting on and writing up the review, and have been suffering withdrawal symptoms ever since the *Chesters* went off for photography.

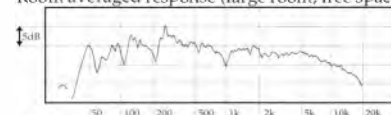
## Conclusion

Although very expensive for a Best Buy, there can be no denying the excellent value for money the *Castle Chester* represents and so this rating is entirely appropriate. The delicious sound quality should quickly bring cult status among enthusiasts. The very revealing nature might require a bit of extra care with system matching, but I'd bet they sound gorgeous on the end of a really good valve amplifier. Just don't expect them to sound as big as they look.

## TEST RESULTS

Size (h x w x d)	94 x 23 x 27 cm
Weight	17 kg
Recommended amplifier power	15-80 W
Recommended placement	39-90 cm from walls
In room averaged response limits 50 Hz-10 kHz	+/- 5 dB
Large room/space LF rolloff (-6 dB ref midband)	45 Hz
Large room/wall LF rolloff (-6 dB ref midband)	45 Hz
Large room output at 20 Hz (ref midband)	below -15 dB
Estimated midrange sensitivity (ref 2.83 V, 1 m)	87 dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£600

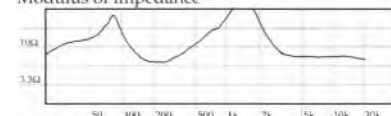
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



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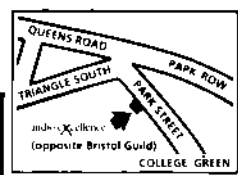
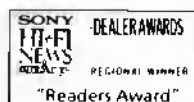
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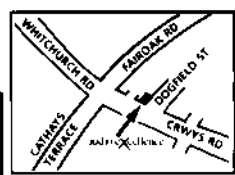


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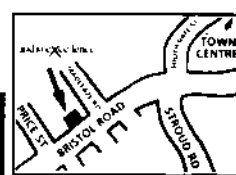
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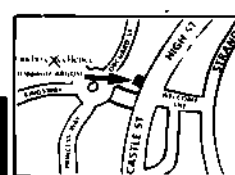
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# Epos ES11

EPOS ACOUSTICS, UNIT A1, HAZLETON INDUSTRIAL PARK,  
HORNDEN, HAMPSHIRE, PO8 9JU. TEL: (0705) 597722

**Best Buy**



The Epos *ES14* carved out a niche as one of the most successful medium size speakers around. With Epos becoming a premium specialist brand within the Mordaunt-Short operation, Robin Marshall had time to concentrate on design work, and the long awaited smaller Epos is now a reality.

The £330 *ES11* is roughly two-thirds the volume - and the price - of its bigger brother, though it has just as many drive units. Apart from exceptionally fine finish and very solid build, on the surface it looks like a straightforward enough medium sized two-way 'bookshelf' model. However, there's a little more to the '11 than meets the eye.

Following the example set by the Mordaunt-Short 3-series, both front and back panels are injection-moulded plastics. Here the process has been taken one stage further, the frame of the main driver itself being an integral part of the moulding. Should you blow one up, it would be necessary to change the whole baffle, but M-S doesn't reckon this would cost more than a normal driver replacement.

Nicely decorated in real wood veneer, the carcass wrap is 25mm MDF, further braced with an O-section internally, which helps account for the substantial weight. The whole thing is held together by four back-to-front bolts, clamping the ported back panel and baffle tightly against the wrap.

Perhaps controversially, but probably sensibly, there's no grille as such. The 25mm metal dome tweeter has its own mesh protection, and a purely protective overall cover is supplied, but must be removed before playing music.

Although two pairs of (very poorly

distinguished) terminals are fitted, this was apparently more at the behest of the marketing department than the designers, the crossover being minimal - indeed nonexistent as far as the main driver is concerned. The latter has a 110mm plastic cone and phase plug pole-piece extension.

## Test report

Sensitivity is a little below average, partly because the impedance represents a very easy amplifier load. Bass extension is also surprisingly limited compared to other models of a similar size, having more in common with miniatures than compacts in this respect.

The response traces are significantly more even than most through the mid and treble, with fine crossover transition, showing just mild perturbations from 3-6 kHz. The top end of the main driver's working range shows unusually good control, with just a small step transition down to the tweeter, which is very creditable considering there's no electrical compensation whatsoever.

The overall response evenness clearly benefits from a little wall assistance, but beware of adding too much, and of rooms that unduly exaggerate the output around 50Hz.

## Sound quality

The *ES11* did very well in the listening tests, with comfortably above average marks from all panellists. The bass is decidedly nimble, if a little short of genuine scale and weight, while the midrange is delightfully open and detailed, focusing well with commendable stereo soundstage precision and depth. Coloration and boxiness are both low, though there's a slight upper range 'glare'

that threatens to be exaggerated by poor system set-up.

Quite independently, two panellists even went so far as to mention a lump coming to the throat during Mary Black's plaintive *Columbus* (on CD, to boot), such was the level of involvement and emotional communication.

## Conclusion

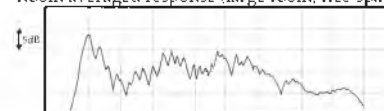
Though a trifle short of scale and welly compared to some of the competition, this loudspeaker's greatest (indeed almost unique) strength lies not in its performance in any one area, but in the way it seems equally capable of satisfying those looking primarily for speed and dynamics whilst not in any way offending those whose main preoccupation lies in the sort of stereo soundfield only achievable with low coloration, out-of-box transparency and fine focus - and vice versa for that matter.

To give a more concrete example, the *ES11* delivers much of the drama and involvement of a Linn *Index*, alongside the sort of delicacy and transparency associated with a Celestion *SL6Si*. Which is quite an achievement in a market that frequently seems all too strongly polarised between these two extremes, and an excellent justification for a Best Buy rating.

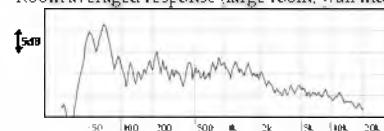
## TEST RESULTS

Size (h x w x d)	37.5 x 20 x 25 cm
Weight	9 kg
Recommended amplifier power	20-70 W
Recommended placement	stands 30-60 cm from wall
In room averaged response limits 50Hz-10kHz	+/-7 dB
Large room/space LF rolloff (-6dB ref midband)	45 Hz
Large room/wall LF rolloff (-6dB ref midband)	45 Hz
Large room output at 20Hz (ref midband)	below -20 dB
Estimated midrange sensitivity (ref 2.83V, 1m)	86 dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£330

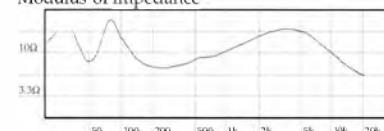
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance





# Heybrook Point 5 Series 2

**Best Buy**

HEYBROOK III-FI LTD, ESTOVER CLOSE, ESTOVER INDUSTRIAL ESTATE, PLYMOUTH, DEVON PL6 7PL. TEL: (0752) 780311



No longer the cheapest model in Heybrook's extensive range of compact 'bookshelf' speakers, that honour going to the £160 *Solo* reviewed on page 127, the popular *Point 5* now costs £190 in its latest *Series 2* incarnation.

Our review of the original praised the lively character while criticising the rather uncomfortable treble, both of which would seem to be characteristics of the brand, so it won't be too surprising if it all comes down to weighing the pros against the cons yet again.

One distinguishing feature of this model is the rather unusual construction of the box. Instead of wrapping the front and back panels with a V-grooved plank of imitation wood, *Point 5 Series 2* has a 15mm wrap forming front, back and sides, while nicely chamfered substantial 25mm MDF top and bottom panels are part-inserted to add stiffening. The inside is carefully filled with a cocktail of damping materials, and a very simple crossover is hardwired using thin 'solid-core' type cabling to two sets of terminals, for bi-wire or bi-amp drive.

The cabinet is finished in a textured black, and looks smart enough with or without the grilles in place. These look harmless enough, but removal improved the sound quality noticeably. The main driver is a small (110mm) paper cone affair, while the new-for-*Series 2* tweeter is a 20mm fabric dome device. Both drivers were exceptionally well secured.

## Test report

Bass extension is very good for the size of the box, and the load is very easy for

amplifiers to drive. The concomitant trade-off is some sacrifice in sensitivity, which is a couple of dB below average.

Although there's a certain amount of local unevenness, the overall frequency balance is very good indeed, especially when sited close to the wall as the manufacturer intends. The crossover transition is very well handled, though the treble is a bit uneven and the upper treble is a shade exposed.

## Sound quality

An overall average ranking is no disgrace for a speaker which is in the lower quartile of the group with regard to price, though one couldn't say the *Point 5 Series 2* had exactly covered itself in glory in the unseen listening tests.

My own notes made during the listening tests praise the exuberance, timing and good wall balance, but also complain of mid and treble scrappiness and untidiness, a combination of attributes that mirror my recollection of its predecessor, and which were repeated under normal listening conditions.

However, although there's scant reference in the accompanying instructions, I recall Heybrook's Peter Comeau once moaning at me for not trying solid-core cables. I'm no great fan of the stuff, which in my experience usually tends to sap some power, energy and speed from a system, but felt obliged to give it a go.

What a transformation! Suddenly the whole sound became much more coherent and sweet, especially from vinyl discs. The slightly 'fat' bass and aggressive 'edge'

both came smartly into line, and the timing became much tighter. Not faster, mind, since this is not a particularly 'fast' speaker, especially via solid-core, but it's much better poised, with a romantically delicate bounce and swing rather than slam and energy.

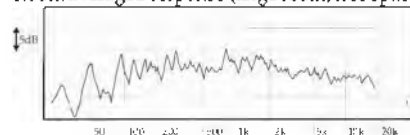
## Conclusion

Right up until the solid-core experience, the *Point 5 Series 2* was pretty borderline for Recommendation. With the cables substituted, the designer's intentions - and his success at achieving them - become abundantly clear. The result is perhaps a slightly rose-coloured view of the world, but it's highly enjoyable, with unusually delicate transparency for a wall-mount. Heybrook should certainly put much more stress on this cable factor in its leaflets, under which conditions the new *Point 5* clearly deserves enthusiastic endorsement - and a Best Buy rating.

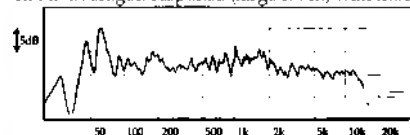
## TEST RESULTS

Size (h x w x d)	37.5 x 23 x 24.5 cm
Weight	6 kg
Recommended amplifier power	15-75 W
Recommended placement	HBSI stands close to wall
In room averaged response limits 50Hz-10kHz	+/-6 dB
Large room/space LF rolloff (-6dB ref midband)	28 Hz
Large room/wall LF rolloff (-6dB ref midband)	28 Hz
Large room output at 20Hz (ref midband)	-11 dB
Estimated midrange sensitivity (ref 2.83V, 1m)	85 dB
Impedance characteristic (ease of drive)	good
Typical price per pair (inc VAT)	£190

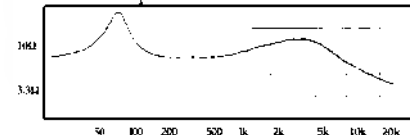
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



# JPW Sonata

JPW LOUDSPEAKERS LTD, UNIT 1, RICHMOND WALK,  
PLYMOUTH, DEVON PL1 4LL. TEL: (0752) 607 000

**Best Buy**



From the heart of the West Country, JPW has been around a number of years now. Assisted by favourable local labour conditions, the company has steadily developed a successful business based on three quite similar medium sized bookshelf models with real wood finish and competitive pricing.

The *Sonata* is altogether smaller, altogether less expensive, and could enable JPW to change gear and move up into an altogether bigger league. Whether it is really sensible to try and make real hi-fi loudspeakers for around £100 must remain questionable, given these severe cost constraints. But as long as a substantial slice of the UK market demands such products, manufacturers will make the necessary compromises. Indeed the task of trying to create satisfying sounds out of a circa £100 pair of boxes must represent one of the pinnacles of loudspeaker design achievement.

One thing that is remarkable about the *Sonata* is that the finish is again real wood rather than some species of synthetic — and on all six sides as well. I wouldn't have described it as a very pretty real wood finish — in fact I'm not sure that I don't prefer some of the better imitations — but it does go to show what can be achieved, with a little assistance from those detained at Her Majesty's pleasure.

Such a speaker inevitably follows the standard formula pretty closely, though with good attention to detail, possibly at the expense of the aesthetics. The small box and even smaller bass/mid driver plus Audax tweeter is pretty much *de rigueur*, though it's nice to see a serious attempt to chamfer the grille profiles, for example, and to provide substantial socket/binder terminals.

More specifically, the Elac bass/mid

unit uses a 110mm paper cone with a 15mm rubber surround. Crossover rates are very gentle, first-order (6dB/octave), on both arms, so all is simple and hardwired. 'Neath the tree wood lies a 15mm thickness of MDF, with Acoustilux wadding and dovetailed joints too, so there's been no under-the-skin skimping. Recommended siting is six to 18 inches from a rear wall, though full wall mounting is also possible.

## Test report

The *Sonata* doesn't have to make any apologies as far as the test programme is concerned, either. Sensitivity just barely reaches average in the important 150-500Hz area (an octave either side of middle C), and output drops steadily towards the crossover region by about 4dB *in toto*, with some recovery thereafter, especially on-axis.

The midrange is a little uneven, but no more so than most, and treble too could be smoother, but the bass is well enough extended considering the modest box size and the impedance represents an innocuous enough load. The room integration is particularly impressive, variations through mid and treble amounting to little more than  $\pm 2$ dB. The pair match proved close, and the grille has little negative influence.

## Sound quality

There's always one, isn't there? One cheap little loudspeaker that does unreasonably well in the blind listening tests, I mean, embarrassing many of the more expensive models. Well, on the occasion of its testing, it was the *Sonata*'s turn, with its basically good balance and fine design integrity taking it firmly into the top ten.

I have to admit that I wasn't so

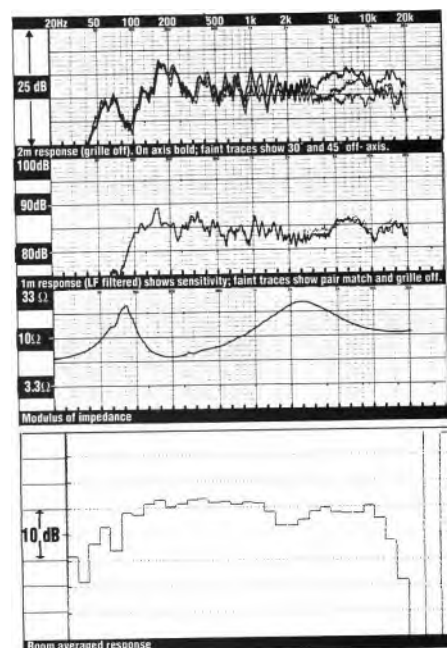
impressed myself, regarding it then — and now — as rather boxy and also unruly in the treble. But I was comprehensively outvoted by a panel who praised the lively, 'foot-tapping' character, and the open and clear sound with fair space and good 'body' and weight. And I have to admit I can see their point of view: the *Sonata* has a rare freedom that tends to promote contrasts and make music interesting. The sound is inherently quick and dynamic, delivering good discrimination between different instruments, although the inherent constraints of the low cost drivers — the tweeter in particular — are something of a limiting factor on the ability to distinguish more subtle shadings.

## Conclusion

The *Sonata* nearly didn't make it into the original review project, since the first samples fell off the back of a lorry on the way. Whoever found it must have known what they were doing, for it's an obvious Best Buy on all counts. Real wood, good measurements and an inviting sound at £115 — it's a genuine enthusiast's loudspeaker at a nearly silly price. Though I'm still not sure I could live with that tweeter myself.

## TEST RESULTS

Size (h x w x d)	32 x 23 x 20 cm
Recommended amplifier power	15-60 W
Recommended placement	on stands quite near rear wall
Estimated frequency response (2m)	55 Hz-20 kHz, $\pm 3$ dB
Estimated LF rolloff (-6 dB ref midband)	55 Hz
Estimated midrange sensitivity (ref 2.83 V, 1m)	86 dB
Impedance characteristic (ease of drive)	very good
Forward response uniformity	good
Typical price per pair (inc VAT)	£115



# Heybrook HB1 Series 3

**Best Buy**

HEYBROOK HI-FI LTD, ESTOVER CLOSE, ESTOVER INDUSTRIAL ESTATE,  
PLYMOUTH, DEVON PL6 7PL. TEL: 0752 780311



As the name suggests, this loudspeaker has been around for many years, during which it has provided much of the foundation of West Country manufacturer Heybrook's success. To my recollection it wasn't in fact the company's first loudspeaker, but originally came in as an entry level budget model underneath the pretty little HB2.

It's a sign of the passing years that the HB1 now looks quite large against the competition and costs £250, while Heybrook has since introduced a number of cheaper and smaller starter models. The tide of fashion too has rather left the HB1 looking a shade anachronistic, with its large baffle area and limited overall depth - not that the shape doesn't make a great deal of sense for a wall-mount model such as this.

It's a large bookshelf size two-way sealed box, and sits neatly enough on Heybrook's excellent HBS1 stand. The vinyl cladding is as good as they come, and all is neatly, if rather demurely finished, with only the stick-on badge to interrupt the various blacks and greys, whether or not the neatly chamfered grille is used.

What is particularly impressive is the considerable attention to detail that has obviously been paid in both design and manufacture. The passage of time brings a maturity through development that is rarely found in brand new models.

The flush-mounted drivers are really tightly screwed and bolted home, while the inside of the enclosure is lightly filled with a complex and carefully arranged mixture of different damping materials, and bituminous pads provide further damping for the box itself. The simple, good quality hardwired crossover uses double terminals for bi-wiring, and solid-

core cables soldered to the driver tags. Solid-core speaker cables are recommended.

The main driver has a rather diddy magnet, but a proper cast frame, supporting the quite large (155mm) doped paper cone. The tweeter is a 25mm soft doped fabric dome. The box is built from 18mm and 15mm board, with extra batten stiffening and a double thickness behind the tweeter.

## Test report

Sensitivity is a generous 88dB, the load will be easy enough for any accompanying amplifier to handle, and bass extension is very respectable too.

Although intended to be placed close against a rear wall, the room averaged response traces suggest that the HB1 will be equally happy (or unhappy) if moved further out. The free space trace looks just as well balanced as that measured with full wall reinforcement, though both have salient characteristics that will influence sound quality.

A little of the midbass assistance provided by the wall is helpful in balancing the slightly strong upper midrange, but too much is inclined to emphasise both of these at the expense of the upper bass and lower mid. The crossover region is well handled, though the tweeter does show a distinct 'corner' at 12kHz prior to rolloff.

## Sound quality

The HB1 received strong and virtually unanimous praise in two separate 'blind' presentations, delivering impressive scale, fine coherent vocals and lively dynamics and dynamic range. There's good weight and body - sometimes a little too much perhaps - but timing and speed are seldom

found wanting. Replacing multi-stand cable with solid-core sweetens the top and tightens the bottom, at some cost in speed.

Balance anomalies like the rather forward upper midband and heavy, 'thuddy' midbass do give rise to some colorations - mild cuppy effects, for example, and a certain relentlessness and aggression that is not always relaxing. There's some disruption in the stereo image too, depth layering not being too well resolved.

But such failings seem relatively inconsequential compared with the vividness of illusion this speaker can create. It's first and foremost a communicator, helping to break down the barriers between performers and listeners.

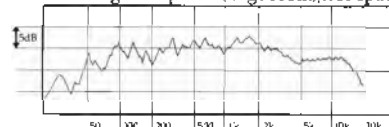
## Conclusion

Not polite or bland enough to satisfy those merely seeking the means to generate background music, this latest version of the HB1 is both a demanding and ultimately a satisfying experience musically. There's nothing particularly special about any of the ingredients used, but the whole here is much greater than the sum of the parts, reflecting the considerable care that has gone into putting everything together. A Best Buy rating is entirely appropriate.

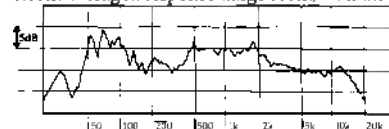
## TEST RESULTS

Size (h x w x d)	47 x 29 x 24 cm
Weight	8 kg
Recommended amplifier power	15-100 W
Recommended placement	stands 30 cm from wall
In room averaged response limits 50 Hz-10 kHz	+/- 4 dB
Large room/space LF rolloff (-6 dB ref midband)	48 Hz
Large room/wall LF rolloff (-6 dB ref midband)	30 Hz
Large room output at 20 Hz (ref midband)	-14 dB
Estimated midrange sensitivity (ref 2.83 V, 1 m)	88 dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£250

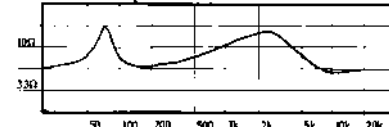
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance





# Linn Index II/KuStone

**Best Buy**

LINN PRODUCTS LTD, FLOORS ROAD, WATERFOOT, EAGLESHAM,  
GLASGOW G76 0EP. TEL: (041) 644 5111



The original *Index* was Linn's first attempt at a modestly priced loudspeaker, and was (predictably enough) a pretty controversial product, tending perhaps to give mechanical considerations priority over acoustic criteria. The resultant brew was strongly favoured by some dealers but almost ignored by others, and now - several years down the road - the rather dumpy enclosure looks more than a little dated.

*Index II* is therefore a complete redesign, slimmer and altogether prettier than its predecessor. It's a conventional enough 2-way sealed box, very smartly presented and pretty good perceived value for £235, especially given Linn's fine reputation for build quality.

But the loudspeaker is only part of the story. More interesting perhaps is a radical new stand, the £109 *KuStone*, which *Index II* is designed to partner. It's not obligatory, but most customers are opting for the

combination, and as a personal believer in the concept of the integral stand I decided to test it that way - as a £344 compact floorstander.

Aesthetically, it's very neat: the stand is lower than most while the central pillar is shaped to tilt the enclosure back a few degrees - a handicap for home horticulturalists, but discrete and almost cute when mounted close to the wall as intended. Anthracite grey plastic trim conceals the driver mounting, tidying the baffle very smartly and providing the spacing and grooving for the clever (optional and sonically inconsequential) stocking mask grille.

Though the sealed box loading only requires a modest main driver magnet, the speaker itself weighs a solid enough 6kg. The baffle is built from high density 18mm board while the vinyl covered wrap is 15mm stock, stiffened by a circumferential brace, with light damping fill. The generously rated PCB crossover is fixed behind the bi-wire 4mm sockets and hardwired to the drivers using hefty multi-strand cable. The main driver uses a 115mm plastic cone, the tweeter a 19mm soft dome.

*KuStone* consists of a large and substantially spiked metal baseplate, neatly disguised with plastic trim. This gives a good footprint and bolts directly to the speaker with long metal rods tensioned against what looks like a shaped metal breeze block, an expanded metal described as microporous. The whole caboodle weighs in at 10kg, and can be used with other speakers via a spiked top plate (Blutak coupling is not an option here).

## Test report

It must have been kind-to-amplifiers week in Scotland when this design was put together - certainly there's no sign of the low impedances found in other Linn designs. Which is one of the factors behind the lowish (86dB/W) sensitivity rating, the other being an exceptionally good bass extension for the size of the box - compare the 20Hz figures.

Measured only at its designated close-to-wall site, the response is both smooth and well balanced, if a shade rich in the mid-bass (50-200Hz) and slightly peaked up around 6-9kHz. The crossover transition is virtually seamless.

## Sound quality

To describe any Linn speaker, let alone an *Index*, as a good overall compromise seems like a contradiction in terms, but that was

how the panel heard - and liked - it. Certainly this is a much tamer animal than its predecessor, though that should not be taken to imply criticism, and the slightly bright and obvious treble and the generally quick and well defined bass are both links with other Linn speakers.

Above all, the music remains nicely coherent and the soundstage delivers a fair measure of transparency, at any rate by wall-mount standards. Speed and timing are both pretty good, but the sound is actually slightly soft dynamically, rather laid back and somehow lacking power and energy. The bass region is clean, clear and quite extended, if a bit lacking in authority. Somehow the dynamic range is rather more impressive than the dynamics themselves.

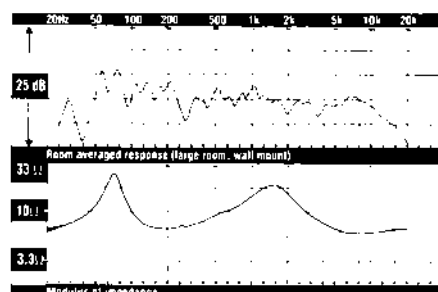
## Conclusion

Not as fast or dramatic as one has come to expect from Linn loudspeakers, *Index II* plus *KuStone* nevertheless make very nice music together, delivering generally good resolution and clarity throughout the frequency band, including the bass region where most speakers of this size and price run into trouble.

At £319 the package is sonically very competitive, aesthetically way ahead of the pack, and good engineering and material value too. Which leaves me no alternative but to hang a Best Buy hat on the corner of the review, adding just the caveat that my drive system uses several Linn components, which might have given *Index II* a bit of a head start.

## TEST RESULTS

Size (h x w x d)	44 x 21 x 23.5cm (box only)
Weight	6kg (stand 10kg)
Recommended amplifier power	20-80W
Recommended placement	<i>KuStone</i> stands close to wall
In room averaged response limits	50Hz-10kHz +1/-7dB
Large room/wall LF roll-off (-6dB ref midband)	28Hz
Large room output at 20Hz (ref midband)	-12dB
Estimated midrange sensitivity (ref 2.83V, 1m)	86dB/W
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£235 + £109 stand



# Mission 760

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

**Best Buy**



Mission markets two separate ranges of hi-fi: the Mission-branded value for money models aimed at the mass market, and the upmarket *Cyrus* sub-brand. Both this £99 Mission 760 and the more expensive *Cyrus 780* (see page 122) share the same drivers, front panel dimensions and trim.

The 760 is of course the beer budget variation, with a less deep and substantial vinyl-wrapped enclosure and a single terminal, commercial grade crossover network. Indeed, the rear terminals are those truly nasty bare wire spring clips, though they'll take 4mm bananas with a bit of a push.

Terminal prejudices aside, there seems little wrong with the rest of the package. It's a stylish slimline in the modern idiom, and the grille is a real feature, using the sort of injection moulding investment only feasible for high volume models, to finish and shape the front elegantly, discreetly and without either acoustic compromise or the even the slightest possibility of rattles.

Following Mission's tradition of mounting the main driver above the tweeter, the drivers were really tightly mounted into the moulded plastics front baffle, apparently using coarse woodscrews. This is a surprisingly thin panel, so taking up little of the limited enclosure volume. Ribbing provides stiffening and a small reflex port is incorporated.

Dig a bit deeper and some of the economies become evident. The box is built from comparatively thin 10mm stock, though the shape itself provides good inherent stiffness. The simple PCB crossover uses decent enough components, but internal wiring is cheap

and driver connections are spring tags. The main driver has a light 100mm doped paper cone, small magnet and pressed steel frame, while the tweeter is a 19mm fabric dome with short horn flare.

## Test report

Almost indistinguishable from the *Cyrus* version, the response is well balanced overall, especially with a little low frequency wall assistance. However, it's not particularly smooth, the band around 1kHz being rather prominent.

Sensitivity is high for a £99 miniature, though this is partly due to a lowish impedance throughout the bass, and partly to the limited bass extension, which falls off sharply below 50Hz (in room). The crossover region is well integrated (though less so than *Cyrus* in this respect), so the listening axis is uncritical; the grille appears to be harmless.

## Sound quality

Every so often a cheap hundred pound miniature turns in an outstanding result when tested under blind conditions. It happened with the JPW *Sonata* (see page 112) it happened with the Mordaunt-Short *MS3.10*; now the Mission 760 has repeated the trick.

Definitely a superior miniature, it sounds clear and lively with inherently good timing. An impressive lack of boxiness allows a quite generous soundstage to be generated with a decent level of transparency.

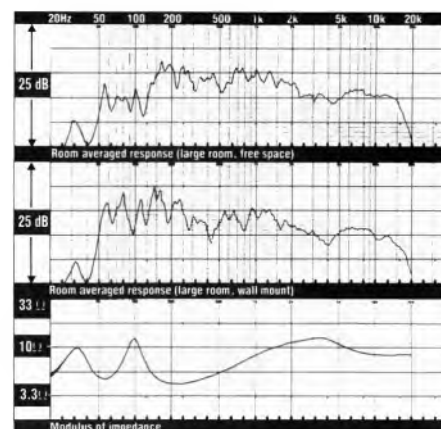
There's a little upper bass thickening and more than a touch of obviousness and untidiness in the treble, but these are relatively minor complaints, especially when one takes the price into consideration.

## Conclusion

An obvious Best Buy, the 760 re-establishes Mission at the forefront of the budget miniature market, a position it last held with the memorable 70 a number of years ago. The sound may lack a little refinement but it's exceptional for the price, while the generous sensitivity will aid those with budget amplifiers, providing these are of reasonably good quality.

## TEST RESULTS

Size (h x w x d)	29 x 18 x 20 cm
Weight	3.5 kg
Recommended amplifier power	15-60 watts
Recommended placement	on light stands close to wall
In room averaged response limits 50Hz-10kHz	-6dB
Large room/space LF rolloff (-6dB ref midband)	50Hz
Large room/wall LF rolloff (-6dB ref midband)	50Hz
Large room output at 20Hz (ref midband)	below -20dB
Estimated midrange sensitivity (ref 2.83V, 1m)	88dB/W
Impedance characteristic (ease of drive)	A little demanding
Typical price per pair (inc VAT)	£99



# Wharfedale Delta 30.2

**Best Buy**

WHARFEDALE LOUDSPEAKERS LTD, SANDLEAS WAY, CROSSGATES, LEEDS LS15 8AL. TEL: (0532) 601222



The *Delta 30.2* is very much the budget model in the Wharfedale range, and these days 'budget' starts at £99, twenty quid up on the launch price of the original *Delta 30* three and a bit years ago. Said predecessor was rated a Best Buy by *Choice* in its day (issue 59), so the 30.2 has a tough act to follow.

Stacked up amongst a couple of dozen other hi-fi speakers, the *Delta 30.2* looks an odd shape, with quite a large front panel area and comparatively little depth. In fact if you were to set out to disguise a hi-fi speaker as a midi system refugee, these basic dimensions would be a good place to start, so maybe Wharfedale has its eyes on the midi speaker upgrade market.

Then there's the graphics, or should that be graffiti, emblazoning the model name in stylised extra bold white script across the uncovered part of the front panel.

One reason why this speaker is such an unconventional shape is that the main bass/mid driver has a somewhat larger cone than most £99 miniatures, a feature that should ensure somewhat greater sensitivity and loudness than others of its ilk. In fact it uses a 125mm paper cone, so the baffle has to be somewhat wider than most speakers of a similar volume.

Finish is strictly econobox, the priority clearly being to provide the most rather than the prettiest loudspeaker with tight cost constraints. To which end, the all up weight is a respectable 4.5kg, and that's not just a function of a large magnet. In fact the magnet is quite small for a reflex ported enclosure - as is the apology for a port itself, set into the rear panel and tuned to a lowish 50Hz.

All drivers were well secured by tight coarse-pitch woodscrews into the 16mm particle board baffle, the same substantial

material ensuring the whole enclosure makes a solid mechanical foundation. Internal damping is limited to a handful of wadding, which should be enough to suppress rear panel reflections and standing waves without overdoing things. The crossover is a minimal affair mounted on a little PCB attached to the terminal block.

## Test report

The logic in the largish baffle and main driver comes in a quite generous 88dB/W sensitivity rating, combined with an easy impedance for the accompanying amplifier to drive. Even the least capable driving systems should manage to generate pretty decent levels, even though the price is extracted in bass that doesn't attempt to extend below 50Hz.

The room measurements show that the 30.2 has been well aligned to take advantage of the midbass boost provided by close-to-wall sitting, though a significant loss of midrange smoothness is an unfortunate by-product. The most significant feature of the curves, however, is the mid-treble peak of about 5dB, a feature so prominent in relation to output just above and below as to guarantee subjective ramifications.

## Sound quality

After the panel had given the 30.2 the thumbs down, I put them up for hands-on listening with no great expectations - and found myself really enjoying the music they were making. Examining the listening test data with hindsight, it's clear that the relative volume setting ought to have been set somewhat higher when the *Delta 30.2* was presented, and this possibly explains the rather disappointing

formal listening results.

Not that the speaker is entirely blameless. A hollow boxy upper bass coloration - probably correctly identified by one panellist as the internal front-to-rear reflection - is quite obvious and somewhat distracting, while the presence dip and treble peak also add to the character.

But what really distinguishes the 30.2 from most of its contemporaries - and what is not assessed in the formal listening tests - is the way that it goes surprisingly loud with relative grace and integrity, and without the hardening and aggression that is the budget miniature norm. Speed and dynamics are not exceptional, and the sound lacks a genuinely firm and solid foundation, but timing is very good indeed, with the impressive crispness and coherence that ensures good fundamental musical communication, the most important attribute of all.

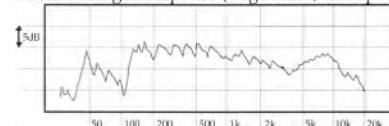
## Conclusion

Less pretty sonically and aesthetically than some of its rivals, the *Delta 30.2* nevertheless shows them a clean pair of heels by maintaining considerable composure when asked to go indecently loud. This evidence of good basic engineering integrity distinguishes the 30.2 sufficiently from the herd to deserve a Best Buy rating, especially for teenage midi system owners who wish to bring the delights of heavy metal to the whole family.

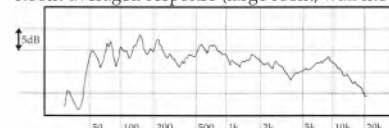
## TEST RESULTS

Size (h x w x d)	38 x 22 x 17 cm
Weight	4.5 kg
Recommended amplifier power	10-60 W
Recommended placement	stands close to wall
In room averaged response limits 50Hz-10kHz	+/- 5 dB
Large room/space LF rolloff (-6dB ref midband)	48 Hz
Large room/wall LF rolloff (-6dB ref midband)	48 Hz
Large room output at 20Hz (ref midband)	below -20 dB
Estimated midrange sensitivity (ref 2.83V, 1m)	88 dB
Impedance characteristic (ease of drive)	fairly good
Typical price per pair (inc VAT)	£99

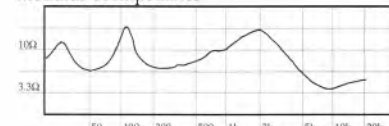
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance





# Arcam Delta 2

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

**Recommended**



It's taken a good few years for the penny to drop, but British loudspeaker manufacturers - presumably both leading and responding to the British loudspeaker buying public - are finally acknowledging that a better loudspeaker is not necessarily a bigger loudspeaker.

As far as modestly priced loudspeakers are concerned, small is usually beautiful. Even small cabinets are quite difficult to control: make them big and you compound these problems.

However, convincing the customer to pay more for a smaller speaker when they can see larger and cheaper models available is difficult, and only really achievable through demonstration. It's therefore much to the credit of UK dealers that this trend has started first in Britain.

All of which is a rather longwinded introduction to a compact new £330 speaker from Arcam, christened the *Delta 2* and actually somewhat smaller than - though just as heavy as - the £200 *Alpha* that gets a *Choice Best Buy* rating on page 103. The *Delta 2* is actually about two-thirds the size of the *Alpha*, but is also slimmer, deeper and consequently a much more fashionable shape.

Construction and engineering, however, are entirely traditional - and by no means the worse for it. The box is attractively finished in real wood veneer, and the speaker looks equally good whether or not the grille is used, partly because the latter fits into a slot machined around the edge of the baffle, which is neater than normal mounting lugs. It is also better designed than most grilles, the chamfered moulded frame offering minimal acoustic impediment.

The wrap is 18mm chipboard, lined with bituminous pads to help damp panel

vibrations, which is certainly a luxury touch these days. The front panel is 19mm MDF, cross-braced and routed to inset the driver frames. A large and long port is fitted to the rear panel behind the tweeter, and internal surfaces are further covered with two grades of acoustic foam.

The generously rated PCB crossover is fitted with bi-wire or bi-amp connections and uses heavy gauge, high quality internal cables hardwired to the drivers.

The tweeter has a small 19mm soft plastic dome with short horn flare, while the main driver is a lovely little unit, with generous magnet, neat cast frame and 120mm polypropylene cone. Both were held unusually tightly in place with fine-pitch machinehead screws and T-nuts.

## Test report

Sensitivity is about average, and the load is nice and easy for any amplifier to drive. The measured in-room balance confirms the installation instructions that the units are better kept clear of wall reinforcement, but, even so, the output at 50Hz is a shade strong, a factor which might cause difficulty in some rooms.

Bass extension is about right for the rest of the package, while elsewhere the midbass is a little lean. The upper midrange, (700Hz to 1kHz), is somewhat forward and exposed, however. There's some loss in the presence band around the crossover, but it's not severe, and the relative treble level looks very well judged, if a touch ragged.

## Sound quality

It may have been helped by its slightly projected midband, or the fact that a rather jaded listening panel had suffered a run of indifferent models and was on the

lookout for something better, but the *Delta 2* was certainly quite a hit in the blind tests.

The sound combines welcome liveliness and openness with good timing and dynamic detail, bringing a real sense of flow to the music, and an impressive sense of scale from speakers so compact. Less welcome is a touch of edginess and high frequency brashness, but the soundstage is more transparent and the sound distinctly less boxy than most.

Working away from the wall always helps minimise midband coloration and promotes spacious and precise stereo imaging, and it's here that the *Delta 2* particularly scores over its stablemate. Where it does fall a little short is in power handling with vinyl sources, the reflex-loading leaving the driver wide open to significant subsonic excursions especially at high levels from warps and the like, which certainly won't improve in-band resolution.

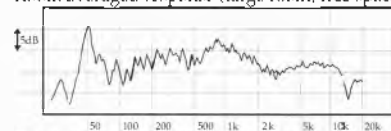
## Conclusion

The *Delta 2* is a sensible partner to the *Alpha* speaker. It needs a little more power to achieve the same loudness, but has the same engaging dynamics and liveliness alongside a smoother, sweeter sound with altogether better stereo imaging and lower coloration. All in all, it deserves similarly warm Recommendation.

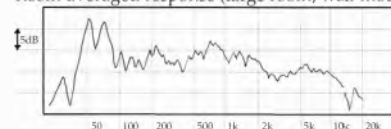
## TEST RESULTS

Size (h x w x d)	37.5 x 22.5 x 27cm
Weight	8.5kg
Recommended amplifier power	15-70W
Recommended placement	stands 60cm from wall
In room averaged response limits 50Hz-10kHz	-7.5dB
Large room/space LF rolloff (-6dB ref midband)	40Hz
Large room/wall LF rolloff (-6dB ref midband)	40Hz
Large room output at 20Hz (ref midband)	-15dB
Estimated midrange sensitivity (ref 2.83V, 1m)	87dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£340

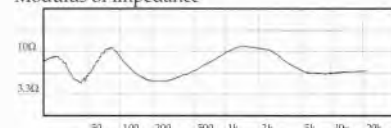
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



# Bose 305

BOSE UK LTD, TRINITY TRADING ESTATE, MILTON REGIS,  
SITTINGBOURNE, KENT. TEL: (0795) 475341

## Recommended



The Bose 305 bears more than a passing resemblance to its distant ancestor, the 301. In fact, the accompanying (unusually informative) instruction sheet was written for the earlier 301 Series II, with just a loose inset adding 305-specific data. Which might be taken to imply that this old stager may not be the most important model in the current Bose line-up, though if that were the case, would they have bothered with the substantial redesign tooling investment?

Although it's one of the company's simpler and cheaper models, it nevertheless follows the Bose tradition of unusual driver configurations. Two-way system it may be, but there are actually two tweeters each side and neither is baffle mounted. In fact the whole cabinet is turned on its side, so to speak, with the bass/mid driver pointing forward, and the tweeters mounted on a baffle set outwards at 45 degrees to straight ahead.

The original 301 used a bizarre reflecting 'paddle' to alter the treble distribution (and contribute variable coloration), but thankfully this has now been abandoned. Instead, the tweeters here are stuck out on stalks (I jest not), so that they actually fire along the line of the angled baffle — one forwards and therefore towards the apex-seated listener, the other in the opposite direction, presumably to splash around the walls.

Such a side by side configuration will inevitably blur stereo precision, despite the mirror-imaging of the pair. It will also increase room interactions, which is more a matter of taste. The corollary is also that the sound balance will be relatively independent of the height of the listener while varying rather more than conventional models across the horizontal axis of the soundstage. More important

still perhaps, the speaker can be mounted high up and out of the way on wall brackets, while still delivering a reasonable balance.

The main changes for the 305 are claimed to be the replacement of chipboard by a moulded vinyl cabinet, with appropriately modern cosmetics (including a red stripe) and a redesigned 'slot' port loading. In fact the vinyl seems to have been used rather selectively, and the baffle for starters remains a rather flimsy chipboard panel. The main driver has a decent magnet and 150mm doped paper cone, with generous foam roll surround, and was pretty securely fixed, albeit with nasty little wood screws. The tweeters are cone/dome devices, the cone serving as a baffle for the most part, solidly mounted on cast 'stalks'. The grille is neatly designed for minimal degradation, despite the complexity involved.

### Test report

A highish sensitivity and 'kind' impedance characteristic together with good bass extension for the box size sets the 305 off in a good light. Though a shade 'rich' in the upper bass region, the balance responds pretty well to either wall or free space siting. There's a fair amount of unevenness here and there, with the lower treble a little depressed and the upper treble distinctly ragged — an inevitable consequence of the odd driver array, I suspect. Off-axis traces are a shade unpredictable, especially the treble level variations across the lateral axis: careful experimentation may be needed to get the best results.

### Sound quality

The British hi-fi establishment has always suffered slightly from a condition known

as Bosephobia, but blind listening tests know no prejudice, and it was therefore refreshing to find the 305 well liked by all — a finding which subsequent sighted listening only serves to endorse.

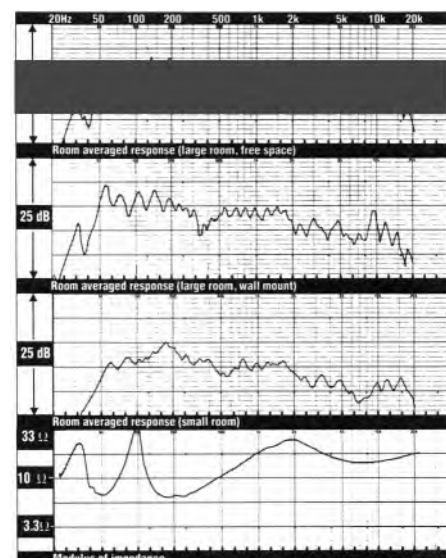
The fine room balance with respectable bass extension irrespective of site (or stand type) is a good start. Although dynamics aren't totally convincing it's still a lively loudspeaker with a good sense of timing and headroom to spare. There's a good impression of scale, enhanced somewhat by the slightly odd but not unimpressive stereo. Purists, however, may well find the top a little too untidy for comfort: it certainly does nothing to enhance the string sound on classical recordings.

### Conclusion

This is a difficult speaker to summarise. Its direct/reflect presentation is sufficiently 'different' — and more than a shade room sensitive — that it ought certainly to be auditioned prior to purchase. The treble quality lacks subtlety too, but there's the same liveliness through simplicity that has always characterised the 300 series, and a fine room-match to boot, so Recommendation is clearly in order for a clever, well developed, if idiosyncratic design.

### TEST RESULTS

Size (h x w x d)	28 x 45 x 23 cm
Recommended amplifier power	15-100 W
Recommended placement	high stands near rear wall
In room averaged response limits 50Hz-10kHz	+/-5 dB
Large room/space LF rolloff (-6dB ref midband)	48 Hz
Large room/wall LF rolloff (-6dB ref midband)	30 Hz
Small room LF rolloff (-6dB ref midband)	48 Hz
Large room output at 20Hz (ref midband)	-18 dB
Estimated midrange sensitivity (ref 2.83V, 1m)	88 dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc Vat)	£358



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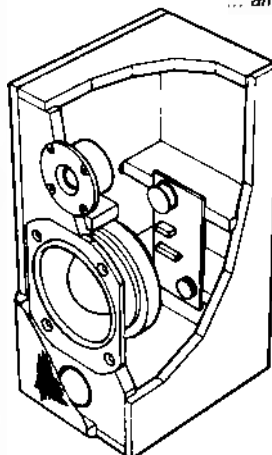
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# B&W DM600

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There are three models in B&W's recently introduced 600 series, competitively priced 'budget' loudspeakers with plenty of hi-tech content. The £150 600 examined here is the least expensive of the trio, and the historical precedents are promising; the floorstanding 620 rates a Best Buy on page 105.

However, whereas the 620 package is clearly highly competitive simply on the basis of box size versus price, the 600 is more obviously a small bookshelf loudspeaker at a small bookshelf loudspeaker sort of price - £160 per pair, to be precise.

What does distinguish it somewhat is the extensive use of engineering plastics in the construction, and the consequent very clean contemporary styling, especially when the rather boring grille is removed. (Boring it may be, but at least it's discreet, has been properly designed to keep baffle reflections to a minimum, and may therefore be regarded as a realistic option for those who prefer not to advertise the brand name in two inch high letters.)

The main styling contribution is made by the complete structural panel that comprises the visible baffle. This moulding incorporates attractive surface textures, edge chamfering that is echoed in the grille frame, plus mounting arrangements for the drivers and the aforementioned giant B&W logo. Soft plastic inserts then cover the visible mounting screws. The panel itself is quite thin, but has reinforcing ribs to add stiffness, and is mounted by six screws onto a thin (4mm) and mostly cutaway sub-baffle.

The whole thing feels a bit lightweight, and rapping the sides merely serves to remind one that this is at heart an

econobox, hi-tech trimmings notwithstanding. The sealed-box wrap is only 13mm thick, well filled with wadding but otherwise unbraced, and the terminal block accommodates separate bi-wire terminals and a multi-component hardwired crossover.

The main driver has a 115mm polypropylene cone with wide surround, mounted on a pressed steel frame, secured by four pretty feeble and coarse-threaded crosshead screws; these seemed fairly well tightened into the plastic, but clearly represent a potential weak spot. The tweeter has a 25mm metal dome, an annulus phase compensator helping to deter probing fingers.

## Test report

Sensitivity is comfortably below average, and the main driver is a fairly enthusiastic consumer of amplifier current too. In this context, and that of sealed-box working, it's not surprising to unearth a quite impressive bass extension despite the small enclosure dimensions.

The room responses are unusually and impressively smooth by any standards, let alone those of near-budget models. The low frequency alignment suggests the speaker should be sited 30-60cm clear of the wall, under which conditions it should provide an even and well balanced response, interrupted only by minor local perturbations.

## Sound quality

The good frequency balance and overall evenness with decent bass extension all contributed to a fine overall result in the blind listening tests. There was praise for the natural relationship of fundamentals and harmonics, and the lack of coloration or exaggeration of any part of the

spectrum, save perhaps an occasionally obvious treble.

On the downside there isn't the finesse and transparency of more expensive models (like the *Matrix 805*), and the bass does let things down somewhat, lacking genuine weight and coherence and showing some lack of control and authority in the upper bass and lower mid.

More extended hands-on listening gave further cause for caution. An initially favourable reaction to the overall smoothness soon gave way to a degree of disinterest. Although the sound seems to be presented faithfully enough, it's all a bit laid back, and the reality behind the hi-fi illusion never seems to reach through, grab and hold the attention. Dynamics too are somewhat disappointing; confusion and congestion were never far away, especially using complex material with much low frequency content.

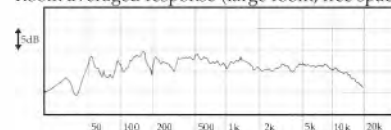
## Conclusion

Although not such obviously good material value for money as the bigger 620, the fine measured performance and listening test results are ample to guarantee the 600's Recommendation. At the same time I must add the personal opinion that it isn't the most communicative model around; an overall blandness somehow fails to encourage the suspension of disbelief.

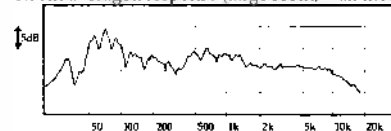
## TEST RESULTS

Size (h x w x d)	44 x 23.5 x 27cm
Weight	5kg
Recommended amplifier power	20-100W
Recommended placement	stands 30-60cm from wall
In room averaged response limits 50Hz-10kHz	+/-4dB
Large room/space LF rolloff (-6dB ref midband)	33Hz
Large room/wall LF rolloff (-6dB ref midband)	28Hz
Large room output at 20Hz (ref midband)	-8dB
Estimated midrange sensitivity (ref 2.83V, 1m)	85dB
Impedance characteristic (ease of drive)	current hungry
Typical price per pair (inc VAT)	£160

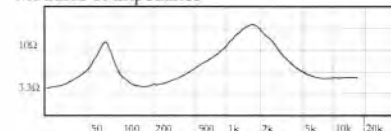
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



# Celestion 3

CELESTION INTERNATIONAL LTD, DITTON WORKS, FOXHALL ROAD, IPSWICH, SUFFOLK IP3 8JP. TEL: (0473) 723 131



Celestion is one of the oldest names in the business, and has been responsible for more than its fair share of innovation over the years. The company's SL series started the whole metal dome tweeter thing going a few years back, while also giving upmarket small loudspeakers a new respectability by using advanced honeycomb materials for the cabinet work.

Just lately, however, they've been working very hard to keep up with demand for something quite different — the *Celestion 3*. This relative newcomer doesn't fit into the established DL and SL hierarchies, but is rather a one-off £115 'entry level' miniature.

For this sort of money, you don't get a great deal in the way of high tech embellishments, though there's a shiny and purposeful looking 25mm metal dome tweeter sitting beneath its own protective and phase compensating grid. The cosmetics are very neat indeed, the grille itself being a cloth covered plastic moulded frame designed to minimise acoustic interference, and with clever key-and-slot retainers which avoid the need to inset those horrid little holes in the baffle proper. So if you decide to discard the grille, you get a very nicely presented front baffle, finished in a textured mid-grey and picture-framed by a chamfered woodgrain edge.

The drivers look as if they're built into chunky die cast chassis, locked into place by tough machine head screws. But this is window dressing: the baskets are plastic, and the machine heads disguise chipboard screws which bite straight into the 13mm baffle board. They were pretty well tightened, but try going any further and a sort of splintering noise persuades you to stop pretty quickly, and the main driver's four screws are not well placed to aid the

overall mechanical integrity.

The sealed box is built from humble 13mm chipboard, its only treatment being to stuff it half full of wadding. The fairly simple crossover is hardwired and glued to the inside of the terminal block, with tagged connections to the drivers. The bass/mid unit uses an entirely untreated lightweight 100mm paper cone (with 10mm wide surround), which should at least ensure that it gets well up to the crossover frequency before running out of rise time. And you also get an attractive enough designer badge, repeated on baffle and grille.

## Test report

This tiny box with an 'easy' impedance characteristic still manages sensitivity only just below average, and shows creditable bass extension to boot when adopting the intended wall siting. Power handling is inevitably restricted, but good levels will still be achieved with even modest amplification.

The downside is a significant 'lumpiness' through bass and midrange, around an overall trend which looks very well balanced, if a touch mid-forward. The grille modifies the response here and there, though not too seriously, while listeners should try to sit a little clear of the main axes for best results.

## Sound quality

Presented twice to the panel, these diminutive boxes achieved a straight average rating on both occasions, which is a very positive result for a speaker at this price level.

The heart of this success is a wall-mount balance which is significantly more successful than most — one panelist actually referred to a good 3D image,

## Recommended

which is a rare compliment for any wall-mount model. The result still lacks muscle, weight and authority through the bass, while the unevenness of what are basically low cost drivers is reflected in a fair amount of coloration — there's some boxiness and a degree of artificial brightening.

Heavy pillar stands also provide some improvement, but the less costly open-frame types which are more likely to be used with a speaker such as this perform quite adequately. Ultimately, the 3 sounds a little overpolite: timing remains consistently good, but grip and dynamic drive are both in short supply, while the poise can become a little stressed when driven hard with top quality vinyl material.

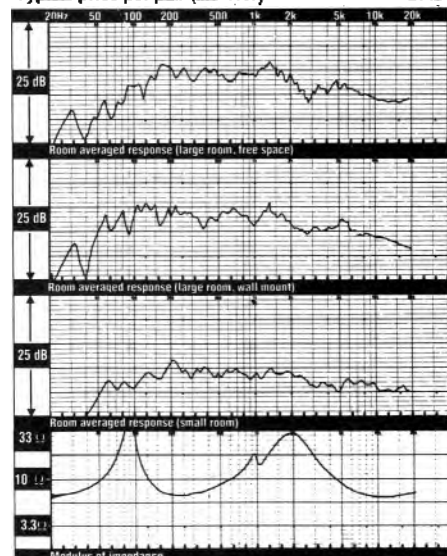
## Conclusion

The commercial success already achieved by the *Celestion 3* would appear to be well founded. Although the pseudo-engineering styling devices serve merely to disguise pretty mundane construction methods, it's an attractively finished and presented little box that produces an unusually well balanced result with more than respectable stereo imagery when placed close to a wall.

With a basic character which leans more towards inoffensiveness than excitement, and showing some favouritism towards CD, it's the sort of loudspeaker that should be tolerant of the limitations of similarly priced ancillaries, and clearly deserves confident Recommendation.

## TEST RESULTS

Size (nominal)	31x18.5x21cm
Recommended amplifier power	15-50W
Recommended placement	high stands near rear wall
In room averaged response limits 50Hz-10kHz	+/-4dB
Large room/space LF roll off (-6dB ref midband)	60Hz
Large room/wall LF roll off (-6dB ref midband)	52Hz
Small room LF roll off (-6dB ref midband)	50Hz
Large room output at 20Hz (ref midband)	-19dB (est)
Estimated midrange sensitivity (ref 2.83V, 1m)	86dB
Impedance characteristic (ease of drive)	good
Typical price per pair (inc VAT)	£115



# Celestion 7

CELESTION INTERNATIONAL LTD, DITTON WORKS, FOXHALL ROAD, IPSWICH, SUFFOLK IP3 8JP. TEL: (0473) 723131



The little 3 has been a big commercial success for Celestion, so there was a certain inevitability about the 5, launched in the summer of 1990. Since then the company has been even busier, introducing 7, 9 and 11, the £200 7 being the first to come under scrutiny.

As with its predecessors, this is a two-way vinyl econobox, seeking to provide maximum performance within tight budgetary constraints. Likewise it's a wall-mount sealed-box too, with special care taken to minimise the unwelcome effects of wall reflections upon the stereo imaging.

The box definitely falls into the 'large bookshelf' category, though proper stands should of course be used. Celestion supplying some high central pillar types that had been part filled with extra damping. It's fashionably narrower than it is deep, and looks very demure with the grille in place. This has a neatly designed moulded frame that causes little sonic impairment, but the speaker certainly looks more impressive with it removed.

I say looks impressive, because rather more effort seems to have gone into the aesthetics than the engineering. The grille retaining lugs are particularly neatly executed, for example, but what look like cast alloy driver frames held in my hefty machinehead screws turn out to be injection moulded plastics frames - which may well be just as effective, though I doubt it - held in by some very feeble, coarse pitch woodscrews, the large machineheads merely permitting leverage that wound them like a spring.

The box is built from fairly coarse chipboard just 14mm thick, though a decent figure-8 brace stiffens the wrap, and the inside is lightly stuffed with wadding. A single terminal pair feeds a

quite simple commercial grade hardwired crossover, and thence via tags to the drivers. The bass unit has a good size magnet and 145mm plastic cone, while the tweeter uses a 25mm metal dome, physically protected by a phase compensating diffuser.

## Test report

The good size enclosure combines decent low frequency extension with average sensitivity and an easy load for the driving amplifier. Although some degree of wall reinforcement is clearly necessary, the low frequency alignment remains less than ideal, the boost in the midbass being accompanied by some loss of energy in the upper bass, leaving the midrange somewhat exposed.

Nevertheless, said midrange and the treble too are quite smooth, well integrated and balanced, with just a slight notchiness in the the crossover region. Mid and upper treble are a little suppressed.

## Sound quality

The 7 did consistently very well in two separate 'blind' presentations, with universal praise for the generous scale and impressively lively and dynamic qualities, tempered by qualifications regarding some harshness, hardness and untidiness. To some extent the balance itself is responsible, tending to project the upper mid and presence, which gives the impression of good detail at the expense of a slightly nasal, pinched coloration and thinning.

The key to the 7's success - or otherwise - has much to do with the stands with which it is used. It doesn't like open frames and spike-coupling nearly as much as Blu-tack and a heavy damped pillar stand. Celestion's own do a pretty good

## Recommended

job, and Foundation's expensive *Designers* an even better one in helping to keep the speaker under control.

On its own stand the midrange sounds nice and coherent with good timing, and the music has an attractive 'bounce'. There's a decent sense of scale that brings a measure of authority too, though the bass is a little thick and slowed - slightly furry in texture almost - and a touch of aggression and hardness remains. The end result is not the subtlest, fastest or most transparent sound around, but is goodhearted, lusty and fundamentally enjoyable.

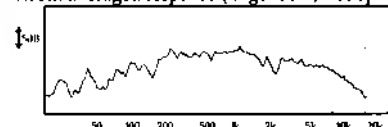
## Conclusion

Despite reservations over the driver fixing and possibly undue emphasis placed on cosmetics, there's no doubt that the 7 is good value for money, well deserving Recommendation. It's good looking for a cost effective large bookshelf model too, and delivers a lusty, up-front performance provided some care is taken to provide the best possible support.

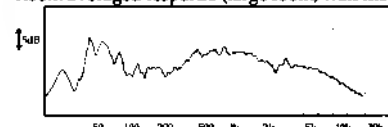
## TEST RESULTS

Size (h x w x d)	45 x 24.5 x 32 cm
Weight	8 kg
Recommended amplifier power	20-100 W
Recommended placement	stands close to wall
In room averaged response limits 50Hz-10kHz	+/-6 dB
Large room/space LF rolloff (-6dB ref midband)	30 Hz
Large room/wall LF rolloff (-6dB ref midband)	30 Hz
Large room output at 20Hz (ref midband)	-11 dB
Estimated midrange sensitivity (ref 2.83V, 1m)	87 dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£200

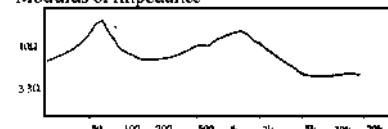
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance





# Cyrus 780

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



In the overcrowded loudspeaker market, with at least fifty brands competing for attention, *Choice's* normal rules of engagement restrict each manufacturer to a single entry per project. Rules, however, are made to be broken, and in issue 90 the temptation to compare and contrast this Cyrus-branded luxury £180 miniature with the £99 Mission 760 was too great to resist.

Cyrus is the upmarket sub-brand of Mission Electronics, itself now linked with Sansui as part of the troubled Polly Peck multinational. Whereas Mission and Sansui products have wide availability, Cyrus products have superior build and performance and are aimed at the enthusiast market, so will only be found in specialist hi-fi shops.

Both the Mission 760 (see page 114) and the Cyrus 780 in fact share the same drivers, front panel dimensions and trim, the £80 premium for this Cyrus variation being devoted to stiffening, prettifying and expanding the enclosure and beefing up the crossover.

It's a stylish 'slimline' miniature, the injection moulded grille neatly finishing and shaping the front edges and fitting (very) snugly onto the moulded, ported baffle. Presentation is both smart and restrained, and certainly looks rather better with the grille in place. The main driver is mounted above the tweeter, in order to obtain the smoothest crossover integration at different listening heights.

As with its baby brother, the drivers were really tightly mounted into the surprisingly thin but rib-stiffened plastics front baffle, using coarse-threaded woodscrews (one of which stripped during re-assembly). The differences are

only really apparent under the now wooden skin (or on the bathroom scales), where the heavier-gauge (multi-strand!) wiring and (6mm) thicker box panels are found, complete with bituminous damping pads on the side panels and a fairly heavy fill of fibrous wadding. Though the extra depth is partly responsible, note that the total weight is increased by more than 50 per cent.

The crossover is generously rated, carefully laid out and hardwired to both drivers and gold-plated bi-wire terminal tags. The main driver has a light 100mm doped paper cone, small magnet and pressed steel frame, while the tweeter is a 19mm fabric dome with short horn flare.

## Test report

Sensitivity is pretty good, though this is partly due to a lowish impedance in the powerhungry lower midband, and there's little in the way of genuine bass extension either. The crossover region is very well integrated so the 780 is very tolerant of the listening axis, while the grille too is benign.

The response is pretty well balanced overall, especially with a little low frequency assistance from a nearby rear wall. However, it's not particularly smooth, being somewhat prominent around 1kHz and rather deficient around 400Hz, though both these effects can be ameliorated if sufficient time is spent experimenting with placement.

## Sound quality

As is only to be expected, the Cyrus 780 has much in common with the standard 760, and like its sibling, it did well in the blind listening tests, on two separate presentations. Once again there was praise

for the overall (wall sited) balance and a general lack of boxiness which lends an impressive sense of scale, even if genuine weight and welly are a little lacking.

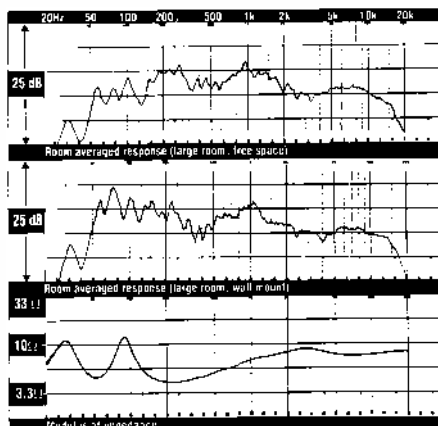
Timing is basically good, though the treble remains mildly obvious and distracting. Compared with the 760, delicacy, clarity and transparency are all subtly improved. Timing is a shade tighter, dynamics are a little more convincing and the stereo soundstage becomes more solid and coherent. These are small, incremental improvements to be sure, but are just the sort to quicken the pulse of the enthusiast, and are, at the end of the day, precisely what the quest for hi-fi reproduction is all about.

## Conclusion

This is a delightful little miniature speaker that goes a long way towards justifying its premium price. Although not quite such good material value as its 760 stablemate, it nevertheless deserves confident Recommendation.

## TEST RESULTS

Size (hwxwd)	29x18x26cm
Weight	5.5kg
Recommended amplifier power	15-70W
Recommended placement	light stands close to wall
In room averaged response limits 50Hz-10kHz +/-5dB	
Large room/space LF rolloff (-6dB ref midband)	50Hz
Large room/wall LF rolloff (-6dB ref midband)	50Hz
Large room output at 20Hz (ref midband) below -20dB	
Estimated midrange sensitivity (ref 2.83V, 1m) 88dB/W	
Impedance characteristic (ease of drive) quite demanding	
Typical price per pair (inc VAT)	£180



# Cyrus 781

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



It's not so long ago that I reviewed the Cyrus 781. It didn't do badly, but didn't do sensationally well either. It hasn't apparently changed to any significant degree, but Mission was convinced that I had underestimated the capabilities of one of the company's own favourites, feebly because the review samples had never achieved a full potential which is only realised after extensive running in.

As the review unfolds it seems quite possible that may indeed have been the case. The whole business of running in is poorly researched and understood, though certainly some designs do change more noticeably than others, especially during the first few weeks of use. This places the reviewer in a difficult position, especially the *Hi-Fi Choice* loudspeaker reviewer who is dealing with a couple of dozen models.

Ideally of course loudspeakers shouldn't need running in, and as far as I'm concerned, it's got to be up to the manufacturer/distributor to ensure that any necessary running in is already carried out before submission. But Mission managed to persuade the editor to give the 781 another try, so I'd better get on with reviewing these new and definitely (?) run in samples.

It's a chunky, compact little bookshelf speaker with the luxury touches and build quality necessary to justify a £250 price - note the substantial 9kg weight. There's also a matching open frame tripod stand which seems to do the business very well, sonically and aesthetically.

Veneered in real wood, and a pretty, modern looking baffle when the grille is removed, the carcass of the 781 is built up in solid 18mm MDF. Using Mission's intelligent 'upside down' configuration, the drivers are properly rebated, and as

before, both drivers were extremely tightly secured - a regrettably rare phenomenon in my experience. The biwire/-amp crossover has good power handling while the grille is an innocuous looking plastic frame affair, of little aesthetic merit, but little acoustic demerit.

## Test report

Although a completely fresh set of measurements was made, these merely serve to confirm the consistency of both Mission's production and our own test programme. Sensitivity is marginally above average and the load reasonably benign, so the decent power handling will allow good levels to be achieved, even with modest amplification.

The in-room traces show a fair amount of unevenness, especially around the crossover region, and a balance which is probably useable against or away from the wall. In practice about a foot from the wall proved ideal in our larger room, but it's important to try out several options, as getting this right is well worthwhile.

Close up measurement implies that the grille is quite useable, if better removed, while the 781 proved unusually tolerant of movement in the vertical plane.

## Sound quality

Twice placed behind the black curtain which is no respecter of reputations, the 781 came up trumps on both occasions, convincing most panel members that they were hearing something significantly larger and more expensive. And of the two presentations, it did best of all when mounted on the Cyrus stand, which confirms that the people up in Huntingdon actually listen to their products.

Speed and dynamics are the main strengths. Even though there's a lack of a

genuine bass extension and a certain amount of mid-bass cabinet honk, the 781 trucks along in a most convincing manner, with a freedom and ability to differentiate tonal variations in the lower octaves that many boxes four times the size might envy.

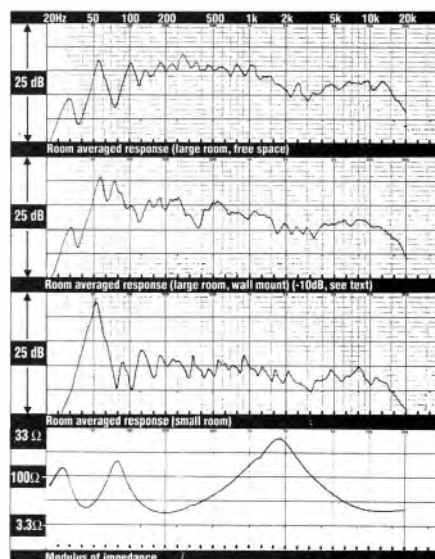
Toe tapping aside, the mid and treble more than passes muster, reproducing leading edges in a convincing and communicative way and attaining fair transparency despite some congestion and coloration.

## Conclusion

I just wish I still had the original, little used review pair from the end of last year, just to see how much difference there really is. Whatever the running in factor, assessed this time around the 781 clearly deserves enthusiastic recommendation.

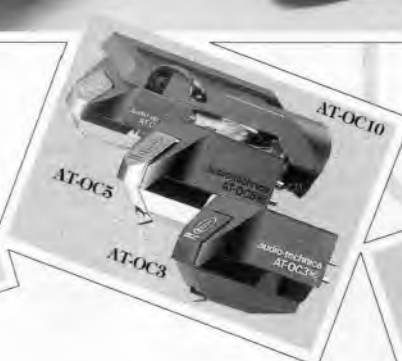
## TEST RESULTS

Size (h x w x d)	43 x 22.5 x 28 cm
Weight	9 kgs
Recommended amplifier power	15-70 W
Recommended placement	stands 1ft from walls
In room averaged response limits 50Hz-10kHz	+/-4db
Large room/space LF rolloff (-6dB ref midband)	45Hz
Large room/wall LF rolloff (-6dB ref midband)	28Hz
Small room LF rolloff (-6dB ref midband)	32Hz
Large room output at 20Hz (ref midband)	<-18dB
Estimated midrange sensitivity (ref 2.83V, 1m)	88dB
Impedance characteristic (ease of drive)	fairly good
Typical price per pair (inc VAT)	£250



# A Refining Of The PRINCIPLE

Bettini stylus  
from the A-T  
Gallery collection,  
Machida, Tokyo.



Little over 100 years ago Gianni Bettini became the world's first audiophile. As an Italian cavalry officer visiting New York in the late 1880's, he was intrigued by the newly introduced Edison wax cylinder 'phonogram' yet unsatisfied with its poor audio quality. Using his flair for things mechanical Lieutenant Bettini began to turn this business dictation machine into a device which would satisfy music lovers and to ensure the ultimate fidelity he opened his own recording studio on Fifth Avenue. There he made the first realistic recordings of famous contemporary opera singers and built up a fabulous collection of 'celebrity cylinders' including his holiness Pope Leo XIII. His 'micro-reproducer' phonograph was first in a line of successful models and today A-T salutes him as a true pioneer of high fidelity.

At Audio Technica we strive toward the same goal, using unrivalled micro-transducer 'know how' to reduce the weight of Bettini's original device to the mere few grams of our latest moving coil series. Below we proudly present our 'reference' specifications but add one small note of caution. At this level 'numbers' do not tell the whole story as component compatibility and musical taste come into play. We thus urge a personal audition at one of our hand selected A-T dealers to fully assess requirements.

Meanwhile, please contact the A-T sales office for a complete selection of press review copies.

## Acknowledgements:

'Illustrated History  
of Phonographs'  
- Daniel Marty

'From Tin Foil  
to Stereo'  
- Read/Welch

	ART 1	OC-30	OC-10	OC-5	OC-3
Frequency response (Hz)	10 - 50,000	10 - 50,000	10 - 50,000	15 - 50,000	15 - 50,000
Output voltage (1kHz, 5cm/sec)	0.35mV	0.4mV	0.4mV	0.4mV	0.35mV
Channel separation (1kHz)	30dB	30dB	29dB	27dB	27dB
Output balance	1.0dB	1.0dB	1.0dB	1.5dB	1.5dB
Vertical tracking force	1.4 - 1.6g	1.25 - 1.75g	1.25 - 1.75g	1.25 - 1.75g	1.25 - 1.75g
Coil impedance (1kHz) / DC resistance	12Ω	12Ω	12Ω	12Ω	12Ω
Load resistance - Head amp/transformer	>100Ω / >20Ω	>100Ω / >20Ω	>100Ω / >20Ω	>100Ω / >20Ω	>100Ω / >20Ω
Coil inductance (1kHz)	50μH	50μH	50μH	50μH	50μH
Static compliance (cm/dyne)	30 x 10 <sup>-6</sup>	35 x 10 <sup>-6</sup>	35 x 10 <sup>-6</sup>	35 x 10 <sup>-6</sup>	35 x 10 <sup>-6</sup>
Dynamic compliance	8 x 10 <sup>-6</sup>	9 x 10 <sup>-6</sup>	9 x 10 <sup>-6</sup>	9 x 10 <sup>-6</sup>	9 x 10 <sup>-6</sup>
Stylus profile	Micro-linear	Micro-linear	Micro-linear	Bi-Radial	Bi-Radial
Magnet type	Special	Neodymium	Neodymium	Neodymium	Samarium-cobalt
Vertical tracking angle	23°	23°	23°	23°	23°
Dimensions L x W x H mm	22.2x16.8x17.3	25.7x16.8x17.3	25.7x16.8x17.3	25.7x16.8x17.3	25.7x16.8x17.3
Weight	9.5g	8.0g	8.0g	8.0g	8.0g



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# Goodmans M100

GOODMANS LOUDSPEAKERS LTD, 1 - 3 RIDGWAY, HAVANT,  
HAMPSHIRE PO9 1JS. TEL: (0705) 429 777



Although the 1988/9 *Sterling* range did liffle to excite either *Hi-Fi Choice* or the marketplace, Goodmans' new *M-series* threesome looks set for better things. Certainly the £100 *M300* proved good value for money in issue 82, and now it's the turn of the baby £85 *M100* to come under scrutiny.

The 'budget miniature' loudspeaker in any manufacturer's range is the model that generates the volume sales provided of course that the engineers have got the formula right. Goodmans already has one of the market leaders in the successful £89 *Maxim 2*. However, it's a couple of years old now, and is also a singleton model - that is it doesn't form part of a range, all of which the company would like its dealers to stock.

To describe the '100 as a member of the *M-series* is to divert attention away from the true nature of this model. Tartyed up with grey baffle and cheerful badge it may be, but the *M100* is in fact nothing more nor less than a budget price version of the *Maxim 2*.

So what has Goodmans done in order to shave a tenner off the price of the *Maxim 2*? The 100 certainly shares the same enclosure, and a similar looking paper cone bass/mid driver and rear tube port too. However, it doesn't weigh as much, 'cos it uses a much smaller magnet. And it doesn't use the neat little Audax tweeter that has formed the basis of more than half the best budget speaker designs of the past decade or so.

In other respects this is very much the familiar *Maxim* mixture: a grille which would be better converted into a fly swat; a simple but inherently stiff 12mm chipboard box; a hardwired commercial grade crossover mounted inside the terminal block.

## Test report

Sensitivity is comfortably (3dB) below average, and power handling is obviously restricted, so high loudness levels are not part of the *M100's* repertoire. Nor is gut-wrenching bass on the agenda: the port is tuned to 70Hz and in-room output rolls off rapidly below 50Hz. The load is simple enough for even the least capable amplifiers.

The limited engineering budget is clearly seen in the unevenness of the bass/mid driver output, covering the vital region below 1.5kHz in a decidedly lumpy manner. In stark contrast the tweeter has a remarkably smooth and nicely extended response. Wall siting is clearly beneficial in smoothing and extending the region below 150Hz, and the units should be placed on highish stands to place the main axis roughly at ear height for the seated listener. The discontinuity from 1-1.5kHz will certainly add a degree of character to the sound: interestingly, both the *Maxim 2* and TGI stablemate Mordaunt-Short's *MS3.10* show similar traits in this region. The grille is definitely better discarded.

## Sound quality

One might have hoped that the *M100* would repeat the blind listening test successes scored by the two similar models mentioned above, where inherent charm and lively 'bounce' more than compensate for a degree of coloration. However, the results were less kind to this cheaper model, and direct sighted comparison confirms that the sound quality doesn't match up to those other two cheeky chappies.

Timing and pace are reasonable enough, though there's no real authority or drive to the music, never mind anything much in the way of weight or power. The

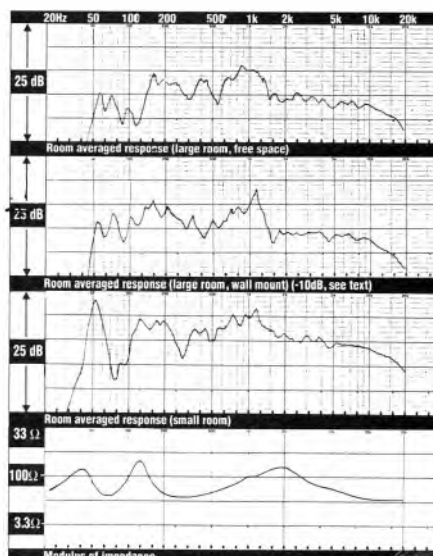
midrange is pretty communicative, if rather coloured and occasionally fierce, while the treble has a rather relentless quality that tends to emphasise the limitations of compact disc, and which several listeners considered irritating.

## Conclusion

The *M100* is not a bad loudspeaker, rather it is an unexceptional one that hovers uncertainly on the dividing line between real hi-fi and just plain audio. That it provides at least half the *Maxim's* charm while saving a tenner is probably sufficient for recommendation, but this endorsement doesn't carry any great enthusiasm here I must admit.

## TEST RESULTS

Size (h x w x d)	20 x 17 x 26 cm
Weight	2.5 kg
Recommended amplifier power	15-60 watts
Recommended placement	close to rear wall
In room averaged response limits 50Hz-10kHz	+/- 5 dB
Large room/space LF rolloff (-6dB ref midband)	50Hz
Large room/wall LF rolloff (-6dB ref midband)	50Hz
Small room LF rolloff (-6dB ref midband)	40Hz
Large room output at 20Hz (ref midband)	< -20dB
Estimated midrange sensitivity (ref 2.83V, 1m)	85dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£85



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# Heybrook Solo

HEYBROOK HI-FI LTD, ESTOVER CLOSE, ESTOVER INDUSTRIAL ESTATE, PLYMOUTH, DEVON PL6 7PL. TEL: (0752) 780311



This West Country hi-fi manufacturer can supply a complete system with turntable and amplifier, but has always been best known for its extensive range of bookshelf size loudspeakers. The *Solo* is a brand new model, competitively priced at £160, which places it at the bottom of the Heybrook line-up.

It certainly looks good value from a material content point of view, being a solidly built two-way sealed box of what might be called a 'standard' bookshelf size. Construction is pretty conventional too, with the carcass wrap fitted with front and back panels (whereas the *Point 5* inserted top and bottom faces).

*Solo* has a slightly dumpy appearance, but it closely matches the top plate shape of Heybrook's popular *HBS1* stand, and the combination looks very good together, taking up very little space when mounted as intended close to a wall.

The driver line-up looks pretty similar to that used in the *Point 5*, with the same slightly unusual looking tweeter, a 14mm hard dome with elaborate phase compensation and flaring. The main driver has a 110mm paper cone with wide surround, pressed steel frame and small magnet, again much as its stablemate.

One notable feature, encountered all too infrequently, is that all the driver screws were properly tightened, and the tough 18mm chipboard baffle seems well able to take the strain of the double-helix woodscrews. The sides are solid panels too, 15mm thick, and all is wrapped in an innocuous black vinyl woodprint, discreetly decorated with gilt logos. The grille is a neat affair with slim chamfered MDF frame and tasteful, sober cloth covering.

Twin terminals on the rear allow bi-

wiring (or bi-amping), providing the internal links are severed first. The crossover - such as it is, or rather isn't - is located behind the terminals and is hardwired to the drivers with special solid-core cables. The box itself is lightly filled with a cocktail of damping layers, including artificial fibres and long-haired wool, which is evidence that careful listening has been part of the development process.

## Test report

*Solo's* sensitivity is close to the average (and a couple of dB better than *Point 5's* rating) and the mild impedance characteristic should present no problems for even the most modest amplifier. Bass extension is pretty good considering.

The overall response is pretty well balanced, and well suited to mounting close to a rear wall, though as usual some experimentation in any given room is essential, and the *Solo* should be quite tolerant.

Balanced it may be, smooth it's not, especially towards the top end of the tweeter range, but also in the broad prominence through the upper mid and lower treble, 600Hz-2kHz. The crossover region is well handled, and the speaker is best sited with the main axis at ear height, on stands such as the *HBS1*, square with walls so that the listener is slightly off-axis laterally from each. The grille is harmless.

## Sound quality

For some reason that continues to elude me, Heybrooks never seem to do well in my blind listening tests, and *Solo* is no exception. Which leaves me with something of a problem since I've grown

to like it a lot over extended subsequent listening.

There are some coloration problems to be sure, the midband sounding a little hollow and nasal and the treble quality mildly distracting and irritating. The upper bass is just a shade on the strong side too, but the thing that sets *Solo* apart from the pack is its excellent speed and timing through the bass and lower midrange.

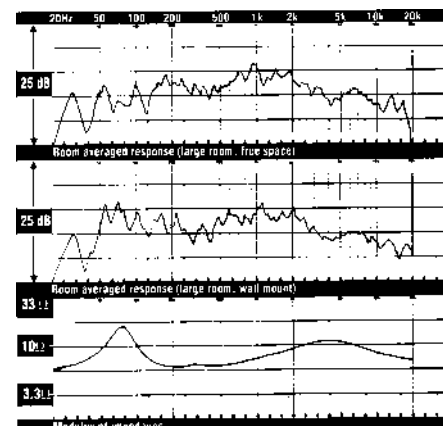
This was brought home forcibly on the release of the Brazilian influenced Paul Simon album with its complex percussion and bass lines. *Solo* simply boogied happily on down, sorting out the various threads impressively well, while most rivals clogged up and sounded congested. In this important part of the frequency band, coloration is distinctly lower than most.

## Conclusion

Not everyone's cup of tea I daresay, *Solo* has its cosmetic limitations and doesn't always produce a comfortable sound. But give it something rhythmic and complex to get its teeth into and it starts to show its real capabilities, encouraging foot-tapping and enthusiastic volume control settings. It may be a bit untidy, but it's a lot of fun too, which is the best reason I know for formal Recommendation.

## TEST RESULTS

Size (hwxwx d)	36x23x22cm
Weight	5kg
Recommended amplifier power	20-80W
Recommended placement	HBS1 stands close to wall
In room averaged response limits 50Hz-10kHz	+/-5dB
Large room/space LF roll-off (-6dB ref midband)	28Hz
Large room/wall LF roll-off (-6dB ref midband)	28Hz
Large room output at 20Hz (ref midband)	-15dB
Estimated midrange sensitivity (ref 2.83V, 1m)	87dB/W
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£160





# Infinity Reference 10

INFINITY LTD, GAMEPATH, 25 HEATHFIELD, STACEY BUSHES,  
MILTON KEYNES MK12 6HR, TEL: (0908) 317707

**Recommended**



One of America's largest and best established specialist hi-fi speaker manufacturers, Infinity has tended in the past to concentrate on its home market, though one or two of the budget bookshelf models have enjoyed their fair share of success over here in the UK.

The two new *Reference Series* models included in this report came with plenty of accompanying propaganda. On the one hand there was a multi-lingual instruction manual (English/French/German); on the other was a design 'white paper' beginning with the words: "The new Reference Series has been specially developed for the UK market..."

Whatever the flannel, this is a good looking and chunkily proportioned little bookshelf model that certainly feels solid and substantial enough to justify its £159 pricetag. Indeed it weighs a cool 7kg, which is a good bit more than most similarly sized speakers, and doesn't even have the excuse of needing a big magnet to control a ported enclosure - this is a straightforward sealed-box design, with fundamental system resonance at just above 80Hz.

Presentation is distinguished by attractive radiusing of both baffle and rear panel edges, and the use of a good quality textured vinyl print on all six faces. The moulded plastic grille is chamfered around its outside edge, for appearances' sake, but not on the edge next to the drivers themselves, which is a wasted opportunity. The speaker looks pretty enough without it - apart from the ugly great mounting lugs left at each corner.

The drivers were pretty tightly secured, albeit using coarse-pitch woodscrews and at the expense of some cracking - and some difficulty in properly re-tightening - into 18mm thick particle board that

should perhaps have been stronger. The odd section of battening adds further strength to some panel junctions, and the whole thing is well filled with wadding.

A conventional terminal pair feeds a fairly elaborate PCB crossover, and that in turn tag-connects to the two drivers, both of which use advanced diaphragm materials. The main driver has an injection-moulded, graphite-loaded polypropylene cone some 120mm in diameter, with contiguous concave sealing dust cap. The fact that the basket is merely pressed steel is disguised by a plastic trim ring. The tweeter uses an ultra-light foamed polypropylene 19mm dome, dubbed Polycell, which is bound to leave your DIY friends impressed.

## Test report

Sensitivity is close to average, and the bass extension is quite impressive for the modest box volume. There's no free lunch, of course: the impedance is resolutely low through the bass region - though not to the extent that it is likely to cause any embarrassment to a modern transistor amplifier.

The curves suggest that although the *Ref 10* is a little bass shy when used well clear of reflective walls, it is inclined to get midbass boomy if moved up too close. Careful experiment will be needed to achieve optimum in-room alignment. That achieved, the overall result is pretty well balanced, though not without some local unevenness and a clear 9kHz treble 'hot spot' that is likely to be subjectively audible.

## Sound quality

In complete contrast to its big brother, the *Ref 10* turned in a solidly impressive listening test result, which subsequent

sighted listening did little to modify. The real strength here is an essentially communicative - though not entirely uncoloured - midrange, providing a good balance between detail and refinement, especially on relatively simple material.

The tweeter seems a little too inclined to make its presence known, though it's reasonably sweet and quite transparent, and the focus sharpened up when the supplied *Supra* cable was substituted for *NACA5*. The sound (inevitably, given the dimensions) lacks scale, weight and authority, and a certain amount of body too, and the bass certainly doesn't sound as 'fast' as the mid and treble, leading to slightly insubstantial transients. But at least there's little tendency to boom, just a slight fuzzing and thickening of textures and differentiation, and low frequency room matching is pretty good.

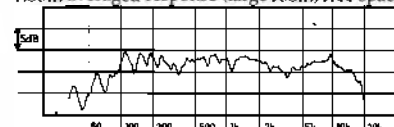
## Conclusion

Disregarding the attendant hype, once again Infinity has demonstrated its ability to US-manufacture, ship and sell a fully competitive bookshelf speaker on the UK market. I still have some reservations over the mechanical integrity of the main driver mounting (enthusiasts could contemplate T-nut conversion), but this good basic allrounder nevertheless deserves Recommendation.

## TEST RESULTS

Size (hxxwxd)	36x23x23cm
Weight	7kg
Recommended amplifier power	20-70W
Recommended placement	stands 30cm from wall
In room averaged response limits 50Hz-10kHz	+/-6dB
Large room/space LF rolloff (-6dB ref midband)	48Hz
Large room/wall LF rolloff (-6dB ref midband)	50Hz
Large room output at 20Hz (ref midband)	-15dB
Estimated midrange sensitivity (ref 2.83V, 1m)	87dB
Impedance characteristic (ease of drive)	current hungry
Typical price per pair (inc VAT)	£159

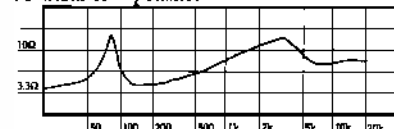
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



# JRT AD2 Micro

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Choice's attention was originally drawn to JRT Loudspeakers on seeing a favourable review of this tiny little miniature in a rival magazine. Julian Taylor, at the end of the telephone, elected instead to send in his much larger AD1 model, which turned out to be one of the higher spots of the reviews in issue 86.

It's therefore high time that we got to grips with the £389 AD1 Micro that set the ball rolling. It's not all that much cheaper than its much larger stablemate, which might seem a bit surprising until you look at the economics of building a low volume specialist product to a high standard. Both have drivers, crossovers and terminals of similar quality; both will take just as long to put together; the only cost differences come in carpentry, wood, packing and transport.

As miniatures go, it's smaller than most, and can just be used on *Kan* stands if they're (the stands of course) turned sideways on. Through a misunderstanding, *Kan* stands (and *Slate Audios*) were used in the test programme. Having finished all tests we discovered that JRT recommends and supplies a Foundation variant *Sir Fred*. Follow up auditioning is being organised.

The presentation is beautiful, with a lovely oiled real wood veneer on five faces, the drivers neatly rebated to make the front flush. Only the grille mounting lugs spoil the appearance, apart from the grille itself of course, which can be wrapped in a plastic bag and left inside the packaging just in case you want to resell the speakers one day. The little metallised soft dome tweeter has its own protective mesh.

Although we normally dismantle speakers (after the listening is done) so as

to report on the innards, JRT frustrated this procedure by making both drivers and terminals non-removable, even after removal of the formers' big and reasonably tight machine-head screws. Quite what happens should you happen to blow a driver is anybody's guess, but it does ensure fine mechanical integrity for the little 90mm plastic cone with its odd spiral pattern sealed dust cap.

## Test report

Sensitivity is usefully high by miniature standards, and just about average against the market as a whole, while the impedance represents a simple load for the partnering amplifier. The trade-off is of course in the bass extension, the *Micro* making little attempt to do much below 50Hz (in room).

The midbass is usefully reinforced by wall loading, the end result being a little recessed in the lower midrange, a little prominent in the octave above that (round about 1kHz), and with some loss of energy in the presence region. But the overall balance is pretty good, albeit with a bit of a sting at very high frequencies.

## Sound quality

The slightly above average panel test rating reflects the dilemma that this is not necessarily a comfortable speaker to listen to, but it is communicative, coherent and informative, both of the music playing and the rest of the components being used in the system.

The balance errs on the bright side, which tends to emphasise surface noise from vinyl discs. The lack of genuine scale and weight is of course evident enough, depending somewhat on the type of material. The sound may lack slam, but

not speed, and in consequence shows great life and impressive dynamic differentiation, even at bass frequencies. There's little boxiness, and an impressively substantive image is generated, with fine positional detail alongside a good impression of real performers playing.

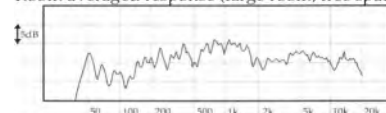
## Conclusion

The *Micro* is a shade on the expensive side for its level of refinement, but not for its ability to communicate the messages within the music. It's sufficiently sensitive to the quality of rest of the system to make an excellent choice for the enthusiast with a smallish room, and is very responsive to 'fine tuning' the overall sound according to siting, stands and cables - quite a little jewel in fact, and definitely deserving Recommendation.

## TEST RESULTS

Size (h x w x d)	28 x 17 x 21 cm
Weight	6 kg
Recommended amplifier power	20-70 W
Recommended placement	high stands close to wall
In room averaged response limits 50Hz-10kHz	+/- 5 dB
Large room/space LF rolloff (-6dB ref midband)	50 Hz
Large room/wall LF rolloff (-6dB ref midband)	48 Hz
Large room output at 20Hz (ref midband)	below -20 dB
Estimated midrange sensitivity (ref 2.83V, 1m)	87 dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£389

Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



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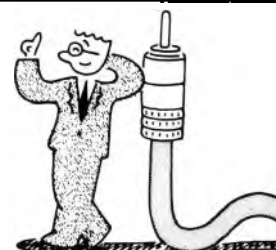
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# Monitor Audio Monitor 11

MONITOR AUDIO LTD, 34 CLIFTON ROAD, CAMBRIDGE CB1 4ZW.  
TEL: (0223) 242898



Monitor Audio has not had a good run in past *Choice* loudspeaker reviews - to the point where diplomatic relations seemed to be in some danger. Happily, the *Monitor 11* arrived on the doorstep just in time for inclusion in this project - and just as happily, it looks like the most promising MA model for some time.

For years Monitor has enjoyed much success with a clutch of medium size stand-mount speakers priced £300 - £400, with a variety of sizes and finishes. The £330 *11* fits in perfectly with the value-for-money side of this tradition, as does its 30cm taller £380 *14* sibling. Both also build on the success enjoyed by the smaller 7 and 9, which introduced this particular style of MDF cabinetwork.

The box is fashionably slim and quite tall for a bookshelf or stand mount design, partly no doubt as a function (or determinant) of the twin main driver 'two-and-a-half-way' arrangement. Two apparently identical bass/mid drivers are fitted, one operating just to augment the bass where a large cone area is an advantage, the other carrying on up into the midrange where its small size helps promote good crossover integration to the tweeter. It's an arrangement that sounds fine in theory, but which designers often find difficult to put successfully into practice.

All is finished in an attractive shiny black paintwork, the drivers bolted straight to the baffle with well-tightened T-nut screws. The rather plain grille is better left unused, partly because the speaker looks prettier without it, but also because the baffle is narrow and the frame

rather thick, while the 25mm metal dome tweeter has its own protective mesh cover.

It's not a particularly heavy loudspeaker for its size and configuration, largely because the very strong MDF panels are only 11mm thick. Extra figure-eight bracing is applied to stiffen the longer panels, and all is lined with pads of acoustic foam. A bi-wire or bi-amp crossover is fitted behind the twin terminals, and all connections are hardwired. The main drivers are simple low-tech affairs, with 110mm doped paper cones, small magnets and pressed steel frames. The tweeter is mounted on a heavy cast faceplate.

## Test report

The *11* achieves average sensitivity without resorting to a current hungry low impedance, and manages pretty good low frequency extension too, especially considering the compact dimensions.

However, as is often the case with twin main driver systems, the overall bass level is a little strong in relation to mid and treble, whether or not wall reinforcement is augmenting the 50 to 100Hz octave. In practice free space siting was subjectively preferred, some added 'body' from 100 to 400Hz being the inevitable but tolerable consequence.

Elsewhere the response is pretty well balanced with a slightly downtilted characteristic, though still somewhat uneven with it. The presence and crossover regions are well handled, but the treble does seem to focus rather around 5-10kHz, especially in the context of the slight energy loss in the octave below.

**Recommended**

## Sound quality

The *Monitor 11* managed to scrape its way into the top ten of its particular test group, which is creditable enough for a £330 model. Although it does nothing exceptionally well, there is very little deserving serious criticism either. The extra 'body' is not unattractive, making the speaker easy to live with whatever one's taste in music, though spoken word radio does sound a touch 'chesty'.

The presentation is a shade thumpy and thick in the bass, the treble is slightly detached, and the overall sound is a little slowed, but the whole still manages to sound lively, bouncy, mostly coherent and above all enjoyable. The balance certainly suits CD rather better than vinyl.

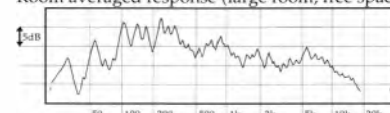
## Conclusion

Fashionably good looking and respectable enough material value for money, the whole comes together even better than the sum of its constituent parts. One might pick nits in both the measured and subjective performance, but the whole package is a well balanced compromise, which is what the art of speaker design is really all about. Recommendation is entirely appropriate.

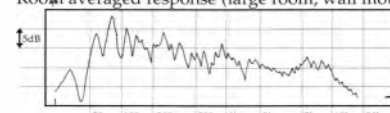
## TEST RESULTS

Size (h x w x d)	52 x 20 x 24 cm
Weight	6 kg
Recommended amplifier power	15-100 W
Recommended placement	stands at least 30 cm from wall
In room averaged response limits 50Hz-10kHz	+/- 7 dB
Large room/space LF rolloff (-6dB ref midband)	48 Hz
Large room/wall LF rolloff (-6dB ref midband)	30 Hz
Large room output at 20Hz (ref midband)	-12 dB
Estimated midrange sensitivity (ref 2.83V, 1m)	87 dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£330

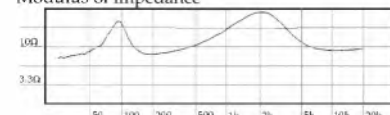
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



# NAD 8100

NAD MARKETING LTD, ADASTRA HOUSE, 401-405 NETHER STREET,  
FINCHLEY, LONDON N3 1QG. TEL: (081) 349 4034

**Recommended**



Originally founded by an international consortium of dealers, NAD has had plenty of success with its amplifiers and source electronics, designed in the UK or US and manufactured mainly in the Far East. The brand is less known for loudspeakers, though *Choice* has reviewed and Recommended a neat little £150 miniature model dubbed the 8225 (see the following page).

The £299 8100 is a very close relative, taking the same two drivers and crossover and mounting them in a larger floorstanding box. The difference in price is not that much more than the price of the decent pair of stands needed to support the miniature, while the 'extended loudspeaker' approach not only looks neater but offers significantly enhanced bass output to boot. On the down side, the footprint made by this little floorstander is much smaller than that provided by many stands, and of course

cabinet coloration becomes more of a problem the larger the box.

Only the width remains as before, the 8100 being 7cm deeper and 40cm higher than its stablemate, while the much larger port is now tuned to a lowish 40Hz (previously c55Hz). Although its no luxury package, all is neatly put together with some attention to engineering detail. The base is a solid 30mm chunk of MDF, for example, fitted with decent quality spikes.

The drivers are not rebated, so the thick MDF grille frame is not too obstructive, but it still does the speaker no acoustic favours. With little relief from omnipresent black and an utterly adequate vinyl woodgrain, styling and presentation have clearly not been a design priority.

The main driver uses a 125mm plastic cone, a pressed steel frame and rather small magnet, and is attached by rather silly woodscrews that were barely tight. The tweeter is a 25mm fabric dome device, and the fixings were certainly much better tightened up.

The box itself is only 15/16mm chipboard, but there are two very classy double-figure-8 braces to stiffen the long vertical panels. There's light damping mainly around the rear of the main driver, and also in the base. The simple commercial bi-wire crossover is hardwired to the drivers and fed from two pairs of gold plated terminals.

## Test report

Sensitivity is pretty good, thanks in no small part to the low impedance that will make some demands on the amplifier's current reserves. Bass extension is pretty reasonable, though clearly peaked up somewhat around 40-50Hz and falling quite rapidly below that, indicating perhaps that the port is a little too exuberant.

The wall reinforcement that was virtually a necessity with the little 8225 must be avoided like the plague with the 8100. Free space siting shows a pretty well balanced overall characteristic, held within tighter limits than most across the majority of the range. However, the fat low/mid bass bump will be subjectively all the more obvious because of the slight leanness in the octave from 75-150Hz, while the broad midrange is slightly forward and a little ragged.

## Sound quality

The 8100 did well in the blind tests, with pretty good consistency between the

panellists. There was praise for the good balance and resolution and for an attractively clear, open and lively sound. This was tempered by general reservations that the treble was a bit obvious, hard and edgy, with some fatigue potential - a factor that might be ameliorated by careful cable selection. The forward presence tends to add to this slight aggressiveness, and also flattens stereo perspectives somewhat.

The bass received a more mixed reaction. It certainly has an attractive character, especially on first acquaintance, with an engagingly lively and bouncy quality. But it is a bit of an illusion, generated by the slight lack of warmth and the bump at the bottom. More extended listening found it somewhat detached and a little ponderous, but more than half convincing nonetheless.

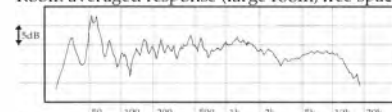
## Conclusion

Much like its baby bookshelf stablemate, the 8100 delivers an overall result that's significantly greater than the sum of its parts. It's by no means above criticism, but the weaknesses always seem less significant than the entertainment value of a speaker which is comfortably more communicative than the herd, and certainly good enough value for Recommendation.

## TEST RESULTS

Size (hwxwd)	75x20x25cm
Weight	9.5kg
Recommended amplifier power	20-70W
Recommended placement	well clear of walls
In room averaged response limits 50Hz-10kHz	+/-7dB
Large room/space LF rolloff (-6dB ref midband)	25Hz
Large room/wall LF rolloff (-6dB ref midband)	28Hz
Large room output at 20Hz (ref midband)	-14dB
Estimated midrange sensitivity (ref 2.83V, 1m)	88dB
Impedance characteristic (ease of drive)	current hungry
Typical price per pair (inc VAT)	£299

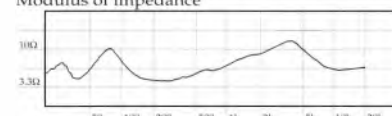
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



# NAD 8225

HI-FI MARKETS LTD, ST IVES INDUSTRIAL ESTATE, BURRELL ROAD, ST IVES,  
CAMBS PE17 4LE. TEL: (0480) 496496

**Recommended**



NAD is a curious company in several ways. Originally created by an international consortium of dealers and distributors, it combines European and American design skills with predominantly Far Eastern sourcing to achieve a frequently impressive cost performance ratio.

The brand is best known for amplifiers, the 3020 series being one of hi-fi's all time classics. Loudspeakers have occasionally featured in the repertoire, but play a much smaller role in NAD's UK operations than electronics. Which means, in effect, that there's little pedigree for the little £150 8225 that is the subject of this review.

Though miniature in size, this model is less miniature in price, implying that rather more than basic budget engineering is involved. To step back for a moment, loudspeakers have historically and traditionally been priced according to size, but with occasional rare exceptions like the BBC LS3/5a. However, we are now moving towards a situation where you can pay anything from £80 to £800 (or even more) for a miniature loudspeaker, and in many cases the high priced models fully justify themselves on the basis of performance.

The premium price ought to add some engineering embellishments to the basic hundred pounders, though in practice these are far from obvious. The small rear ported enclosure is built from vinyl woodgrain finished 15mm stock, with no special treatment bar some fibrous wadding lining the inside.

At least the PCB crossover uses generous components, while the UK-built main driver has a decent magnet and advanced polymer cone, though it's built into a cheap pressed steel basket. The tweeter is a 25mm soft fabric dome with

short horn flare, while the grille has a nasty thick MDF frame with badly glued covering material - though in fact it's acoustically quite harmless and the rest of the speaker is properly screwed together. There's nothing wrong with the appearance or aesthetics, save that they're deadly dull.

## Test report

Despite its diminutive dimensions, the 8225 is only just below average sensitivity, though this is largely because its 40hm impedance characteristic pinches 3dB which in turn implies the use of an amplifier with good power and current delivery - such as many of NAD's own.

Naturally the bass extension is rather limited, falling rapidly below 50Hz, but elsewhere the free-space room response shows a beguilingly flat midband, 150Hz-3kHz, alongside the sort of stepped bass response that invites wallloading. Close-to-wall siting admirably fills in the 50-150Hz octave and a half, albeit at some expense in overall smoothness. The crossover is admirably well integrated, especially on and around the main driver axis.

## Sound quality

The little NAD did pretty well in the listening tests, and certainly better than expected in the light of both size and price. It came in my personal top ten under blind conditions, and subsequent sighted listening only serves to confirm my own liking for its sound quality. Tried over a range of stands the 8225 continued to deliver the goods, responding rather well with various foundation models.

Bass is inevitably limited: the sound is irremediably lightweight, but there's a lightness of touch - a jauntiness, as one

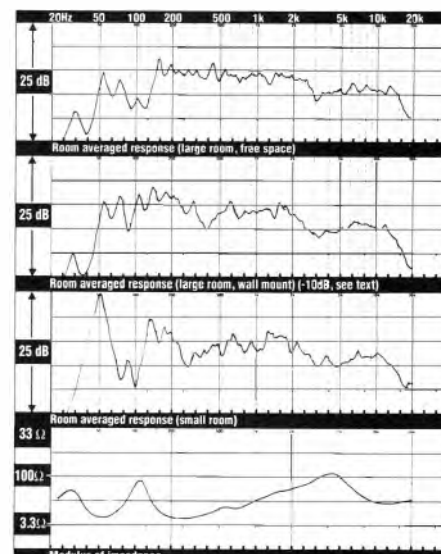
panelist described it - that adds a welcome sense of urgency to the music. A couple of listeners criticised the lack of muscle, pronouncing the end result rather plodding and boring, but the busy, detailed and neutral midband delivers its own welcome tension and articulation, while stereo images are well formed too.

## Conclusion

In term of the engineering content - not to mention rather lacklustre styling that will do nothing to help it shift off dealers' shelves - the 8225 is something of a disappointment at £150. But to NAD's credit the whole turns out to be worth significantly more than the sum of the parts, reflected in the good measured performance and very respectable sound quality. At the end of the day it's a borderline recommendation, and certainly worth trying out for taste.

## TEST RESULTS

Size (hwxwd)	34x20x18cm
Weight	4kg
Recommended amplifier power	15-60W
Recommended placement	Foundation stands dose to wall
In room averaged response limits 50Hz-10kHz	+/-5db
Large room/space LF rolloff (-6dB ref midband)	45Hz
Large room/wall LF rolloff (-6dB ref midband)	45Hz
Small room LF rolloff (-6dB ref midband)	35Hz
Large room output at 20Hz (ref midband)	<-20dB
Estimated midrange sensitivity (ref 2.83V, 1m)	87dB
Impedance characteristic (ease of drive)	current hungry
Typical price per pair (inc VAT)	£150



# Philips FB825

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



Historically, Philips has made some notable contributions to the field of loudspeaker development, including the brave motional feedback models of a decade ago, though its UK profile in this sector has been low for the past several years. Having made the decision to get back into hi-fi separates, a speaker range is an obvious accompaniment. In our September 1989 issue, we examined the £250 FB815, which is certainly a lot of speaker for the money. This month's representative, the £650 FB825 is a lot of loudspeaker, period.

It's a big floorstanding model with four drive units including a ribbon tweeter, and makes a visually imposing statement when introduced to the listening room. It's too severe and monolithic to be called pretty, but is handsome enough in its way, I suppose, helped by the radiused edges and rebated drivers nestling beneath a plastic trim,

providing you don't look too closely at the slightly tacky and obviously plastic finish.

Four drivers are actually used as a traditional three-way lineup, the two 155mm doped paper cone bass drivers operating in tandem, and so allowing the width of the speaker to be much narrower than if a single equivalent had been used. The box is a traditional reflex with large rear panel port and much larger internal volume than most. The baffle is 30mm MDF, while the sides are 20mm chipboard, stiffened by a little bracing. The panels are thickly and carefully lined in long-haired wool. Wiring is utilitarian, tag connected to a decent looking PCB crossover, doped paper cone.

The ribbon tweeter has a plastic chassis and was secured by tolerably tight woodscrews, while the 95mm paper cone midrange driver operates in its own very small sealed sub-enclosure. There's widespread evidence of careful cost engineering, but that's only to be expected when selling something as big and heavy as this for a relatively modest price. The plastic frame grille has a thick profile, and should be discarded.

## Test report

This large model makes no attempt to go for high sensitivity, registering an average 88dB rating, but doing so whilst maintaining an easy 80mW amplifier load. However, given the size of the box, it's rather surprising to discover that the bass is no more extended than a number of smaller models.

Although wall proximity over-inflates the mid-bass region quite dramatically, when sited a metre or so into the room, the 825 turns in a remarkably flat and surprisingly (for one so large) even response across the band. There's a little too much energy around 200Hz, and some odd interference effects above 1.5kHz, but these blemishes look relatively minor in context.

## Sound quality

Big and cost-effective, the 825 also turned in a subtle enough performance in the listening tests to convince the panel of its virtues. The sound is surprisingly airy and free, notably lacking in congestion, if a shade thick and heavy in places. Mid-session, cones were inserted, bringing a worthwhile improvement in precision and timing.

Ironically perhaps, much of the criticism was directed towards the treble end of things, with adjectives ranging

from scrappy to acid. Certainly the directionality of the ribbon tweeter can give rather unpredictable results, which is a bit of a pain, and the one here is set higher off the ground than most. (Ribbons radiate the highest frequencies in a tight beam whose reception requires the ear to be at the same height off the ground as the tweeter.)

However, the sound doesn't really hang together that well when it's driven loud. The bottom end lacks authority and extension, sounding rather slower with compressed dynamics and some muddle on complex material. There's a measure of overhang coloration too, though timing remains pretty good. Male voice has some chestiness, and overall it must be said that the sound is a little bland, though very competent.

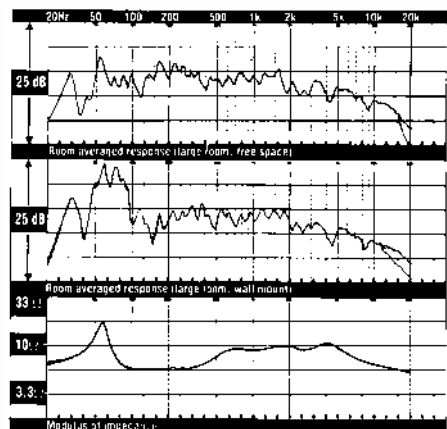
## Conclusion

To get away with a box as big as this at a price as low as this whilst still managing to come up with a coherent and spacious sound that is impressively uncongested implies some very subtle engineering.

The 825 clearly deserves Recommendation though it's a pity the loudness and bass welly don't quite match up to the box size, which itself will probably prove something of a commercial liability in the miniature-oriented UK market, even though it's probably largely responsible for the relative lack of congestion.

## TEST RESULTS

Size (hwxwd)	110x29x41cm
Weight	33kg
Recommended amplifier power	15-100W
Recommended placement	on cones well clear of walls
In room averaged response limits 50Hz-10kHz	+/-4dB
Large room/space LF roll-off (-6dB ref midband)	25Hz
Large room/wall LF roll-off (-6dB ref midband)	25Hz
Large room output at 20Hz (ref midband)	-10dB
Estimated midrange sensitivity (ref 2.83V, 1m)	88dB/W
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£700





# Royd A14 II

ROYD LOUDSPEAKER CO LTD, UNIT A6, STAFFORD PARK 15,  
TELFORD, SHROPSHIRE. TEL: (0952) 290700

**Recommended**



I've been rather fond of the Royd speakers I've heard so far, and have also built up a healthy respect for one of the pioneers of the 'small is beautiful' trend. Anyone with the commercial temerity to offer six identically sized models across a three to one price span, which are differentiated purely by engineering content and sound quality, certainly deserves some respect.

What this review should establish is whether Royd's obvious mastery of the seven litre 'miniature' box is matched when the enclosure volume is doubled. I recollect trying an A14 the best part of a decade ago, but this *Mark II* version is very different, and currently retails for £199.

It's certainly a big enough box for the money, though undeniably an ugly one too. Devoid of any decoration, the rather squat shape gives a somewhat dated impression, harking back to the pre-designer era. What you do get, however, is a pretty solid helping of engineering content for your money, exemplified by an all up weight of 8kg. The grille is a rather hefty and severe affair, though it's nicely chamfered and doesn't have a detrimental effect on the sound.

Unlike most Royds, and despite the fact that a little foam pad inset into the rear panel looks for all the world like a damped port, this is a sealed-box design. There's nothing particularly special about the cabinet, which has a 19mm baffle and 15mm sides, is unbraced and lightly damped with absorbent. The most important extra is a heavily damped aluminium tube that braces the back of the main driver magnet to the rear panel. Besides well-tightened screws, the drivers are actually glued into place, ensuring good mechanical integrity.

The crossover is minimalist, with no

bi-wire or bi-amp option. The main driver has a hefty magnet, pressed steel frame and light 115mm paper cone with very lossy surround. The treble is handled by a small 19mm soft dome with short horn flare.

## Test Report

With sensitivity close to average, a kind amplifier loading characteristic and bass extension that is better than most, the overall parameters of the A14 II have been very sensibly chosen to suit most rooms and systems, allowing for the creation of rather more welly than most bookshelf models can normally manage.

Although the overall balance looks pretty good, the responses could certainly be smoother. The upper mid and presence region (2-4kHz) is slightly forward, and the overall treble is several shades stronger than the norm, and distinctly ragged close to the limit of audibility. Siting should be fairly uncritical, about 30cm from the wall providing roughly the right degree of reinforcement in our test room.

## Sound Quality

The A14 II passed muster on the blind listening tests, without in any way distinguishing itself. Most listeners reacted positively to the good sense of timing and the foot-tapping, well-extended bass, but also criticised the rather brash and uncomfortable presentation of high frequencies, attempting to arrive at an overall judgement that combined these observations.

Subsequent seen experiments largely confirmed the findings with the LK20 cable used for the blind tests. Substituting Cyrus solid-core sweetened things considerably, albeit at some price in bounce and speed,

while Naim NACA4 turns out to represent a very good compromise (whereas NACA5 sounds altogether over the top).

Although the rough edges remain something of an impediment to relaxed enjoyment, the very fact that the A14 II proved so transparent to these changes is itself highly impressive.

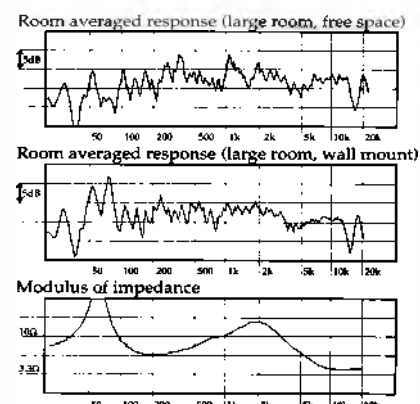
## Conclusion

Not the prettiest speaker at the price, the A14 II is nevertheless a largely successful attempt at creating a genuinely informative largish bookshelf model, despite its fair share of cosmetic and sonic blemishes. Recommendation is clearly in order, tempered by the warning that this speaker is very sensitive to the precise set-up of the system, and apt to sound aggressive and uncomfortable.

Welcome though this newly revised model is, I can't help hoping that Joe Akroyd will soon turn his attention towards something halfway between his 7s and 14s. The ten or 11 litre compact size that sits midway is justly increasing in popularity, offering a worthwhile volume increase over the miniatures without bringing in too many of the extra engineering difficulties of a 14 litre enclosure. They look a lot prettier too.

## TEST RESULTS

Size (hwxwd)	40x26x23cm
Weight	8kg
Recommended amplifier power	15-70W
Recommended placement	open frame stands 30cm from wall
In room averaged response limits 50Hz-10kHz	+/-6dB
Large room/space LF rolloff (-6dB ref midband)	30Hz
Large room/wall LF rolloff (-6dB ref midband)	30Hz
Large room output at 20Hz (ref midband)	-10dB
Estimated midrange sensitivity (ref 2.83V, 1m)	87dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£199



# Royd Sapphire

ROYD LOUDSPEAKER COMPANY LTD, UNIT A6, STAFFORD PARK 15, TELFORD, SHROPSHIRE. TEL: (0952) 290700



The *Sapphire* is but one of about half a dozen different Royd models that share more or less the same little seven litre 'miniature' enclosure. At £200, it is in fact the middle model in the most recently introduced threesome, all featuring a curious rear port/damper made from a massive vibration absorber.

In many respects it's a cost-pared version of the estimable *Sintra*, a personal favourite of this reviewer that was covered in issue 90. Both share the same rather special little main driver, the *Sapphire* economies being found in the omission of mass damping on the enclosure panels, and the substitution of a less costly tweeter.

One thing that hasn't changed is the good quality real wood veneer wrap, which is still quite unmatched by even the best vinyl prints, both in appearance and to the touch. But then you expect to find a few luxury touches if you're paying £200 for something this small.

To one already conditioned to lifting the little 7.5kg *Sintras*, the *Sapphire* seems distinctly less solid, but in fact 5kg is itself pretty substantial for a box this size. The main driver has no dust cap to protect the magnetic gap from possible pollution, so the fitted foam grille is a permanent fixture. Its appearance is perhaps a matter of taste, though the acoustic transparency of the foam is invariably excellent.

The unusual Royd main driver has a tiny 90mm paper cone driven from a 19mm voice coil and a generous magnet. The rigid cast frame is nicely open at the back, and has no fewer than eight fixing holes. All eight rather diddy wood screws were pretty well tightened into the MDF baffle; this tough composite, some 13mm thick, making the whole box very rigid.

The inside is lined with light wadding, and the heavy rubberised ventilated port

acts as a brace/damper by being tensioned against the magnet. The tweeter is a Vifa-sourced 19mm soft dome, and the drivers are fed through a simple hardwired crossover behind the 4mm input terminal pair. The matching open frame stand looks good value at £79.

## Test report

Sensitivity is a generous 88dB, aided and abetted by a nice easy load for the partnering amplifier, but compromised by some pretty obvious limitations towards the bass end of the spectrum, due to the limited size of both enclosure and driver.

Accepting that there's nothing of consequence below 50Hz, the overall response trends aren't at all bad, but are certainly far from perfect, and also differ markedly from the norm. Optimum bass balance should be achieved, as the manufacturer suggests, about 15-30cm from the wall.

This brings the midbass level, aided and abetted by the port resonance, up to match the midrange. But there's no avoiding the broad loss of energy through the two octaves comprising the upper bass and lower midrange, and that in turn leaves the next octave and a half somewhat exposed. There's a slight discontinuity at the crossover point itself, but no suckout, and treble output thereafter is unusually flat and extended.

## Sound quality

The *Sapphire* received a very uneven reaction from the listening panel, the lack of body and bass weight receiving due criticism from all while several panellists also found the mid and treble altogether too forward and aggressive.

However, despite these obvious

cosmetic deficiencies, extended hands-on listening revealed significant positive qualities besides. The midrange and treble is exceptionally fast and coherent, with excellent timing, and this in turn helps break down the barrier between illusion and reality to a quite remarkable degree, given a good enough source. The *Sapphire* is musically very informative - but also brought astonishing realism to a Nicam Test Match live broadcast.

Going over to the Royd from a more average loudspeaker can be a bit of a shock. The upfront presentation is initially discomfiting, but given a few minutes of acclimatisation and the return to the previous speaker brings a real sense loss, as the glimpses of reality give way to an altogether more prosaic - if more tonally accurate - presentation.

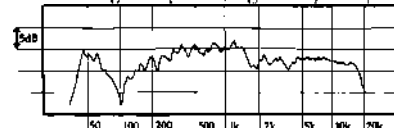
## Conclusion

Like others from the Royd stable, the £200 *Sapphire* has a somewhat controversial performance. Lack of genuine weight and power beneath a rather projected midrange can make for an edgy and uncomfortable experience. But the sheer speed and coherence can also be captivating. On the end of a good quality, carefully chosen system, there's no speaker at the price known to the author that can create such a convincing illusion of reality. Recommended then, but not for the fainthearted.

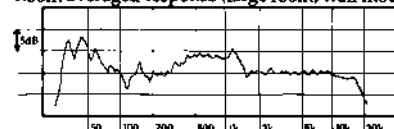
## TEST RESULTS

Size (h/w/d)	30.5x20.5x21cm
Weight	5kg
Recommended amplifier power	15-70W
Recommended placement	stands 30cm from wall
In room averaged response limits 50Hz-10kHz	+/-5dB
Large room/space LF rolloff (-6dB ref midband)	48Hz
Large room/wall LF rolloff (-6dB ref midband)	48Hz
Large room output at 20Hz (ref midband) below -20dB	
Estimated midrange sensitivity (ref 2.83V, 1m)	88dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£200

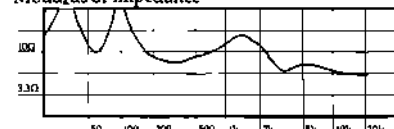
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



# Shan Shimna

SHAN ACOUSTICS, THE OLD SCHOOLHOUSE, BURNS CROSS,  
BALLYGOWAN, COUNTY DOWN BT23 6JL. TEL: 0238 521 085

**Recommended**



I'm really not sure why this has come in for review, since I recall putting it through its paces a couple of years ago (issue 71), patting it on the back and giving it a little Recommended flag at the top of the page. About the only thing that seems to have changed since is my word processing technology, so I'm going to have start all over again from the beginning.

Shan Acoustics comes from the Northern part of the Emerald Isle, so one reason I know virtually nothing about them may well be that East Kent is just about as far away as it's possible to travel without a passport. The speakers themselves are quite tiny and far from cheap (£315), but feature unusual construction and appearance and quality ingredients by way of justification.

They make a pretty enough picture too, sitting on the little matching stands which were also supplied. If my memory serves me correctly, the latter have been modified slightly since last time, and now use a heavy metal base to support the MDF pillar and top plate - getting the speaker off again after fitting proved quite difficult. And the cabinet finish is now beyond reproach - I did find one or two reproaches last time around.

The enclosure itself is moulded from a resin-based material, so that the top, base, baffle and sides, complete with cutaways for the drivers, are all in one piece, with just the flat back added later. The material is very dense, and the walls are about 15mm thick, so the whole thing feels very solidly built.

Good from the point of view of mechanical rigidity, this technique also lends itself to unorthodox shapes, which not only look attractive and distinctive but also confer some acoustic advantages. The *Shimna* is therefore a truncated

rectangular pyramid; baffle and both sides taper from the small plinth base up to the even smaller flat top, with nicely radiused baffle edges. All of which serves to distribute internal reflection modes (just as well since there's no internal damping whatsoever), provide optimum lateral dispersion and improve main and treble driver time alignment. The speaker is normally supplied in the buff, but a foam grille is an optional extra for the squeamish.

The drivers were fixed pretty tightly, using machinehead bolts (of rather limited purchase) into T-nuts. A tiny little port tuned to 60Hz is fitted to the back panel, along with bi-wire/amp terminals and a fairly simple hardwired crossover, connecting to the drivers with solid-core cables. The main driver has a cast alloy frame, a decent enough magnet and a tiny 90mm plastic cone, while the tweeter is a 19mm soft plastic dome.

## Test report

The measurement procedures have changed more than the loudspeaker itself over the past couple of years. The *Shimna* records an identical impedance trace, representing a nice easy amplifier load, and a similarly low sensitivity rating of 84dB (which will make up for the easy load, demanding plenty of volts rather than amps). Notwithstanding which, bass extension is about as close to nonexistent as it's possible to get away with.

Nevertheless, with a little help in the midbass from a wall carefully placed about a foot behind the speaker, it's possible to obtain a pretty flat overall balance in-room, albeit with sufficient variation to introduce some colour and individuality. Whatever the final bass alignment, the midrange is a shade forward, the presence

recessed, and the mid-treble distinctly exposed - much the same as last time, in fact.

## Sound quality

Again much as before, the *Shimna* emerged with credit from the blind listening tests. Despite the obvious lack of bass welly, grunt or power, low frequencies are precise, controlled and well timed, without unwanted overhang though with a mild coloration that's all its own.

This clean, dry bass tends to draw attention to the *Shimna*'s most immediately obvious characteristic, which is a top-py, bright and slightly spitty balance that tends to exaggerate sibilants. It's perhaps a little less well defined and focused than MA's comparable *Studio 5*, for example, but has an inherent sweetness that usually manages to stop short of aggressiveness. There's a touch of nasal coloration, and dynamics are rather pinched, especially through the bass. But there's fine coherence and information retrieval for all that. Voices have unusual realism despite the lack of weight, though serious loudness is not on the agenda.

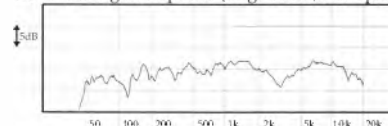
## Conclusion

This review has simply served to confirm the validity of the original findings, noting the improvement in presentation and finish. This is an attractive design in almost every respect, lacking only in bass welly and loudness capability, and characterised by a lack of boxiness and a slightly bright balance. Recommendation confirmed.

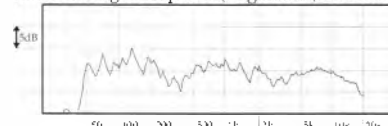
## TEST RESULTS

Size (h x w x d)	31 x 21 (max) x 17 (max) cm
Weight	6kg
Recommended amplifier power	20-70W
Recommended placement	stands quite close to wall
In room averaged response limits 50Hz-10kHz	+/- 5dB
Large room/space LF rolloff (-6dB ref midband)	50Hz
Large room/output LF rolloff (-6dB ref midband)	48Hz
Large room/wall LF rolloff (-6dB ref midband)	below 20dB
Estimated midrange sensitivity (ref 2.83V, 1m)	84dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£305

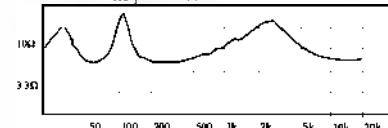
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



# Wharfedale Diamond IV Recommended

WHARFEDALE LOUDSPEAKERS LTD, SANDLEAS WAY, CROSSGATES,  
LEEDS LS15 8AL. TEL: (0532) 601222



Long one of Britain's favourite loudspeakers - from Britain's best known loudspeaker specialist - the *Diamond* is now entering its fourth generation, complete with trendy metal dome tweeter and a modest price increase to £120.

Despite its undoubted commercial success, it's not a model that has found particular favour with *Choice* loudspeaker reviewers or their listening panels over the years. Now that the *Diamond's* top end is handled by a variation on the 504's metal dome, there seems a fair chance this situation could change.

There are plenty of other detail differences in the new model too, even if the basic configuration of a tiny reflex-loaded miniature designed for close-to-wall mounting remains much as before. Call it a bookshelf speaker if you want to, but have no doubt that it will only give of its best when properly stand mounted, so allow sufficient in the budget to cover for this.

The cosmetics are distinctly smarter and happily rather more restrained than earlier *Diamonds*. The grille in particular is new, different and rather elegant, the cloth being fitted behind wide horizontal slats that add a touch of designer style while being slim enough and close enough to the baffle to minimise any acoustic interference. It looks pretty enough from the front with or without the grille, since the MDF baffle has a nice textured vinyl finish and radiused verticals. Driver mounting hardware is concealed beneath a discreet plastic trim.

The decision to stick with a traditional wood-based enclosure is a deliberate one, since Wharfedale feels this still offers optimum all-round performance. Boxes

as small as this are inherently rigid, the carcass here being 12mm chipboard, while the more important baffle is altogether sturdier stuff, at least 20mm thick. All is - and feels - very solidly put together, with copious glue sealing up the internal edges. A small tube port exits at the rear, behind the tweeter.

The 19mm metal dome tweeter and the 95mm textured plastic cone main driver, with pressed steel basket and generous magnet, were both well screwed in place. The crossover is a modest enough affair, tag connected to the drivers and single terminal pair.

## Test report

Although there's a suggestion of the 'three-humped' characteristic, the wall-sited room curve is remarkably well balanced, from 50Hz right up to 1.5kHz, though there's some loss of energy around the crossover and focusing of the tweeter output at around 7-9kHz on our far field measurement.

Sensitivity is a little below average, and bass doesn't realistically extend below 50Hz in-room, but the load which the amplifier sees will save even the least capable from embarrassment, mid-system owners might note. The grille is innocuous and the listening axis uncritical, though it's better to use high stands and avoid above-axis listening.

## Sound quality

The *Diamond IV* did pretty well overall in the listening tests, although opinions were somewhat divided. The balance is a little thin and a shade abrasive, leading to occasional over-enthusiasm on sibilants and surface noise, but adding some gusto

and incisiveness to CD.

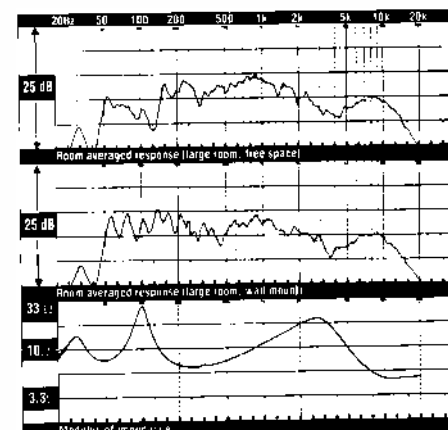
But for the most part the sound is smooth, pleasant, controlled and tidy, if also a bit 'sat upon' dynamically and a trifle boxy with it. Coherence and speed could both be improved, but the bass nevertheless has an attractive 'bounce' and timing is pretty good. Genuine scale and weight are inevitably in short supply, so the soundstage stays a little constrained, leaving one aware of the small box size - and indeed the box itself - which tends to constrain both transparency and depth somewhat.

## Conclusion

The *Diamond* has matured into a very competent loudspeaker that now makes an impressively civilised sound from a tiny and very prettily attired enclosure. It more than passes muster amongst the UK's leading budget miniatures, and clearly deserves confident Recommendation, even though in my view and under our conditions it doesn't quite reach the top of this highly competitive class.

## TEST RESULTS

Size (hwxwd)	27x18x18.5cm
Weight	3.5 kg
Recommended amplifier power	20-60 watts
Recommended placement	rigid stands close to wall
In room averaged response limits 50Hz-10kHz	+/-6dB
Large room/space LF roll-off (-6dB ref midband)	48Hz
Large room/wall LF roll-off (-6dB ref midband)	48Hz
Large room output at 20Hz (ref midband)	below -20dB
Estimated midrange sensitivity (ref 2.83V, 1m)	86dB
Impedance characteristic (ease of drive)	very good
Typical price per pair (inc VAT)	£120





# Wharfedale 505.2M

WHARFEDALE LOUDSPEAKERS LTD, SANDLEAS WAY, CROSSGATES, LEEDS LS15 8AL. TEL: (0532) 601222

**Recommended**



The 505.2 has been one of the mainstays of the Wharfedale catalogue for the past several years, aided and abetted no doubt by the fact that this largish bookshelf model not only looks like plenty of loudspeaker for the money, but also received a Best Buy rating when reviewed in *Choice* nearly three years ago (issue 66).

Now we're re-examining the 505.2 dressed (apart from the back panel) in a new suit of clothes, the M suffix accounting for an extra £60 on the price and referring to a real and decidedly reddish mahogany veneer that is currently just the thing to put in today's lounge over on the European mainland.

Whether or not it will fit in with your decor, it certainly makes an attractive change from the mass of black plastic and wood that has become such a tedious norm in the UK. And the move from plastic to veneer board facing will also of course change the behaviour of - and presumably stiffen - the various panels to which it's applied.

The shape is the slightly squat stereotype of a largish 'bookshelf' model, the 9kg weight and the 20mm wide rim around the inset (for stiffening) rear panel attesting to the solidity of the carcass. The thick-framed grille should perhaps be left stored inside the carton, the baffle being veneered and the drivers neatly finished with silver trimwork and additional protection for the tweeter's metal dome, the most ugly feature being the grille retaining lugs.

I haven't the remotest idea whether the drivers are well secured, nor what lies inside the box, simply because I haven't the remotest idea how the drivers are secured.

I understand that a bayonet fixing is used, and that the inside is therefore

strictly non-user-serviceable - some sort of special tool being needed. There's no port to peer down - it's a sealed box - and there isn't even the option of removing the usual plastic terminal block, again because there isn't one - just a pair of terminals poking through the inset back panel.

All I can say for sure is that the main driver has a quite large (140mm) textured plastic cone with wide surround termination, and the tweeter uses a 19mm metal dome.

## Test report

The test programme has changed quite considerably since the original 505.2 review, so direct comparison is difficult. However, the impedance appears to be much as before, and the responses show much the same overall trends so presumably any changes are minimal.

The 87dB sensitivity is close to average, and the impedance only falls to a lowish figure at high frequencies where energies tend to be dropping. The reflex loading with its fast ultimate rolloff takes serious bass extension off the agenda, though some worthwhile in-room output remains at 30Hz, the port being tuned to a lowish 35Hz.

Indeed the output around 40-50Hz does look a shade strong, making room matching a bit tricky. Too close to the wall will tend to be boomy; too far away leaves the upper bass and lower mid a little strong, so somewhere in between should work best.

Wherever, there remains a fair amount of local unevenness, and although the crossover region is well enough handled there's certainly a touch too much relative output through the mid treble, and a fairly early ultimate rolloff.

## Sound quality

Albeit with a couple of dissenters, the 505.2M received comfortably above average ratings in two separate listening test presentations. The real strength of this speaker lies in its balance. Not just the frequency balance, which is respectable though unexceptional, but in the way all the various parameters have been blended to give a mix that avoids the worst pitfalls while remaining evenhanded, engaging and lively on the majority of material.

The balance is basically good, and voices are nicely focused, with an attractive open quality, if slightly thinned and nasal in colour. Timing is pretty good, though the bass could certainly be more authoritative, and dynamics generally are slightly softened. There is also a measure of congestion on complex material, and this tends to mask lower level information, limiting transparency and subtlety. Additionally, the treble is always a little obvious and detached, almost as if it needed to remind you there's a tweeter in there too.

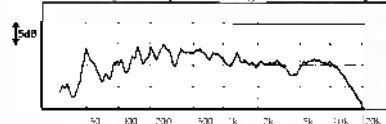
## Conclusion

Much like the vinyl version, the 505.2M is a fine allround loudspeaker that will deliver a lively and big hearted sound without being too fussy about the rest of the system. Recommendation is clearly appropriate: only you can decide whether to pay the extra for the mahogany veneer.

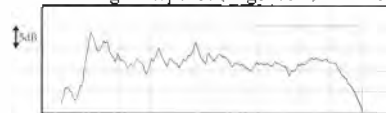
## TEST RESULTS

Size (h x w x d)	44 x 25.5 x 25.5 cm
Weight	9 kg
Recommended amplifier power	20-80 W
Recommended placement	stands 30-60 cm from wall
In room averaged response limits 50Hz-10kHz	+/- 5 dB
Large room/space LF rolloff (-6dB ref midband)	45 Hz
Large room/wall LF rolloff (-6dB ref midband)	43 Hz
Large room output at 20Hz (ref midband)	below -15 dB
Estimated midrange sensitivity (ref 2.83V, 1m)	87 dB
Impedance characteristic (ease of drive)	good
Typical prices per pair (inc VAT)	black ash £200
mahogany	£260

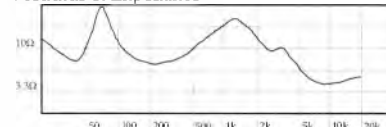
Room averaged response (large room, free space)



Room averaged response (large room, wall mount)



Modulus of impedance



# Top end

All three current Acoustic Energy models are recommended, the high prices being accounted for by truly substantial cabinet work and all metal dome/cone drive units. The pick of the bunch remains the tiny £764 AEL, a speaker that has done much to give miniatures genuine respectability.

It's the tall, narrow metal case that particularly distinguishes the Alexander SE11, a lively £299 near-miniature that is particularly suited, stylistically and magnetically, to A/V work.

The £290 Allison CD6 takes wall-mounting to its logical conclusion, the main driver of this compact and nicely finished cube-shaped enclosure firing upwards giving close wall coupling and fine bass extension and evenness.

The Alphason Orpheus is a large and attractively sculpted bookshelf model, best placed close against a wall on substantial stands, the unusual depth limiting wall coupling but ensuring modest coloration and good stereo imaging. The £1,000 pricetag is high, but Orpheus is distinguished by the use of an isodynamic (planar) type tweeter and the placement of said tweeter on its own sub-baffle above the enclosure proper.

Though not formally recommended, the £1,200 ATC SCM20 is another interesting but pricey prospect. It's small, but immensely heavy, thanks to the massive magnet used on the main driver. Lowish sensitivity and no bi-amp capability limit the attainable loudness, and a seriously powerful amplifier is mandatory.

The £799 Audioplan Kontrapunkt is an exceedingly attractive little miniature from Germany. It's not marvellous value for money, and suffers from the inevitable power, loudness and bass constraints of anything so small, but it is very sweet tempered and comes complete with a matching veneered plinth/stand that should be damped and mass-loaded with sand or lead shot fill.

The £915 B&W Matrix 805 is a compact free-space monitor aimed partly at the professional studio market. The 'matrix' honeycomb-stiffened cabinet and out-of-box tweeter ensure both low coloration and superb stereo imaging, with Slate Audio stands preferred for the supporting role.

Decidedly ugly in shape, the £350 Boston A120 is nevertheless a cunningly crafted combination of a tiny main driver and a much larger passive ABR drone cone. The end result is the mid-to-treble integrity of a small loudspeaker with a big and rich bass performance.

A generous floorstanding three-way

*This Best Buy Guide is aimed primarily at the budget price sector of the market, so the loudspeaker reviews concentrate on the more recently tested affordable models. However, for those of you with a little more money to spend here are some of the other units worth considering.*

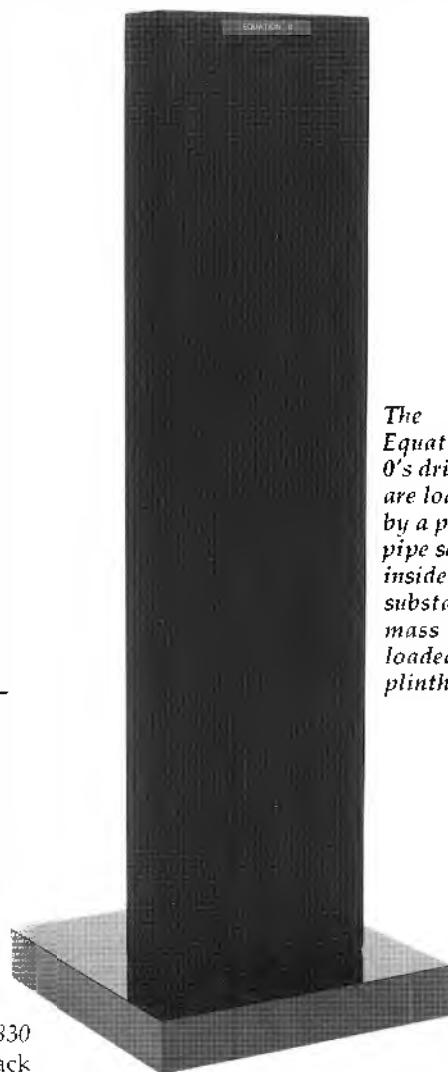
at a modest enough £399, the Boston T830 is a smooth if rather lazy and laid back performer, capable of effortlessly filling a decent size room with sound.

The £1,400 Castle Winchester uses quarter-way bass loading, somewhat akin to a horn, and has a delightfully dynamic and transparent midrange, though not quite the bass extension one expects from the size of the beautifully veneered cabinet, and can sound a little midbass heavy.

Dahlquist has always been known for providing exceptional mid and treble transparency by means of open and staggered sub-baffles. The £800 DQ8 follows firmly in this tradition, though the rather heavy and slow bass is a comparative disappointment, and the appearance might euphemistically be described as individual.

The £450 Epos ES14 had already built its reputation as a leading 'large bookshelf' stand-mount long before the Choice panel was given the chance to confirm its deserved status. The mid is somewhat forward but very informative, while the bass lacks some authority but cleverly avoids getting out of control. The tweeter — one of the first of the metal domes — is just beginning to show its age.

Undeniably pricey at £1,290, the Equation 0 is also undeniably very attractive, both in appearance and sound, the enclosure consisting of a quite small plastic



*The Equation 0's drivers are loaded by a plastic pipe seated inside a substantial mass loaded plinth.*

pipe seated in a substantial mass-loaded plinth. The main driver and internal volume are no greater than a small bookshelf model, but fine ingredients ensure a sweet and dynamic transparency that is very seductive.

Heco designs show a particular mastery of room matching, an area where many rivals get it all wrong, and the £430 Interior 430 is a fine example of a generous floorstander that gives good bass extension without any boomy tendencies. Elsewhere the sound is well balanced if a little lacking in dynamic excitement.

The £500 JRT AD1 is a classic stand-mount free-space monitor in appearance, and is very nicely veneered to boot. The sound is not entirely uncolored, but it is lively, dynamic and pretty transparent too, which makes for one of the more communicative, better value models around.

The £1,295 KEF 104/2 was so radical and advanced when it first appeared that it has survived much longer in production than most of its original peers. This substantial multi-driver floorstander goes loud without effort, delivering fine stereo imaging and impressive dynamics.

The £1,100 Linn Kaber is a very smart,

slim and physically discreet floorstanding wall-mount, with two identical main drivers under subtly different loading from the immensely rigid cabinet. Bass extension is good for the size and dynamics are very impressive, though the upper part of the frequency range can sound a shade relentless and unforgiving.

Meridian has two interesting new *Argents*, compact, passive and distinctly hi-tech speakers that are a shade expensive for formal recommendation, but which are beautifully finished and, in the case of the £995 *A1*, unusually and attractively shaped. The sound is smooth, sweet, even and uncoloured.

Monitor Audio's £300 *Monitor 11* is a tall, slim stand-mount with two small main drivers, one just operating over the bass range. Used well clear of walls and floor, it delivers a lively and engaging sound with plenty of urge, if a little lacking in subtlety.

The same company's tiny £650 *Studio 5* just scraped a recommendation, although rather pricey the all metal dome/cone drivers deliver remarkable presence focus and vividness which is very exciting, if ultimately perhaps a little wearing.

Something of the same is true of the £800 Naim *IBL*, a tiny, very discreet yet complex floorstanding wall-mount which possesses remarkable speed and fine musical coherence, but also has a somewhat forward and aggressive balance.

Amplifier specialist NVA has a number of unusual cube-shaped loudspeakers that owe something to the Allison school of acoustic wall-loading. The end result here is a somewhat aggressive and coloured mid and treble, but unusually fine bass for the box size; stand selection is critical.

The £650 Philips 825 is a large multi-way floorstander that looks distinctly old fashioned in the context of the current British marketplace, though such a configuration is still common enough in Europe. A ribbon tweeter sweetens the top end, and the overall balance is impressively smooth and even, though loudness and bass extension are unexceptional considering the large size of the rather plasticky box.

Quad's unique full range *ESL63* electrostatic loudspeaker is an audio legend that now just tops £2,000. Though loudness and bass extension are unexceptional, the unorthodox approach delivers a transparency and stereo image quality that is probably unequalled, and is certainly very seductive in its own quite distinct way.

Rogers is one of the guardians of the BBC tradition in monitoring loudspeakers,

models such as the £450 *LS7t* and £612 *Studio 1a* following a long tradition of compact free-space stand-mount monitors with fine midband and stereo imaging qualities.

The £1,570 Roksan *Darius* may be expensive, but it has several unusual and worthwhile features, including a properly integrated frame/stand, an external decoupled crossover and a mechanically decoupled tweeter. Free space siting and low sensitivity gives great transparency and well extended bass, though a powerful amplifier is mandatory.

Royd's £330 *Sintra* and £485 *Apex* share much the same drivers, including a very advanced small bass/mid unit that has much to do with the impressively lively sound that both produce. Whereas the *Sintra* is a miniature with mass-loaded enclosure panels and the need for a decent stand, the *Apex* is a floorstander, complete with spiked frame support and a transmission line loading technique that helps augment the bass.

An exquisitely shaped and beautifully finished baffle does much to distinguish the £629 Ruark *Talisman* from the competition aesthetically, and plays a part in the fine, lively sound quality of this compact wall-mount floorstanding two-way.

SD Acoustics' £845 *OBS* and £1,350 *SD1* are both three-way free-space floorstanders, but unusual cabinet construction enables the midrange driver to operate under open baffle conditions, which in turn brings fine midband delicacy, dynamics and freedom from boxiness. The bass is much less interesting, while the *SD1* (and now a variation of the *OBS*) are fitted with ribbon tweeters.

Only a genuine uncompromising en-

thusiast could have come up with something as weird and wacky as the Seventh Veil *System IV*. The small and heavily damped head unit uses four tiny (50mm) metal cone drivers as a full range line source, while a hefty metal stand incorporates transmission line loading to augment the bass. The result still isn't in the headbanging league, but *System IV* has a beguiling transparency and delicacy that is its own reward.

Spendor loudspeakers are steeped in the BBC inspired tradition for supremely natural voice register monitoring, the £800 *SP1* setting standards for midband delicacy and precision and the subtleties of stereo imaging that few can match.

Carrying on in the long-standing tradition established by IMF, TDL is the acknowledged master of transmission line bass loading, the £600 *Studio 1* and £1,800 *Monitor* being fine examples of the type, producing rolling extended bass and well balanced mid and treble with fine stereo imaging from free space locations.

The Townshend *Glastonbury* variations use advanced metal cone/dome drivers in massively dense ceramic-based compact floorstanding enclosures. Bass is very clean, dynamic and well extended, though power handling is low so loudness is limited; the mid and treble are exceptionally well focused, though somewhat coloured.

£695 is an extravagant price tag for the pretty little Vecteur *Premiere*, but this French audiophile compact has great sonic charm. The midband is a little projected, but coherence and transparency both reach a high standard, and the bass is unusually enthusiastic and quick for such a small model.

**B&W's Matrix 805 features a rather unusual tweeter arrangement.**



**B**uying a tuner is probably the last thing on your mind right now. After all, with a choice between cassette, CD and vinyl sources already at your disposal what possible incentive is there for old-fashioned radio? Well, if you haven't tuned into the airwaves for a few years then you've a treat in store. For the stereo FM band now offers a wider selection of music, news, arts, entertainment, documentary, business and minority interest programmes than ever before.

Whether it's a live orchestral broadcast from *Radio 3*, chart-hitting pop from *Radio 1*, a documentary on pebble collecting courtesy of *Radio 4* or sizzling brass from *Jazz FM* there is, quite literally, something for everyone. And, assuming you've already got a TV licence, all this 'software' comes free of charge!

It's all there, seven days a week and, often as not, 24 hours a day, hurtling through the very air we breath - so why let it slip your grasp? Nobody's suggesting you spend a fortune tapping into the

IF bandwidths, for instance, the former helping to filter out any spurious 'ghost' stations caused by cross-modulation between two 'real' stations. This is all well and good, but restricting the RF/IF bandwidths also has the effect of compromising stereo and increasing audible distortion. So, you may experience less interference but what you do hear is necessarily compromised in quality. Ho hum.

### The missing link

This brings us smartly along to the importance of a decent FM aerial - the tuner's first and only line of defence from an atmosphere that's polluted with RF garbage. Most tuners are supplied with a length of T-shaped wire which acts as a simple and thoroughly indiscriminating dipole. However, you'll only realise the true potential of your tuner when it's hooked up to a decent outdoor aerial. And this advice applies as equally to £100 tuners as it does to the legendary £5,000+ *Day Sequerra*!

Be prepared to sink some 20 to 30 per cent of funds on an aerial but don't forget to partner it with a high quality 75ohm unbalanced downlead. The coaxial construction of this cable affords far greater immunity from interference than the open-plan layout of a 300ohm balanced lead, for instance. Electrically too, it's ideally matched to both the tuner's 75ohm FM input and aerial's characteristic impedance.

Only the central dipole section of the aerial is linked to the tuner. The surrounding rods or elements are parasitic but serve a vital role both in directing incoming signals towards the dipole and scattering unwanted transmissions that approach from the side and rear. This enables the aerial to reject RF signals that are reflected off nearby buildings or hills (so-called multipath signals) while concentrating on those within line of sight.

But here lies the rub. The more elements you have the more selective is the aerial, providing a beefy output from signals arriving head-on but shunning those impinging off-axis. Whacking great FM rigs (like the *Galaxie TE Model 17* used for our listening tests) offer a very narrow acceptance angle and will limit you to just one or two FM transmitters in its line of sight. If you need this sort of tight selectivity but also want to tune-in to a variety of transmitters then the rig must be mounted on a rotator, a motorised gadget that enables you to point the rig in any direction. Costs are likely to run into hundreds of pounds but if you live in a difficult reception area, and have the inclination, such a rig would not be out of place with a quality £200 tuner.

Yet the vast majority of us will be more than adequately served by a fixed four or five element FM aerial costing around £30. The difference in reception and sound quality between this and the supplied T-wire will thoroughly justify any extra hassle. Of course, if you don't fancy clambering over chimney stacks then flip through the Yellow Pages to find a reputable installation service. That's if your local hi-fi dealer cannot help you out, of course! However if you don't fancy being stung for labour costs and have a head for heights you can purchase a DIY aerial pack. But do weigh up any savings here against your confidence on the roof. One loose tile and your first taste of quality radio could be from a hospital bed.

# Choosing and Using ... Tuners

*Paul Miller offers tips and advice for those looking to purchase a tuner.*

ether, just £100 can provide you with access to all three wavebands along with the convenience of automatic and preset tuning. A modern digital synthesizer tuner will guarantee spot-on tuning because the broadcast frequency is compared directly to a quartz crystal reference within the unit.

### No more drifting

Neither should the tuner drift after it's homed-in on a station, one problem you'll still face with even the most up-to-date analogue designs. Still, by avoiding the discrete frequency steps (typically 50kHz for FM) employed by a digital unit, an analogue radio can be fine-tuned to optimise noise, frequency response and distortion. Because of this many radio buffs still swear by the sound of their analogue tuners and are quite happy to forego the convenience of presets, automatic tuning and other luxuries!

Nevertheless over the last few years the traditional dial-and-scale tuner has been squeezed from the mass market by increasingly stiff competition from flexible and swish-free digital designs. So much so that the tuner 'high-end' starts around £200 these days, a breakpoint where you can expect improved RF performance along with even greater flexibility. The ability of a tuner to sort through a tangle of broadcasts is now more important than ever, particularly as the FM band is becoming very crowded.

Stereo FM certainly deserves the title of 'hi-fi' (unlike the mono LW/MW AM bands), but the sheer wealth of programming could force modern tuners to compromise sound quality in an effort to tighten their selectivity. Many tuners will offer switchable RF and



# Denon TU260L

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

**Best Buy**



Bold claims accompanied the introduction of Denon's latest integrated amplifier, but perhaps its enthusiasm might have been better directed at this new budget tuner. Destined to retail at £100 and equipped with a skeleton crew of features, the TU260L is easily enough overlooked. But that would be a mistake, for behind the bland alloy fascia and simple fluorescent display lurks a design that's surprisingly capable.

The tuner certainly sounds unlike any other in this test, but then it uses a combination of AM/FM receiver and mpX decoder ICs (Toshiba and Sanyo) that are specific to this model. Neither has Denon skimped on the all-important RF 'front-end', choosing to buy-in a ready-made FM pack from Mitsumi. Clearly the pennies have been thoughtfully allocated, for there's not much to go around when the budget is this tight!

As far as features and facilities are concerned, you'll have to make do with a 20-station AM/FM memory together with auto and manual tuning. That's your lot I'm afraid. There's no signal strength meter or wide/narrow IF selection, but at least Denon has provided pukka 300ohms AM and 75ohms FM aerial connections.

## Lab report

Second only to Arcam's *Alpha*, the TU260L is usefully sensitive and requires only 106uV (40.5dB/uV) RF to yield a stereo S/N ratio of 65dB. Neither has this been achieved at the expense of selectivity (77dB at +/- 400kHz) or its susceptibility to image signals which are squashed by more than 100dB! This is a fabulous start for the TU260L.

Full quieting is equally impressive at -70.8dB (A-wtd) extending to -75.4dB in mono mode, though both figures are beyond the BBC broadcast spec. Stereo separation is pretty good through the midband but perhaps it's the FM frequency response and distortion that tells us most about the sound of this tuner.

The 0.9dB dip at 5kHz followed by the

+0.7dB peak at 14kHz seems due to Denon's rough LC pilot filtering and this, in itself, may well colour the upper octaves. On this occasion, the level of harmonic and intermodulation distortion are about equal at 0.28 per cent and, as far as the audio range is concerned, pleasant-sounding even-order products tend to dominate.

This is reflected on the 3D plot which also picks up a higher level 38kHz subcarrier than might be suggested by the numerical results (a suppression of 66dB was measured). This is most likely caused by an upset in the active pilot or subcarrier cancelling circuit by the dynamic, and therefore realistic, nature of the 20Hz to 20kHz sweep.

## Sound quality

Following hard on the heels of the Aiwa's down-trodden '003, this tuner provoked an immediate and very positive reaction from the assembled listeners. Our panel remarked enthusiastically upon its very much more open, detailed and, above all, communicative presentation.

Subtle tonal features of piano, brass and strings were now drawn out in a way that made its music all the more captivating. Ambient details seemed more obvious too, almost as if the tuner were deliberately enhancing the natural acoustic of the broadcast.

On the other hand, we did detect some extra background noise, but even this was a relatively innocuous hiss rather than a harsh or gritty hash - intrusive but not uncomfortable, remarked one panellist. In absolute terms, this tuner certainly lacks the refinement of, say, the Technics ST-G70L (see page 147), yet despite being a little rough about the edges, there's a basic honesty and enthusiasm about its sound that seems hard to resist.

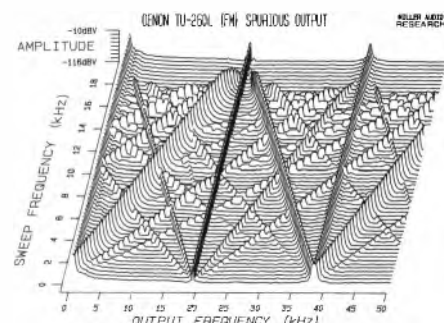
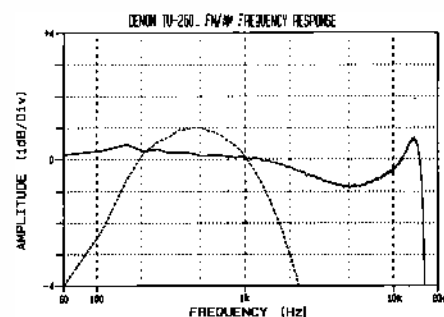
## Conclusion

Denon has come up with a winner in the TU-260L. This is a tuner that offers the essential facilities of a modern design

together with an FM performance that wouldn't look out of place in a design at £200. It's not 100 per cent accurate, but what it does is highly enjoyable! I feel a Best Buy coming on...

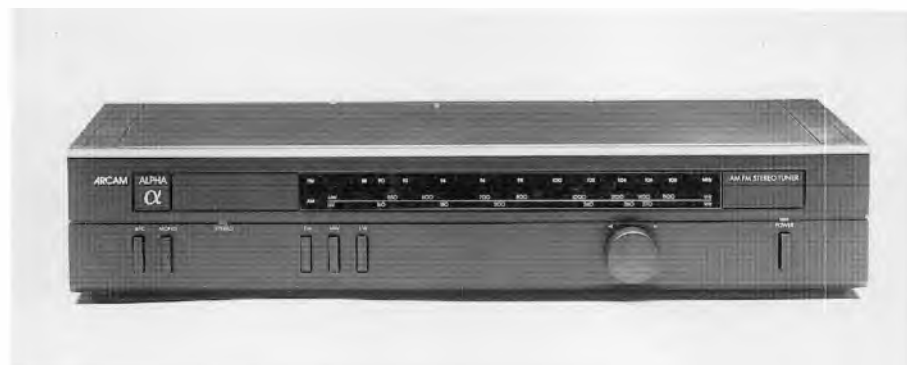
## TEST RESULTS

Muting Threshold	1uV
Sensitivity, 50dB S/N (mono)	3.0uV
50dB S/N (stereo)	23uV
65dB S/N (stereo)	106uV
Ultimate S/N ratio, mono	75.4dB
stereo	70.8dB
Stereo Separation, 1kHz	37.0dB
15kHz	31.1dB
Alternate channel selectivity	77dB
Second channel rejection ratio	>100dB
Pilot Suppression, 19kHz	43.4dB
38kHz	66.0dB
FM Stereo Distortion, THD	-51.8dB
IMD	-50.7dB
AM Rejection Ratio	-64.2dB
AM Distortion	-42.4dB
Maximum Output (peak modulation)	1.44V
Typical Retail Price	£110



# Arcam Alpha 2

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



At a time when hi-fi components are becoming more flexible and convenient, it's sobering to reflect upon the good old days of analogue technology. Arcam's *Alpha* tuner is certainly something of a home-grown classic and despite being remodelled to match the rest of the *Alpha* range, the *MkII* version has lost none of its charm. The insides, you see, remain pretty much unchanged.

Simplicity is the key here. Each and every station has to be tuned in by hand using a small, nicely-weighted dial which drives a tri-colour LED across a conventional three-waveband scale. The search for FM stations is monitored by this mobile LED, changing from red to amber as it sniffs out the edges of a broadcast before settling on green once it's spot-on target. Once you've located a favourite station, it's best to engage the AFC facility and hold it firm. Don't use AFC when fine-tuning a weak station though, for it could pull the *Alpha* towards a stronger, adjacent broadcast.

And that, as they say, is your lot. The only unusual feature of the *Alpha 2* is its AM antenna input which, confusingly, comprises a pair of phono sockets. Inside, it's all basic but tried-and-tested stuff including a commercial RF front-end. In this respect, this analogue tuner is no different to its digital cousins.

Except here the tuning-knob directly adjusts the voltage that's applied to the vari-cap diodes and so has a direct and continuous influence over the tuned frequency. In a digital design the voltage is synthesised in discrete steps by comparing the tuned frequency with the desired frequency via a quartz crystal reference.

## Lab Report

If you've grasped this much then you'll appreciate that an analogue tuner like the *Alpha 2* may be fine-tuned in a way that's impossible with a digital design. Distortion, for instance, could be squeezed down to 0.2 per cent on FM but then the

frequency response 'peaks' by +1.25dB at 10kHz, as you can see on the graph. Re-tune the *Alpha* for a flatter FM response and distortion climbs slightly to 0.4 per cent. As you can appreciate, using an analogue tuner is still something of a juggling act!

Nevertheless, there's no disputing the high sensitivity of the *Alpha*, which proved itself to be the most responsive in our test. Just 66uV RF (36.4dB/uV) is all that's required to yield a full 65dB stereo S/N ratio (A-wtd), while higher RF inputs (>500uV) will extend this up to 70 or even 71dB. Chalk one up to Arcam.

On the debit side, I felt its second channel rejection was rather worse at 55dB, equivalent to an image station strength of just 1.4mV. The 3D plot also looks rather busy. Arcam's filtering could obviously stand improvement but at least most of the audible distortion is lower-order grunge from the 19kHz pilot instead of high-order products tracking in from the 38kHz subcarrier.

## Sound Quality

On test it was possible to fine-tune the *Alpha 2* and obtain a delightfully smooth, almost silky-smooth presentation that accentuated many subtle midband details. It seemed to relish female vocals in particular, enhancing qualities that were all but missing with the cheaper digital tuners. There was simply less of a blur surrounding these gentle nuances, enhancing the focus, articulation and stereo spaciousness of both our pop and classical programme.

Re-tuning revealed a brighter sound that grabbed the attention of our listening panel, the *Alpha* now projecting its music in a more forthright manner. Yet it could also become brash at high levels, a condition that could be fatiguing in the long term. Still, however much we tweaked the tuning, the *Alpha* was not especially strong in bass or treble performance - it's certainly the lush midband that proves its strongest asset.

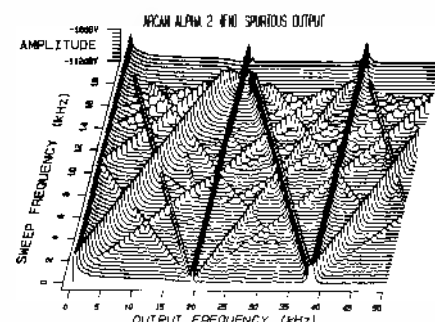
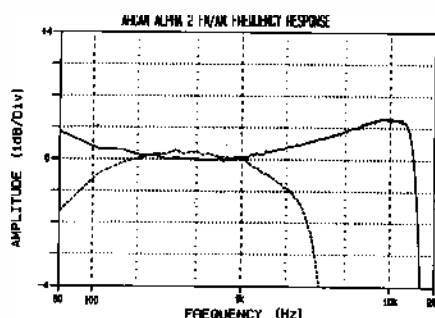
## Recommended

## Conclusion

The fact that our listeners guessed this was an analogue tuner by its rosy vocal quality has to stand for something! As a result, they thought it best suited to sympathetic, mellow-sounding systems where its smooth and typically undemanding presentation would go down a treat. It's simply a matter of weighing the *Alpha*'s flexibility in fine-tuning against its lack of convenience features. The sub-£200 tag tips the balance in favour of Recommendation.

## TEST RESULTS

Muting Threshold	1.5uV
Sensitivity, 50dB S/N (mono)	2.5uV
50dB S/N (stereo)	13uV
65dB S/N (stereo)	66uV
Ultimate S/N ratio, mono	76.4dB
stereo	70.5dB
Stereo Separation, 1kHz	36.3dB
15kHz	30.5dB
Alternate channel selectivity	69dB
Second channel rejection ratio	54.9dB
Pilot Suppression, 19kHz	53.2dB
38kHz	44.1dB
FM Stereo Distortion, THD	-54.0dB
IMD	-36.3dB
AM Rejection Ratio	63.6dB
AM Distortion	-49.8dB
Maximum Output (peak modulation)	1.049V
Typical Retail Price	£180



# Harman Kardon TU9400

**Recommended**

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



If you ever needed an excuse to splash out on a costly tuner, then this is it. In fact, the *TU9400* is the cheaper of Harman's two new tuners, its top *TU9600* model offering full remote control plus advanced tuning facilities, if you're prepared to pay the £100 premium. But let's concentrate on the *TU9400*. The contoured alloy fascia is designed to complement HK's current range of CD players and cassette decks, but it's a style that really hits home when applied to a narrow profile like this tuner.

All the function keys are chamfered to coincide with the gentle curve of the display window, behind which lies full frequency, preset number and status information. Up to 24 stations can be stored using just eight presets and an ABC shift key, just as tuning can be performed in manual or auto (seek) modes. Tuning is especially slick with this model, the display hurtling through FM, MW or LW bands to pause with a jarring confidence on any station of sufficient strength. However, with its muting threshold set as high as 15uV, the tuner can afford to be confident!

Features like RF and IF band selection, DX and local front-end settings are notable by their absence, though HK has provided a hi-blend option that trades stereo separation for lower noise at high frequencies. In fact, with a L/R separation of just 6dB at 15kHz, the treble performance descends to near-mono with hi-blend in tow. A row of signal strength beacons are also provided and although the first segment is permanently lit (cheapskates!), the others span a usefully wide 7-500uV range.

## Lab Report

Harman has bought in a compact RF front-end from Mitsumi while relying on tried-and-tested Sanyo ICs in the FM detection and decoding circuits. It's a fairly sensitive combination, matching Sony's tuner, for instance, and achieving full quieting before the final (500uV) beacon is lit. The maximum stereo S/N ratio is not state-of-

the-art at 68dB, but it's still four or five dB ahead of the BBC's broadcast specification, so I'll not winge unnecessarily.

Distortion is pretty low, too, clocking in at 0.11 per cent but appearing as an extended 'carpet' of harmonics that litter the entire noise floor. These and second to fourth-order intermodulation products can be seen penetrating the audio band on the 3D plot. The FM frequency response has an innocuous 0.6dB lift at 10kHz while the AM band is rather too extended into the low bass. Still the excellent 0.16 per cent THD via AM is testament to the potential of Sanyo's LA1245 AM receiver chip. Oh yes, the tuner's output is unusually high at over 3V and might cause problems with some older amplifiers.

## Sound Quality

No sooner had the *TU9400* homed-in on our simulated FM broadcast than we were treated to an exceedingly quiet, open and dynamic sound. Boasting a quality that seemed closer to that of a competent CD player than a digital tuner, the *TU9400* provided music that was noticeably less processed and certainly less artificial than many we had heard. Its resolution of massed strings was particularly impressive, allowing these instruments the freedom to build and soar without compression.

A live transmission on Radio 3 tested its ability to sustain a deep and proud acoustic, but our panel was still kept enthralled by the performance. We were especially impressed by the way in which the grandeur of the orchestra could swell unchecked, the tuner's highly transparent soundstage growing to accommodate the sound rather than simply becoming louder and more forceful.

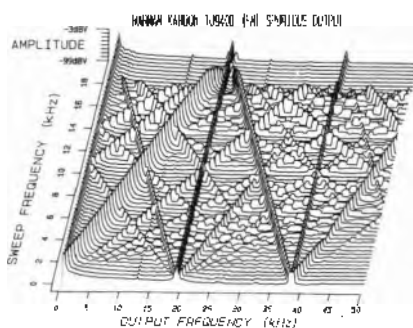
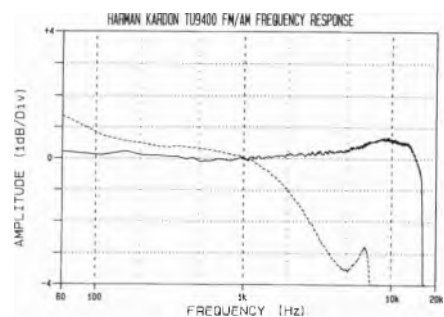
## Conclusion

HK has always maintained a modestly successful range of tuners but nothing that might have heralded the arrival of so startling a design as the *TU9400*. Not only is this product a visual delight but it enjoys

a sound that's equally refreshing - fast, clean and delightfully communicative. It went down a storm in the listening tests and with no major blots in its RF copybook, has only to step forward to receive its Recommended flash.

## TEST RESULTS

Muting Threshold	15uV
Sensitivity, 50dB S/N (mono)	5.8uV
50dB S/N (stereo)	34uV
65dB S/N (stereo)	65uV
Ultimate S/N ratio, mono	76.1dB
stereo	68.0dB
Stereo Separation, 1kHz	38.3dB
15kHz	33.9dB
Alternate channel selectivity	77dB
Second channel rejection ratio	>100dB
Pilot Suppression, 19kHz	46.0dB
38kHz	62.5dB
FM Stereo Distortion, THD	-58.9dB
IMD	-40.7dB
AM Rejection Ratio	61.7dB
AM Distortion	-55.7dB
Maximum Output (peak modulation)	3.203V
Typical Retail Price	£250



# Marantz ST-40L

MARANTZ HI-FI (UK) LTD, KINGSBRIDGE HOUSE, PADBURY OAKS, 575-583 BATH ROAD, LONGFORD, MIDDLESEX UB7 0EH. TEL: (0753) 680868



Marantz's previous budget tuner was never a great favourite of mine and so I consider its successor, the *ST-40L*, long overdue. The clumsy two-tier styling has also been banished to the history books, replaced in the *ST-40L* by an elegant appearance that blends in with the current range. It's a very easy tuner to use: simply punch the up/down tuning bar to tune step by step or hold it down for half a second or so and it'll begin scanning automatically. With mute in operation you won't hear a thing until the tuner bumps into a station of acceptable strength!

A soft fluorescent display indicates the tuned frequency, waveband (FM/MW/LW), preset number and whether the broadcast is being received in stereo or not. This tuner uses the same display as the costlier *ST-50L* so you might see what appears to be a signal strength meter hidden over on the far right. However, in this budget model, the meter is disabled, leaving you with no gauge of signal strength. Still, lying underneath the display is a nought to nine digit keypad which controls the 30-station random preset memory, so at least the essential features are left intact.

## Lab report

Tuning isn't particularly swift, but with a sensible 5uV muting threshold, at least it skips over much of the garbage littering the FM spectrum. Sensitivity is more than adequate, just as the ultimate S/N ratio approaches 70dB, both aided by the MOSFET RF front-end bought in from Mitsumi. Second channel rejection is less impressive, indeed a spurious RF image (double the IF bandwidth) needs a level of just 2.1mV to cause 50dB worth of breakthrough at the tuned frequency.

Anyway, I could find just two ceramics for FM selectivity, but Marantz has tweaked the AM stage with an SFL455C filter from mu-Rata. The AM response is rather odd too, featuring a +0.9dB boost just below 2kHz. By contrast, the FM

response falls gently above 2kHz, an effect not likely to have much subjective impact.

What's more important is the poor 19 to 38kHz pilot and subcarrier suppression (just 35dB and 47dB respectively), giving rise to a considerable amount of intermodulation distortion, both in and out of the audio range. I have to say that this is a feature of previous Marantz tuners. It's a juggling act - some amps and speakers are not going to appreciate this ultrasonic rubbish but, equally, Marantz's subtle filtering could have its rewards.

## Sound quality

"Beefy, uncongested, strain-free dynamics" - sample phrases taken from the listening panel as they latched onto the up-beat FM sound of this tuner. It proved to be an impressive sound, though not through any false display of aural fireworks. Instead, the mounting power of a live orchestral broadcast was allowed to climb swiftly and freely to realistically high levels without losing control or becoming overbearing.

On the debit side, there's a slightly jangly quality to strong percussion but there's also a firmness, a richness and conviction about the sound that gripped our listeners. AM had a little extra bite too, perhaps as a result of the peak in its response, though some occasional whistles did intrude upon our listening.

Subjectively, its FM reception seemed to possess a wider bandwidth, a feature that only served to encourage its gutsy presentation. This left our listeners complimenting the *ST-40L* on its involving and communicative sound which, in many respects, was voted one, if not the best, in the budget category. Putting this in some perspective, it was not quite as open nor as vivacious as the Denon *TU260L* (see page 143), but certainly more refined and detailed in presentation than Pioneer's budget offering, the *F-447L*.

## Conclusion

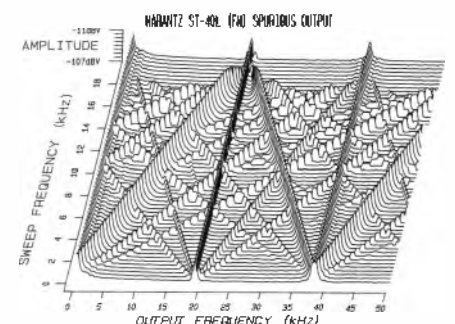
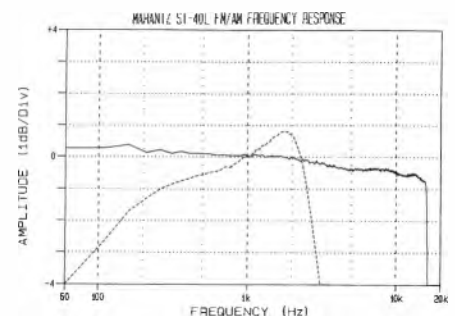
Simple to look at and simple to use,

**Recommended**

Marantz has hit the nail on the head with its new *ST-40L*. In many respects it measures like some of its older-generation budget designs, yet subtle revisions have brought about a significant improvement in sound quality. Pioneer should take a leaf from Marantz's book - by plugging away at the basics, Marantz has come up with the goods. **Highly Recommended.**

## TEST RESULTS

Muting Threshold	5uV
Sensitivity, 50dB S/N (mono)	7.5uV
50dB S/N (stereo)	41uV
65dB S/N (stereo)	173uV
Ultimate S/N ratio, mono	77.2dB
stereo	69.9dB
Stereo Separation, 1kHz	35.9dB
15kHz	33.5dB
Alternate channel selectivity	68dB
Second channel rejection ratio	48.9dB
Pilot Suppression, 19kHz	35.3dB
38kHz	47.1dB
FM Stereo Distortion, THD	-51.1dB
IMD	-39.5dB
AM Rejection Ratio	68.5dB
AM Distortion	-50.8dB
Maximum Output (peak modulation)	0.965V
Typical Retail Price	£140





# Technics ST-G70L

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

**Recommended**



Where features and flexibility are at a premium, you're unlikely to go wrong with the Technics' ST-G70L. It's not a particularly new digital tuner, but then it still out-manoeuvres much of the competition at £200. Up to 39 AM and FM stations can be stored for later recall and it's even possible to fine-tune both FM and AM in between their customary 50kHz and 9kHz steps. This will enable you to receive certain European broadcasts, for instance.

Scanning, whether manual or automatic, is initiated via a rotary tuning knob instead of the usual up and down tuning buttons. In manual mode it works just like an analogue tuner, while in auto mode a brief flick of the wrist will set the tuner on its way, to pause at the first strong station it encounters. It's possible to adjust the muting threshold of the ST-G70L in three stages, ensuring it won't stop at the merest whiff of RF. A useful feature.

This is linked to a digital read out of signal strength which covers a nominal 10-86dB, corresponding to a vast 4uV-25mV range. Most decent strength signals will fall in the 60-75dB range, for instance. In addition to all this, it's possible to select both the RF and IF bandwidth of the tuner's front-end, optimising both its rejection of 'ghost' signals caused by cross-modulation, while also providing protection against strong adjacent channels.

In auto mode, the presence of any such interference is revealed on Technics' fluorescent display as the frequency counter scans either side of the desired station frequency. Phew! Plenty to keep you busy and yet there's not one superfluous widget in sight.

## Lab Report

Sensitivity is at its best in the narrow IF mode (28uV for 50dB S/N) but most FM broadcasts will actually sound better if you stick with the 'wide' settings. For instance, stereo separation deteriorates

by 15dB (at 20kHz) and distortion increases from an exceedingly low 0.043 per cent to 0.38 per cent, the jump accounted for by a huge increase in second harmonic distortion. Furthermore, most odd-order intermodulation products increase by a good 16dB in narrow IF mode, though you have to weigh this against its second channel (image) rejection which improves beyond measurement (>100dB).

Technics uses a bought-in FM front-end pack but relies on its own AM/FM receiver and decoder ICs - there's even a proprietary Class AA output stage. Anyway, the AM response is still abominable but, back on FM, pilot tone and subcarrier cancellation is about the best of the bunch. As a consequence, the sound of this tuner should prove fairly consistent from amp to amp. Its freedom from ultrasonic garbage is revealed on a very clean looking 3D plot which, as far as audible IMD is concerned, also gives the Rotel RT-870 more than a run for its money.

## Sound Quality

The ST-G70L is a very even and neutral sounding tuner, perhaps even less dynamic and sparkling than the Rotel. In this respect, our listeners likened it most closely to Sony's offering, though at the time they were unaware of which tuner was which. Nevertheless, it responded to moderate RF levels (500uV or more) with an exceedingly quiet background, free of spurious whistles and other interference.

AM reception was not its forte, however, sounding distinctly compressed and scratchy with even the strongest of broadcasts. Neither is the non-standard snap-fit antenna connection a bonus because it prevents access to a superior AM rig. Anyway, the FM performance, though hugely superior to the din of AM, was still criticised for its slight lack of fine detail. Its presentation was certainly not dull but it did seem rather lacklustre or matter-of-fact, failing to grasp the emotive

power of large scale orchestral works.

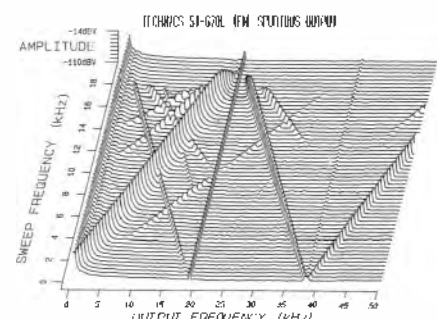
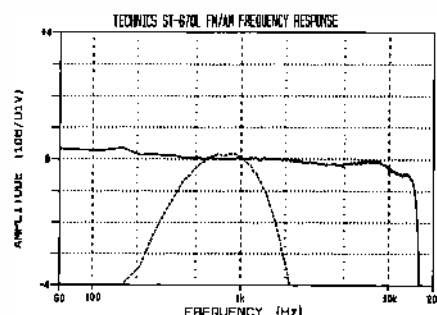
You are unlikely to become fatigued at the sound of the ST-G70L, but then it's equally unlikely to get the adrenalin pumping.

## Conclusion

What we have here is a tuner with a technically neutral yet mildly unfulfilling sound, civilised almost to a fault. Ranged in its favour, however, are a wide variety of genuinely useful features designed both to optimise its performance and maximise its flexibility. For many this trade-off will prove quite satisfactory and, bearing in mind the accessible price tag, earns the ST-G70L a tentative Recommendation.

## TEST RESULTS

Muting Threshold	1uV
Sensitivity, 50dB S/N (mono)	4.8uV
50dB S/N (stereo)	33uV
65dB S/N (stereo)	175uV
Ultimate S/N ratio, mono	78.8dB
stereo	72.1dB
Stereo Separation, 1kHz	43.5dB
15kHz	55.7dB
Alternate channel selectivity	58dB
Second channel rejection ratio	96dB
Pilot Suppression, 19kHz	84.8dB
38kHz	90.5dB
FM Stereo Distortion, THD	-67.4dB
IMD	-52.2dB
AM Rejection Ratio	60.0dB
AM Distortion	-42.5dB
Maximum Output (peak modulation)	1.260V
Typical Retail Price	£200



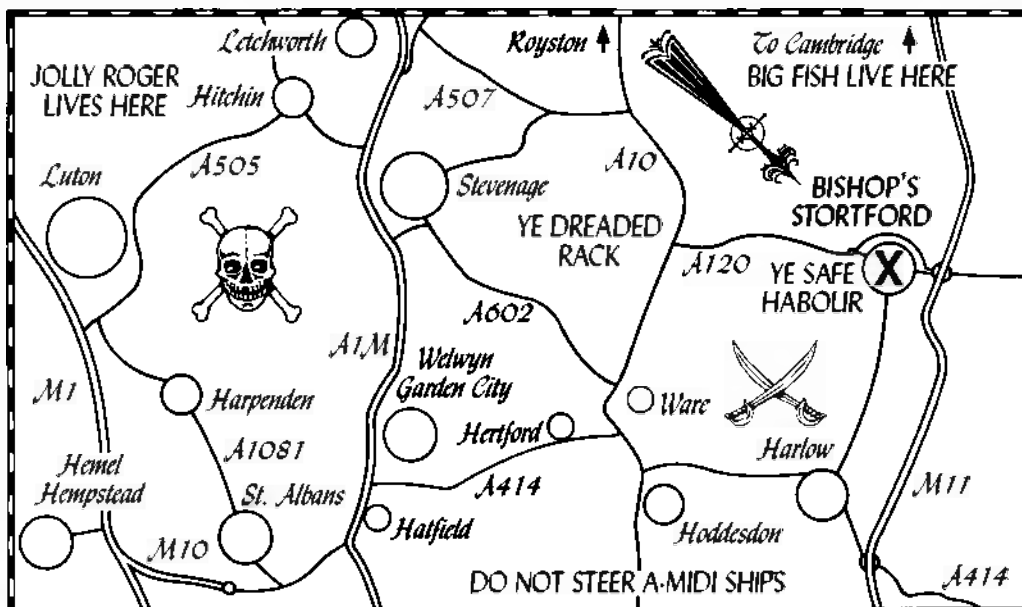
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# Aiwa AD-F410

**Best Buy**

AIWA (UK) LTD, UNIT 5, HEATHROW SUMMIT CENTRE, SKYPORT DRIVE, WEST DRAYTON, MIDDLESEX UB7 0LY. TEL: (081) 897 7000



To all intents and purposes, this new model appears to be much the same as the AD-F500 (issue 93). The only obvious material difference is that the AD-F410 lacks the 500's record sensitivity adjustment, which helps eliminate the subtle errors due to Dolby mistracking. The only other substantive difference is that whilst the AD-F500 costs a perfectly reasonable £150, the AD-F410 is pitched at a bargain basement £99.99.

The Aiwa offers all the usual mod cons, including full soft-touch logic controls, auto tape type sensing, timer standby and Dolby B, C and HX Pro. Dolby HX Pro is quite a coup at this price level, of course. A fine bias adjuster is also included. Tape search aids include track search and audible cueing as well as a mechanical tape counter. The record level meters cover a 30dB range in seven steps, but have rather sluggish ballistics which can lead to distortion on transients with dynamic material unless care is taken not to over-record. Headphones can be connected, but driven at fixed level only.

## Test report

Surprisingly, on the constructional side, not too many corners have been cut, at least not where it counts, though the front panel is all too obviously a plastic moulding. The record/replay head, for example, uses 5N high purity copper PC-OCC windings, and is profiled to reduce low frequency ripple, whilst the knee of the response curve is placed at a highly creditable 50Hz.

The midband record/replay responses are all flat, and the slightly rising treble output at the standard bias settings is well within the scope of the bias control. The only weaknesses in this general area concerns Dolby C which manipulates the EHF region quite strongly, and the prerecorded response which falls through the midband, treble output being an average 3dB lower than the bass.

The transport has an AMTS (anti modulation tape stabiliser) cassette shell damper built into the tape loading door whose main claimed effect is to reduce modulation noise. Basic signal/noise figures are very creditable, and slightly better overall than the AD-F500 sample reviewed previously. Pitch integrity, however, ranks as barely satisfactory due to some quite prominent flutter sidebands - see the spectrum analysis.

## Sound quality

Assessed 'raw' - that is without noise reduction - deep bass is a little slow and over-blown, but it has a striking and very unusual strength and power, which might even be described as authority.

The mid/treble and treble itself are very well presented and quite finely detailed, investing the Aiwa with an unusual liveliness and clarity at this price level, especially (but not exclusively) with female vocal and piano. Some of the apparent clarity is in fact a result of lost information.

A considerable amount of fine detail - for example acoustic guitar action noise and odd ambient details from Mary Blacks *No Frontiers* album - is eliminated from the source material, an effect analogous to the way a television invariably loses picture information, no matter how sharp and clear the picture appears. Pitch stability is fair, with no noticeable programme wow.

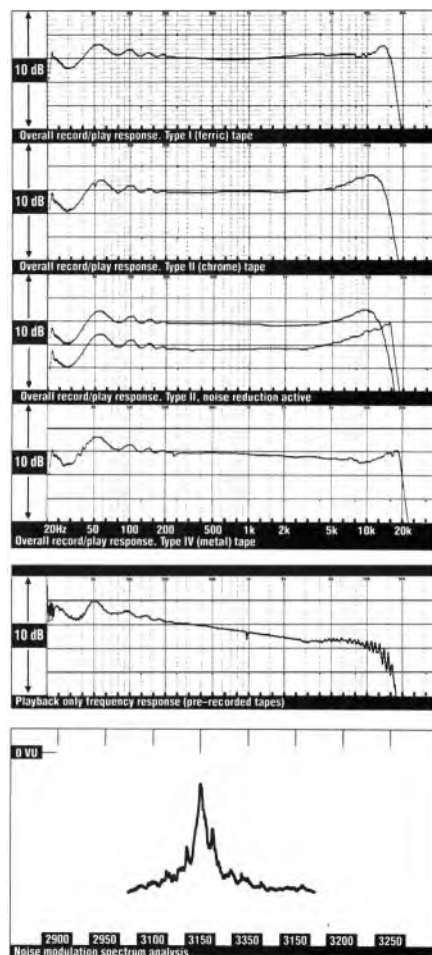
Dolby processing imposes its usual losses. With Dolby C in particular music is clearly compressed and lacking in top end liveliness (in reality these are two aspects of the same thing). The deck is quiet enough to be used without noise reduction for some material, but where noise is intrusive (which inevitably it will be at times), Dolby B represents the nearest to an optimum compromise. Prerecorded material was handled well, with good presence.

## Conclusion

The performance of a £150 deck for £100 - what more of a commendation do you want? An excellent all rounder, and the definitive starter deck - this week at least.

## TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	20Hz - 17kHz
IEC Type II	20Hz - 21kHz
IEC Type IV	20Hz - 21kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.16%/0.21%
Wow/Flutter - Peak DIN wtd	0.07%/0.28%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	50dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	55.5dB
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	55.5dB
Noise Figure of Merit (Dolby level/noise Type II)	58.5dB
Line input sensitivity/overload	78mV/13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	570mV/3.0V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	2.5%
Azimuth check R-L phase at 10kHz	60 degrees
Dimensions (wxhxd)	43x14x26cm
VU indication at IEC 0dB	+3dB
Average wind/rewind time (C90)	2min 14sec
Typical Retail Price	£100



# Choosing and Using ... Cassette Decks

*Confused by the options available to the purchaser of the humble compact cassette? Let Alvin Gold sort out your tape related problems.*

**O**ver the years, domestic tape recording equipment has changed from the glamorously macho world of open reel tape decks; big button bound monsters that consume tape at a prodigious rate, to neat little boxes which look little different to CD players or amplifiers, and which use tiny quantities of tape safely housed in cassette form. The types of uses to which tape is put has seen a similar revolution. The early pre-compact cassette days saw tape being used widely for live recording of music or for events of personal or family importance such as baby's first words. These days such applications are more likely to be served by a camcorder, and cassettes have become synonymous with casual listening to commercial recordings, either purchased as prerecorded cassettes, or dubbed from records or CD.

The two most important hardware based trends over the last decade, and these have a particular bearing on the choice of cassette deck, are the introduction of personal stereo equipment and the massively increased popularity of car cassette players. For both types of hardware, the cassette deck frequency plays a support role by providing the recordings, perhaps dubbed from CDs or records. In many systems, the cassette deck has no other function and is not used as a primary music source.

## Where you can use it

These days you can spend a lot of money on personal stereo players, and a fortune on car stereo which may employ multiple amplifiers, active crossovers and any number of loudspeaker drive units. The electronics are often engineered to absurdly high standards - or absurd if you're unused to the wonderful world of high fidelity. However the difference between portable/car audio and domestic high fidelity remains huge. Although car audio can be loud and impressive, it is about as far from attaining meaningful levels of fidelity as your humble reporter is from running a three minute mile. To a large extent, the same argument applies with personals, if not in principle then certainly in practice when you consider the conditions under which players are likely to be used.

The implications for aspiring cassette deck buyers flow naturally from this. There is no sense in imagining that you can manage with a poor quality cassette deck, any problem here will add to whatever imprecision exists in the car or personal stereo player and will certainly be audible. At the same time it is foolish to imagine that the subtleties that distinguish, say, a good £250 deck from one costing twice as much represent a cost effective purchase decision.

A similar analysis can be applied to other purposes to which cassette decks are put. Copying from tape to tape is generally thought of as an undesirable process because the various inadequacies of cassette tape are compounded in the copying process, whereas

there is a kind of averaging process when copying from a different kind of source onto tape. This is one reason why it is virtually impossible to buy a genuinely high quality twin transport deck, but there is another. Many hardware producers are running scared of the anti-home taping lobby, and don't like to stick their necks out. If you're interested in tape to tape dubbing, there are some quite reasonable performers to be had at moderate prices, but if you're in earnest about sound quality and want to be able to dub from tape to tape, a second cassette deck may be best solution.

## Single transport

This leaves a hard core of quality-first users for whom a single transport is enough, and for whom auto-reverse and similar convenience features don't figure highly. For many users of this kind, cassette decks find their natural metier when recording from digital sources and recording FM radio broadcasts off-air. Heavy CD users will be particularly attracted by the idea of a deck which can accept control instructions from a CD player to decant tracks off disc and onto tape in a way that packs both tape sides reasonably evenly and which doesn't split tracks across tape sides. Recording off air makes it desirable for the cassette deck to offer a timer stand-by facility. All users will find reassurance in a three-head deck which offers a near-instantaneous playback from the tape whilst recording, with a quality check no further away than a flick of the tape monitor switch. Three head decks have never been more affordable, a comment that applies equally to high grade twin capstan transports whose prices have been spiralling down in the in the last couple of years.





# Aiwa AD-F810

AIWA UK LTD, UNIT 5, HEATHROW SUMMIT CENTRE, SKYPORT DRIVE, WEST DRAYTON, MIDDLESEX UB7 0LY. TEL: (081) 897 7000

**Best Buy**



Jointly with the Sony TC-K570, the Aiwa AD-F810 is the lowest cost three head cassette deck in this guide. But this implementation includes automatically controlled source/tape switching so that operationally there is little to choose between this deck and any two header.

The AD-F810 also has a dual capstan transport, a refinement the Sony can't match. There is no direct causal relationship between performance and the number of capstans of course, but even when they don't improve wow and flutter levels, dual capstans will usually help alleviate tape modulation noise, leading to a clearer, sharper sound. A tape shell stabiliser, described by Aiwa as an anti-modulation tape stabiliser, is also part of a strong mechanical package.

Record sensitivity and bias can be adjusted, which makes it possible to match almost any tape type to the deck, ensuring at least a reasonably accurate frequency response and a reduced chance of Dolby mistracking. This is a manual adjustment which can be made quite easily and in a few seconds by switching repeatedly between source and tape whilst twiddling the knobs.

Track location is facilitated by a track search feature and by audible cueing (only just audible as it happens - the level has been set rather low) and by a standard track search feature invoked by hitting fast forward or rewind from play mode. The time counter also has a 'return to zero' feature. Dolby HX Pro is included, and the MPX filter can be defeated. The Aiwa even has a volume control for headphones and support for an outboard timer. Last and certainly not least, a display switch can blank the entire display or just the record level meter.

## Test report

The AD-F810 produced a near textbook set of results on the test bench. The frequency responses are all well extended

and accurately presented; pitch integrity is a positive strength. IEC 0dB is set at +4VU, yet no apologies need be made for the signal/noise figures even when referred to the usual 0VU. Some remarkable MOLs are possible, up to +9.5VU for three per cent THD (400Hz) with metal tapes for example and +6.5VU for the Type II setting, which outshines most decks in this price area.

## Sound quality

There were times during the test when the Sony TC-K570 sounded sharper and more Technicolorishly colourful than the Aiwa, whose key failing is that it can tend to sound a little grey. But little is the operative word here: it can be genuinely hard to distinguish before from after with this deck - the cheapest of the 20 odd of which this can be said - even in the context of a high resolution system. Much of the credit for this lies with the dual capstan transport which has given this deck less of the usual tell-tale signs of modulation noise than any other deck in the same general price band. Lack of modulation noise means such things as a dynamic way of responding to transients, firm, uncluttered bass lines and a precise, detailed treble without obvious 'squash' or compression.

The deck was electrically quiet enough, and had enough headroom to manage without Dolby noise reduction with a wide range of material. Taking the plunge in this way adds a sparkle to the sound and increases tonal and dynamic contrasts still further, and has a particular advantage in increasing the sense of presence during quiet passages. But the two Dolby circuits are clearly well aligned, and the losses they impose are small and generally manageable.

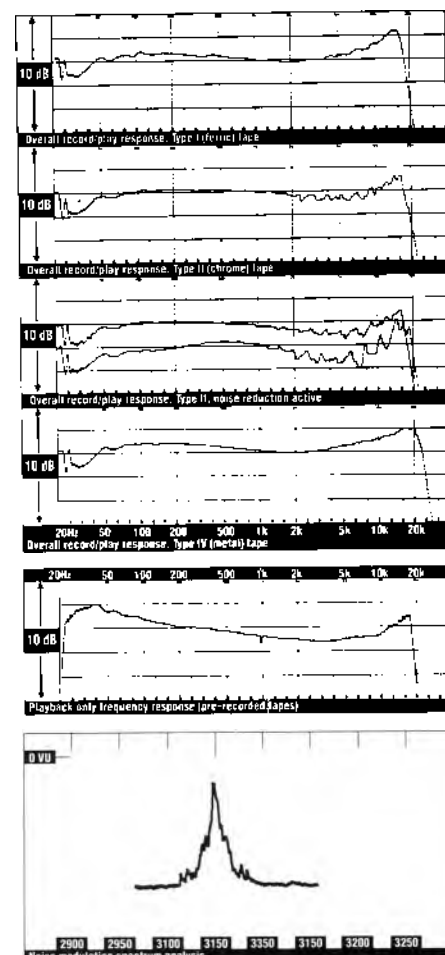
## Conclusion

Although this deck isn't as slick to handle as the equivalent Sony model, the redis-

tribution of resources in favour of the parts that affect sound quality most has paid ample dividends. This is an accomplished recorder at a giveaway price, and classic Best Buy material.

## TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 19kHz
IEC Type II	<20Hz - 20kHz
IEC Type IV	<20Hz - 22kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.094%/0.052%
Wow/Flutter - Peak DIN wtd	0.06%/0.052%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	49.5dB/0.6%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	54.6dB/0.65%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	52.5dB/0.5%
Noise Figure of Merit (Dolby level/noise Type II)	57.5dB
Line input sensitivity/overload	90mV/13.0V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	713mV/3.84V
IM distortion 10kHz/1kHz 0dB peak, 1kHz product	2.82%
Azimuth check R-L phase at 10kHz	10 degrees
VU indication at IEC 0dB	+4dB
Dimensions (wxhxd)	43x13.9x29.5cm
Average wind/rewind time (C90)	2 min 37 sec/t
Typical Retail Price	£200



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# Sony TC-K520

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

**Best Buy**



Sony has been extremely active on the cassette deck front, with no less than ten new models. This is the top of the non-ES single transport designs, and it shows considerable evidence of clean sheet thinking in several areas. It's well equipped too.

The basics of the TC-K520 are that it is a two-head deck built with a Dolby B and C (with defeatable multiplex filtering), Dolby HX Pro headroom extension circuitry, fine bias adjust, track search and a time counter with memory stop. This last is not a true real time counter; it simply tracks elapsed time from when it was last zeroed, or the deck was turned on or the tape inserted.

The display is well designed and wide ranging (-30 to +8dB), but in a surprising departure it can be switched off, leaving either a completely blacked out display or just the tape counter illuminated. Eliminating the fluorescent display reduces internally generated noise potentially improving sound quality. It also reduces a prominent source of visual distraction when playing music.

Styling is blocky with emphasised transition lines, for example between the display window and the fascia, and prominent shock absorbing feet. The overall impression is high tech but clear control dispositions and restrained graphics mean it is more approachable than many.

## Lab report

Superbias is Sony's name for its bias frequency oscillator which operates at 210kHz, double the frequency used in older Sony decks, to reduce downband intermodulation. A laminated laser-amorphous head helps reduce HF losses in the head core, but the deck's frequency responses are not particularly wide, and with Type I and II tapes especially they're not very well controlled. The rather lumpy output shape casts doubt on the integrity

of the contact between tape to head, one of the most critical areas of any cassette deck design, which might be compromised by insufficient back tension in the tape or by the detailed design and geometry of the various guides that touch the tape. The bass is slightly uneven too, though it does provide the necessary bandwidth.

Pitch integrity is good enough with a clean spectral analysis. Although the signal to noise figures are good too, they're achieved at the cost of rather high 0VU distortion levels, especially in the IEC Type II bias slot. The moral of the story is not to push recording levels too far into the red.

## Sound quality

With prerecorded material, the Sony provides a slightly soft-edged sound, but with a powerful bass and a strong sense of presence. Here at least, the Sony can be counted an overall success.

It is also a considerable success as a recorder, though predictably Type I and II formulations tended to sound soft and laid back, a tendency that could be addressed with careful rebiasing. Metal tapes are handled accurately without rebiasing, but the deck is borderline for use with Type IVs which offer a degree of extra top-end clarity at the cost of sounding frazzled when driven too hard. As so often in the past, Dolby B offers the optimum blend of freedom from noise and good sound quality with a wide range of music types.

Try as I might, I consistently picked the counter on/main display off condition as sounding best of the three display mode options. Interpreting like mad, I think this means there's no appreciable difference.

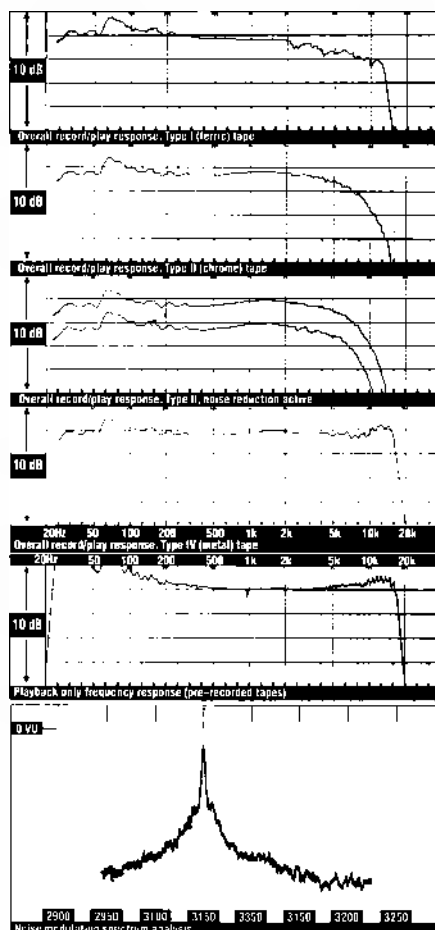
## Conclusion

Sony's rethink of its cassette deck range has been far reaching and successful at least on the evidence provided by the TC-K520. Whatever rough edges it may have

(and what cassette deck doesn't at £170?), this is an excellent performer. 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-10kHz
IEC Type IV	<20Hz-17kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.09%/0.15%
Wow/Flutter - Peak DIN wtd	0.07%/0.13%
Speed error	+0.1%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	52dB 0.6%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	56dB 2.5%
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	55.5dB 1.3%
Noise Figure of Merit (Dolby level/noise Type II)	55dB
Crosstalk + Noise ref 0VU/1kHz	51 dB
Line input sensitivity/overload	117mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	704mV/3.2V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	6.4%
Azimuth check R-L phase at 10kHz	20 degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	43x12.3x28.5cm
Average wind/rewind time (C90)	2mins 10sec/average
Typical Retail Price	£170





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Pioneer A300	344.95	361.95	378.95	395.95	429.95	446.95	476.95
Marantz PM30	318.95	335.95	344.95	369.95	403.95	420.95	446.95
Marantz PM30SE	369.95	386.95	403.95	420.95	454.95	471.95	501.95
Marantz PM40	386.95	403.95	420.95	437.95	471.95	488.95	518.95
Marantz PM40SE	412.95	429.95	446.95	463.95	497.95	514.95	544.95
NAD 3020i	335.95	352.95	369.95	386.95	420.95	437.95	467.95
NAD 3225PE	352.95	369.95	386.95	403.95	437.95	454.95	484.95
NAD 3240PE	378.95	395.95	412.95	429.95	463.95	480.95	510.95
NAD 7020I	386.95	403.95	420.95	437.95	471.95	488.95	518.95
Rotel RA920AX	310.95	327.95	344.95	361.95	395.95	412.95	442.95
Rotel RA930AX	344.95	361.95	378.95	395.95	429.95	446.95	476.95
Sony TAF440E	378.95	395.95	412.95	429.95	463.95	480.95	510.95
Sony TAF 540	403.95	437.95	446.95	471.95	505.95	522.95	548.95
Technics SUVX 600	378.95	395.95	412.95	429.95	463.95	480.95	510.95
Yamaha AX 550	412.95	429.95	446.95	463.95	497.95	514.95	544.95

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Denon DCD660 add... £47.00	Philips CD624 add... £47.00	Sony CDP791 add... £30.00
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Denon DCD960 add... £132.00	Philips CD850 add... £217.00	Sony CDPK1 add... £47.00
Marantz CD42 add... £30.00	Pioneer PD6700 add... £23.00	Sony CDP 222ES add... £132.00
Marantz CD52 add... £47.00	Pioneer PD7700 add... £90.00	Technics SLPG 200 add... £13.00
Marantz CD62 add... £132.00	Pioneer PD8700 add... £132.00	Technics SLPG 500 add... £47.00
NAD 5420 add... £30.00	Rode RCD955 add... £98.00	Yamaha CDX 450E add... £23.00
NAD 5425 add... £47.00	Rotel RCD865 add... £132.00	Yamaha CDX 550E add... £47.00
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Marantz SD40 add... £45.00	Rotel RD945 add... £45.00	Yamaha KX250 add... £45.00
Marantz SD50 add... £125.00	Rotel RD955 add... £75.00	Yamaha KX330 add... £75.00
Marantz SD315 add... £75.00	Sony TCK470 add... £45.00	Yamaha KX530 add... £125.00
NAD 6325 add... £65.00	Sony TCK520 add... £65.00	Yamaha KXW232 add... £95.00
NAD 6340 add... £115.00	Sony TCK570 add... £95.00	



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# Technics RS-BX404

PANASONIC (UK) LTD, 300-318 BATH ROAD, SLOUGH,  
BERKS SL1 6JB. TEL: (0753) 34522

**Best Buy**



This is an astonishing box of tricks for the £129.95 price tag. Built and finished to a standard way beyond its price, the Technics is also equipped in a manner fully in keeping with the value for money flavour of these impoverished times.

The basics are straightforward: two heads, Dolby B, C (with an MPX filter switch even at this price) and HX Pro. The display has a respectable range (28dB) but is set apart from some at this price level by its illuminated scale markings and a peak hold facility that can, if required, hold an indicated peak indefinitely, which can subsequently be used as a guide when adjusting record levels. The tape counter is electronic and has a memory stop option. There are few other tape search aids, but audible cueing, which is increasingly uncommon elsewhere, is included, along with a fine bias adjust feature.

The RS-BX404 is also one of the few decks that still caters for microphones, for which two 6.3mm sockets are provided. Headphones are also accommodated, though without a volume control. And that's about it, apart from a mention for the excellent ergonomics and aesthetics which do Technics real credit.

## Test report

The transport is clearly exceptional at the price. It is not just the weighted wow and flutter figure that is deserving of praise; the unweighted figure and that for wow, the most audibly obnoxious class of speed instability, are also low. The spectrum analysis is clean and free of dominant artefacts for the ear to latch onto. Great stuff.

The various frequency responses are also extremely well aligned, with notably smooth midband responses both for the record/playback cycle and when playing prerecorded material. There's also a freedom from pen wobble on the plots that at least implies good tape to head contact

integrity. Bass is quite well extended, though there is some sharp 'woodles' ringing caused by unfavourable head geometry.

The bias control can take care of most of what residual HF errors remain, though some extreme HF excess seems to be part of the package. Some 0VU inter-modulation is present too, implying limited headroom in the record amps or heads when dealing with complex waveforms, and this can militate against the deck, which appears to rely on headroom above the 0VU point to redress below average signal/noise figures. Note the low harmonic distortion figures at 0VU, which explain where the signal/noise went.

## Sound quality

It would be going too far to describe the Technics as having the *joi de vivre* of, let's say, the Aiwa AD-F410. Its treble can sound a little insistent or even steely with some material, especially when recorded on metal tape.

The bass end too can sound a trace wooden, showing some boxy coloration with certain material, not least male voice (as, for example, the title role in Britten's *Paul Bunyan*).

On the other hand, the Technics, which costs only £130 remember, has an uncommonly assured character, with real stability throughout the audio frequency range. It also works well with metals, sounding even more solid and consistent, though there is some extra brightness with this particular tape type that cannot be fully eliminated, even after resorting to the fine bias control.

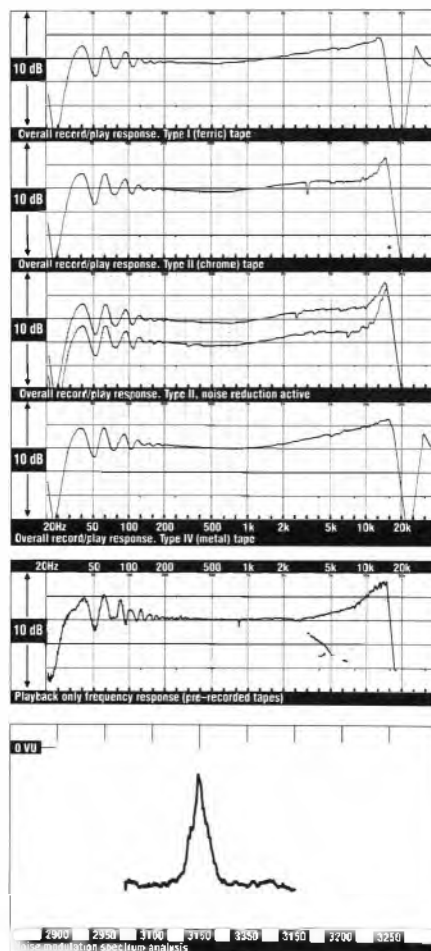
Clarity is always of a high order, making it possible to hear deep down into the mix, and if the Technics lacks real root and branch subtlety, it is also possible to hear through the music without obvious masking. Prerecorded material followed the same pattern, though the measured brightness was audible on audition.

## Conclusion

Best Buy, obviously. This deck won't please many of Technics' competitors. It is, however, an excellent low cost cassette deck with features and performance fully the match of the best at £150, yet it costs only £130.

## TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	24Hz - 16kHz
IEC Type II	24Hz - 18kHz
IEC Type IV	24Hz - 20kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.11%/0.18%
Wow/Flutter - Peak DIN wtd	0.07%/0.17%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	46dB 0.8%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	51.5dB 0.5%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	50dB 0.5%
Noise Figure of Merit (Dolby level/noise Type II)	54.5dB
Line input sensitivity/overload	5mV/>13V
Mic input sensitivity/overload	0.41mV/22.7mV
Line output for 0dB/maximum	698mV/2.72V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	6.3%
Azimuth check R-L phase at 10kHz	20 degrees
VU indication at IEC 0dB	5dB
Dimensions (wxhxd)	43x12.5x29cm
Average wind/rewind time (C90)	2 min 10 sec
Typical Retail Price	£130



# Yamaha KX-250

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

**Best Buy**



The essence of this rather fussily designed near-budget model is that it is very well equipped. Facilities include a full side and phrase repeat mode and timer play/record standby. The next along is a bias adjust control, which is followed by Play Trim, Dolby B and C switching (with or without MPX filtering - a good point on a deck at this price level) and the other standard amenities.

Play Trim? Like most good ideas, Play Trim is intrinsically simple, consisting merely of what amounts to a treble tone control, placed in the playback circuit after the playback amplifiers, but before the Dolby decode circuit. Tapes recorded on one machine will often reproduce with reduced treble on the next, usually due to head azimuth (alignment) incompatibilities. Positioning the circuit ahead of the Dolby processor doesn't just flatten the tonal balance of the sound, it also means that Dolby level errors can be corrected, the results of which can be very impressive indeed. The only problem - if it can be called that - is that the adjustment can only be made by ear. This takes some practice, but is not hard.

Other features include 21dB six step record level meters, fixed level headphone monitoring, a mechanical tape counter, track search and intro-scan. Engineering and operational feel are of a standard commensurate with the price. An infra-red remote control handset is available for about £20 extra - a real plus.

## Test Report

The effect of the Play Trim feature in the frequency domain can be seen in the family of replay response plots which also show that the central 12 o'clock control position gives an accurate result for nominally correct tapes (ie specially recorded test tapes whose azimuth is guaranteed). The various record/replay responses are very accurately handled, though there is a trace of mistracking with Dolby C which can,

however, be eliminated as a practical problem by using Play Trim.

Transport integrity is of a high order: the 0.08 per cent weighted wow and flutter figure leads its class, and the spectrum analysis plot is clean. Bias noise and THD results are also satisfactory with the +3VU Dolby level taken into account, as the noise 'Figure of Merit' indicates. Even wind speed is a little better than expected for a deck at this price level, perhaps due to the use of separate dedicated capstan and wind motors.

## Sound Quality

This is a good one. Compared to other similarly priced decks, the Yamaha has greater subtlety and 'shape'. This is difficult to explain on paper, but is readily apparent on a quick play through. The Yamaha was no less hiss bound than most. Slight variations in pitch were sometimes audible, and the bass was both more extended and woollier than usual, which occasionally led to blurred and excessive bass lines. Through all this however, the Yamaha demonstrated an ability to reproduce fine detail and to separate out the strands of a musical performance, especially in the midband. The result of this was that subtle events that pass other such decks by were clearly reproduced by this one.

This slightly more exacting than usual performance standard was consistent with all tape types, though it would be hard to justify the cost of some of the more expensive metals in particular. A quiet Type II such as TDK's SA-X is ideal for most situations, but excellent results were obtained from AR and AD-X.

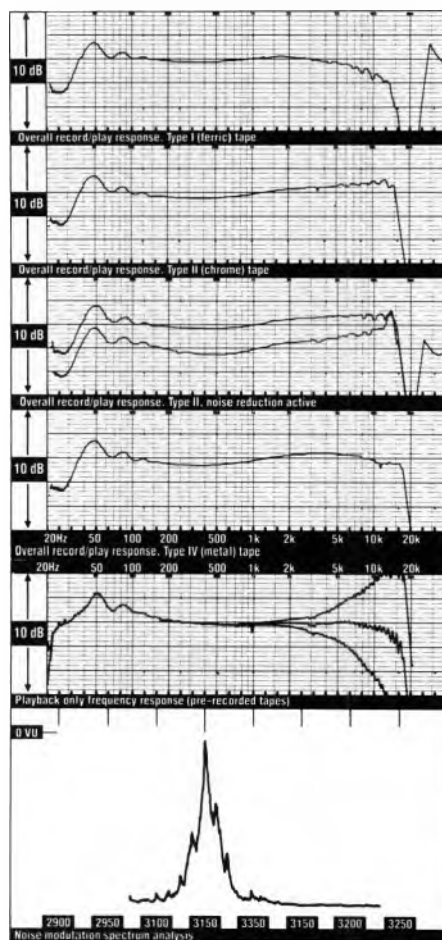
Play Trim proved useful in rescuing tapes (some prerecorded) which often don't sound too good, though as with any stable-door bolting exercise there is a trade off, in this case for increased hiss, which naturally is concentrated on the most exposed area, the top couple of octaves.

## Conclusion

The fussy control layout happily turns out to be the only significant shortcoming of this excellent budget all rounder. Play Trim is a decided plus, but the main attribute is its simple musical integrity. Best Buy.

## TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	25Hz - 14kHz
IEC Type II	25Hz - 16kHz
IEC Type IV	25Hz - 16kHz
Wow/Flutter - Peak DIN wtd/unweighted	0.08%/0.17%
Wow/Flutter - Peak DIN wtd	0.06%/0.16%
Speed error	0.01%
Type I signal/noise CCIR/ARM	500Hz 50dB
& distortion 0VU	0.65%
Type II signal/noise CCIR/ARM 400Hz	54dB
& distortion 0VU	0.60%
Type IV signal/noise CCIR/ARM 400Hz	53dB
& distortion 0VU	1.0%
Noise Figure of Merit (Dolby level/noise Type II)	57dB
Line input sensitivity/overload	13mV/>13V
Mc input sensitivity/overload	n/a
Line output for 0dB/maximum	62mV/3.83V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.9%
Azimuth check R-L phase at 10kHz	0 degrees
VU indication at IEC 0dB	3dB
Dimensions (wxhxd)	3.5x12x27.5cm
Average wind/rewind time (C90)	2 min 9 sec/average
Typical Retail Price	£149





# Yamaha KX-530

**Best Buy**

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



In common with the KX-330, the KX-530 uses a hyperbolic profile 12 layer amorphous record/playback head, advantages of which include improved saturation performance needed by many high energy tapes. A smoother low frequency performance is also claimed, partly determined by head shape. The KX-530 also features a low noise, direct coupled playback op-amp and a high current record amp to help drive the tape fully. The transport drive system employs three motors and includes a dedicated DC capstan motor.

The complex control system includes everything already mentioned in connection with the KX-330 - play trim, variable bias, intro scan, track search, the usual Dolby amenities and so on and more besides. Highlights include a volume control for the headphones, a master fader control in addition to the individual channel level controls (this allows correctly channel matched fades), and a tape counter with remaining time display (you supply tape length data, it works out the rest).

Remote control is an option with this recorder. The handset costs around £25, and allows direct access to tracks up to 99 away from the current position, and random programming of a more down to earth nine tracks. This could prove useful, but the attempt to make a cassette deck that thinks it's a Compact Disc player comes up against reality when waiting patiently for the tape to shuffle its way slowly from one track to the next at the other end of the tape, or where the deck thinks a new track has started in the middle of a Beethoven piano sonata. Which happens...

## Lab report

The KX-530 behaved well on the test bench. The main frequency responses are finely engineered, though not without a suggestion of waywardness in the case of

the Type II response and playback only responses which tend to favour the bass.

The transport delivers a fine set of numbers on the whole, but there is a fair amount of wideband flutter visible in the spectrum analysis which shows in the raw flutter figure of 0.40 per cent. Signal/noise results are excellent all round when the very low distortion figures at which they're achieved is taken into account. In practice it is possible to drive the Yamaha substantially into the red with suitable tapes (metals especially), though the IM test shows that very high level high frequency might get recordings into trouble.

## Sound quality

This is a lucid and articulate design, which has a sure-footed quality with complex material, a wide dynamic range and a richly varied range of tonal colours with which to paint the music. Compared to the KX-330 it provides a more solid and meatier style, and greater presence and analysis which in the real world translates into greater access to and clearer audibility of complex material. Stereo imagery also benefits. It is large in scale and firmly positioned in space, especially in the depth plane.

The KX-530 is also good enough to extract something extra from metal tapes which generally sounded sharper and more dynamic, with a purer, more penetrating treble. Yet treble quality remains good: penetrating in this context does not mean aggressive or nasty.

Dolby noise reduction was well engineered, with Dolby B providing a near optimum blend of transparency and freedom from tape hiss.

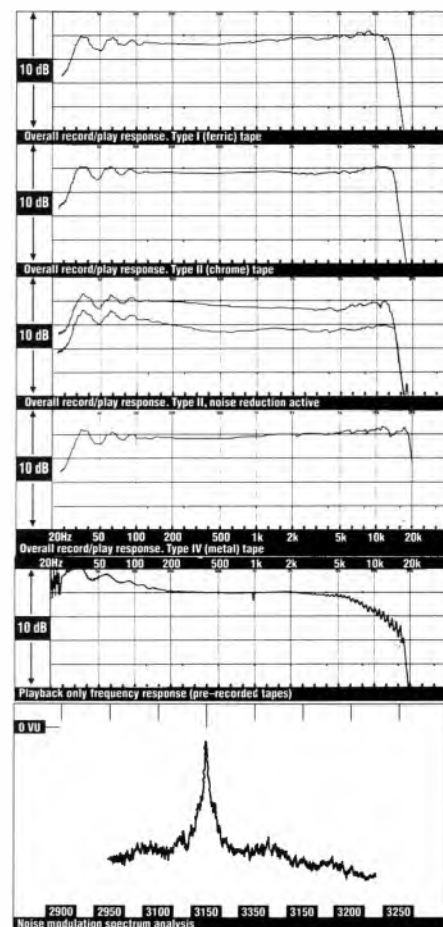
Prerecorded cassettes also sounded good, but with a strong suggestion of the bass bloom and slightly distant perspectives which are implied by the frequency response plot shown on the right.

## Conclusion

An excellent all rounder, the KX-530 is fast, articulate and assured, especially with metal tapes. Best Buy.

## TEST RESULTS

Dolby Level reading on deck's meters	+2dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	25Hz-14kHz
IEC Type II	25Hz-15kHz
IEC Type IV	25Hz-20kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.095%/0.25%
Wow/Flutter - Peak DIN wtd	0.05%/0.40%
Speed error	-0.03%
Type I signal/noise CCIR/ARM 400Hz	48.5dB
& distortion 0VU	0.1%
Type II signal/noise CCIR/ARM 4XHz	53dB
& distortion 0VU	0.1%
Type IV signal/noise CCIR/ARM 400Hz	51dB
& distortion +3VU	0.7%
Noise figure of Merit (Dolby level/noise Type II)	55dB
Crosstalk +Noise ref 0VU/1kHz	48dB
Line input sensitivity/overload	92mV/13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	573mV/3.72V
IM distortion 10kHz/11kHz 0dBpeak, 1kHz product	2.51%
Azimuth check R-L phase at 10kHz	24 degrees
VU indication at IEC 0dB	4dB
Dimensions (wxhxd)	43.5x93x26.7cm
Average wind/rewind time (C90)	1 min 56sec/average
Typical Retail Price	£230



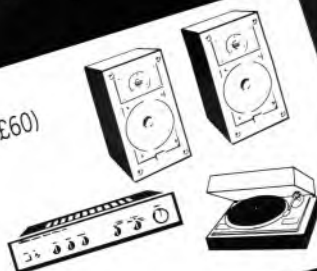


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## SUGGESTED SYSTEMS

The suggested systems priced below all include the popular Dual CS503/2 turntable but an alternative turntable or CD player is available at extra cost. Please see "OPTIONS" list below for further details.

SPEAKERS All system prices include the Dual CS503/2	W/dale Delta 30.2 JPW Minim Gale GS210 JPW Sonata (vinyl) Mission 760	Celestion 3 JPW Sonata M/Short MS 3.10 W/dale Diamond 4 Roid A7 Tannoy 603	Celestion DL4 II JPW Sonata M/Short MS3.20 Mission 761	Nad 8225e Celestion 5 B&W DM600 Kef K120 Tannoy 605	Monitor Audio R7 Celestion DL6 II Tannoy M15 Wharfedale 505.2	Mission 762 Castle Warwick Celestion DL8 II Monitor Audio R9 M/Short MS 3.30 B&W DM610 Tannoy 607	Castle Durham Heybrook HB1/3 Tannoy 609 Tannoy DC 2000 (Add £70) Rogers LS4A B & W DM620 (Add £50)
AMPS							
Rotel RA820AX	324.95	336.95	356.95	368.95	388.95	404.95	444.95
Rotel RA820BX4	348.95	359.95	379.95	392.95	412.95	428.95	468.95
Kenwood KA3020	308.95	319.95	339.95	352.95	372.95	388.95	428.95
Pioneer A300	324.95	336.95	356.95	368.95	388.95	404.95	444.95
Rotel RA930AX	324.95	336.95	348.95	372.95	384.95	404.95	444.95
Harman HK6100	336.95	352.95	368.95	379.95	399.95	416.95	456.95
Sony TAF440E	339.95	352.95	372.95	384.95	404.95	419.95	459.95
Sony TAF540E	379.95	392.95	412.95	424.95	444.95	459.95	499.95
Technics SUVK500K	324.95	336.95	356.95	368.95	388.95	404.95	444.95
NAD 3240	356.95	368.95	388.95	404.95	416.95	436.95	476.95
Marantz PM40SE	388.95	399.95	419.95	432.95	452.95	468.95	509.95
Kenwood KA5020	372.95	384.95	404.95	416.95	436.95	452.95	492.95
Nad 3225PE	332.95	344.95	364.95	376.95	396.95	412.95	436.95
Nad 3020 i	332.95	344.95	364.95	376.95	396.95	412.95	436.95
Marantz PM 30SE	316.95	328.95	348.95	359.95	379.95	396.95	419.95
Rotel RA920AX	299.95	312.95	332.95	344.95	364.95	379.95	419.95
Technics SUVK600K	356.95	368.95	388.95	404.95	416.95	436.95	476.95

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	Was	Now
Rotel RA820AX Amp	£159.95	£119.95
RT850AL Tuner	£179.95	£126.95
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RA820 BX4 Amp	£189.95	£132.95
RCD 865 CD Player	£299.95	£194.95
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RCD965BX £299.95 including 5 FREE CDs		

## OPTIONS

The following Compact Disc Player or Turntable may be ordered instead of the Dual CS503/2 in the above systems.

### CDs

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Denon DCD480  
Denon DCD580  
Denon DCD680  
Denon DCD860  
Denon DCD960  
Denon CD41  
Marantz CD42  
Marantz CD52  
Marantz CD62  
Marantz CD72  
Nad 5420  
Nad 5425  
Nad 5440

Philips CD604  
Philips CD610i  
Philips CD618  
Philips CD624  
Philips CD634  
Philips CD850 MkII  
Pioneer PD4700  
Pioneer PD5700  
Pioneer PD6700  
Pioneer PD7700  
Pioneer PD8700  
Rotel RCD865  
Rotel RCD865  
Rotel RCD955AX  
Rotel RCD965BX

deduct £15  
deduct £20  
add £25  
add £25  
add £55  
add £85  
add £250  
deduct £15  
add £5  
add £25  
add £105  
add £155  
add £105  
add £155  
add £115  
add £155

### TURNTABLES

Technics SLPG200AK  
Technics SLPG400AK  
Technics SLPG500AK  
Dual CS505-4  
AR EB 101  
Nad 5120  
Ariston Q Deck  
Rotel RP855  
Systemdek WX900 +  
MOTH + AT110E  
Thorens TD2B011

add £15  
add £35  
add £55  
add £25  
add £100  
deduct £55  
add £20  
add £55  
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Arcam Delta 90.2	£409.95
Arcam Delta 120	£519.95
Arcam Delta 110S	£719.95
Arcam Delta 110	£409.95
Audiobab 8000A/91	£374.95
Audiobab 8000M/91	£594.95
Audiobab 8000P/91	£544.95
Aura YASO	£199.95
Cyrus One II	£229.95
Cyrus PSX II	£249.95
Cyrus Two II	£349.95
Dellec 50S	P.O.A.
Denon PMA250 II	£139.95
Denon PMA350	£169.95
Denon PMA560	£209.95
Denon PMA 850	£239.95
Harman HW6100	£174.95
Kenwood KA3020	£139.95
Marantz PM30	£129.95
Marantz PM 30SE	£149.95
Marantz PM 40SE	£239.95
Musical Fidelity A120	£549.95
Musical Fidelity A1 MK II	£299.95
Musical Fidelity B1	£139.95
Musical Fidelity B1 II	£229.95
Musical Fidelity PRE34	£399.95
Musical Fidelity A120	£549.95
Musical Fidelity A200	£799.95
Musical Fidelity B200	£349.95
Musical Fidelity P150	£429.95
Musical Fidelity P173	£729.95
Musical Fidelity P180	£899.95
Nad 3225PC	£169.95
Nad 3020	£149.95
Nad 3240E	£199.95
Nad monitor range	P.O.A.
Pioneer A229	£129.95
Pioneer A300	£159.95
Pioneer A400	£239.95
QED A2400C II	£249.95
QED A2400A II	£239.95
QED A2700C	£369.95
QED A2700A	£429.95
QED P300	£369.95
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Quad 306	£322.95
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Rotel RA820AX	£159.95
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# Aiwa AD-F500

AIWA UK LTD, UNIT 5, HEATHROW SUMMIT CENTRE, SKYPORT DRIVE, WEST DRAYTON, MIDDLESEX UB7 0LY. TEL: (081) 897 7000



Issue 93 provided an excellent opportunity to compare a single transport deck with an identically priced twin deck from the same stable. The *AD-F500* is a single transport deck, and the *AD-WX616*, also reviewed in that issue, is the comparably priced twin.

Aimed at a somewhat more quality conscious marketplace than the *616*, several of the *AD-F500*'s headline features are directed squarely at improving sound quality. It is important to qualify this, though, by remembering that it is always dangerous to definitively link specific characteristics of the sound you hear to particular hardware attributes.

Prominent features are the use of independent capstan and reel drive motors in a transport mechanism Aiwa describes as 'super stable' and having 'class beating' levels of wow and flutter. Other goodies include very fast wind speeds, PC-OCC headcoils, and a cassette shell clamp which rejoices under the name AMTS (Anti Modulation Tape Stabiliser in case you're collecting trivia questions). Also fitted are independent manual record bias and sensitivity adjusters, the latter being useful for avoiding Dolby mistracking.

Remaining features include Dolby B and C, Dolby HX Pro, audible cueing, track search (the latter worked only erratically on the test sample) and seven step 30dB record level meters. The transport is logic buffered, has large, easy to use controls and works quietly. A fixed level headphone socket is fitted, as is a timer standby switch. The tape counter however, is strictly manual, and no counter memory option is available.

## Test report

For some reason, the raw unweighted wow figure is slightly higher than for the *AD-WX616*, but all the other figures, including the overall weighted wow and flutter figure, support the thesis that Aiwa has been able to sink more resources into

this transport than into the two required for the equivalent twin. The superior numbers are supported by a more impressive spectrum analysis plot. The *AD-F500*'s frequency responses are also more accurate at the normal settings of the bias and level controls. The bass end is smoother with less 'ringing' and there is greater control and uniformity elsewhere, along with less dropout (see Type IV response plot) and much improved Dolby response accuracy. Only the playback response was significantly in error, the shape being clearly dished.

Curiously, the *AD-F500* was inferior to the *616* in the area of bias noise, by quite significant amounts - with or without the differences in THD taken into account.

## Sound quality

The increased noise levels of the *AD-F500* were less apparent than might have been expected. This would seem to be because the electronics of this model are more transparent and can be driven nearer to their limits without audible distress. Nevertheless, this isn't the quietest deck in its class, and it is generally not feasible to bypass Dolby processing, though as always this depends on the type of tape, and the nature of both the music and the playback system. As with the *AD-WX616*, the Dolby circuits are not totally transparent, but they remain a whole order of magnitude better than those fitted to the dual transport model.

Indeed, everything about this deck sounds an order of magnitude better, and the *AD-F500* is a triumphant reaffirmation of the sonic advantages of a single transport deck at the lower price points. The *AD-F500* is neutral and open sounding, with a solid and accurate bass. It has a clean refined treble and is capable of excellent presence and vitality.

## Conclusion

With slightly lower noise levels to facili-

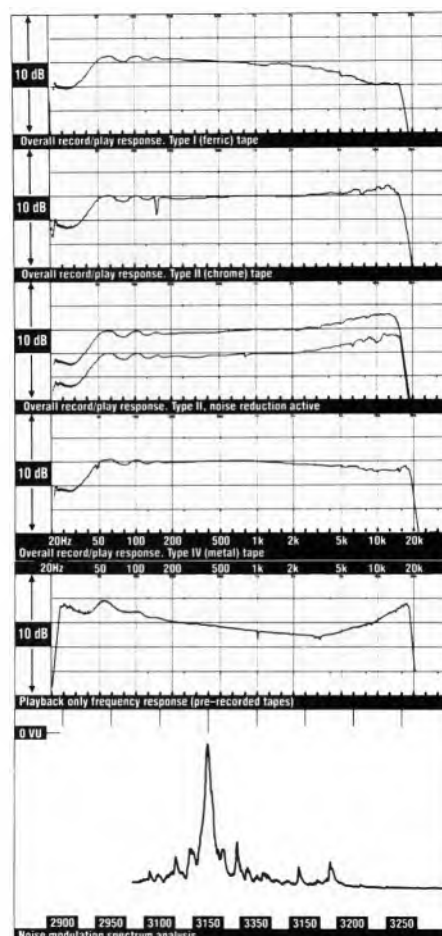
**Recommended**

tate Dolby-less recording, this would have been a Best Buy. It is still highly Recommended at the price - an excellent all-rounder.

*Note: Formal listening was carried out using a second sample after the first experienced failure on one channel.*

## TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/play response -3dB ref 1kHz	
IEC Type I	<20Hz - 16kHz
IEC Type II	<20Hz - 17kHz
IEC Type IV	<20Hz - 20kHz
Wow/Flutter - Peak DIN wtd	
/unweighted	0.08%/0.25%
Wow/Flutter - Peak DIN wtd	0.06%/0.30%
Speed error	0.9%
Type I signal/noise CCR/ARM 400Hz	47.5dB
& distortion 0VU	1.7%
Type II signal/noise CCR/ARM 400Hz	54dB
& distortion 0VU	0.85%
Type IV signal/noise CCR/ARM 400Hz	9.5dB
& distortion 0VU	0.95%
Noise Figure of Merit (Dolby level/noise Type II)	57dB
Line input sensitivity/overload	90mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	563mV/2.9V
IM distortion 10kHz/11kHz 0dB peak,	
1kHz product	2.82%
Azimuth check R-L phase at 10kHz	0 degrees
VU indication at IEC 0dB	3dB
Dimensions (w x h x d)	43x13.5x27cm
Average wind/rewind time (C90) 1 min 40 sec	very fast
Typical Retail Price	£135



# Denon DRM-510

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

**Recommended**



Denon's new budget baby is very much in the style of its predecessors. Headline features include Dolby HX Pro, in addition to the usual Dolby B and C, fine bias adjust and some simple search features. These include a mechanical tape counter, memory stop (independent of the counter) and record return which puts the tape back to the start point of the current recording. Headphone monitoring is available, but only at a fixed volume level.

Some long term nuisances and omissions have been perpetuated in this new model. In the former category is the Dolby switching which forgets its setting every time the deck is switched off. There is also a general criticism to be made of the status indicators and the record level meters which need to be peered at closely to yield any information. The 26dB range bicolour record level meters are adequate in price context, apart from the poor scaling.

Arguably the most important omission is timer standby, which means that the deck cannot be left to record unattended.

## Test report

In common with other new Denon models, the DRM-510 has a new, more highly integrated Dolby IC which has an on-board HF skewing network, a circuit that used to be handled externally. Greater stability at high frequencies and a 1-2dB improvement in signal/noise are the claimed benefits.

Not for the first time, Denon has excelled itself with a transport which outperforms most comers, at least in this price area. The weighted wow and flutter figure is little short of remarkable in context, and whilst this aggregate figure conceals a certain amount of flutter energy, the clean peak in the spectrum analysis shows that the deck keeps a basically steady pitch.

The Denon is capable of favourable frequency responses, but seemed some-

what wayward in its alignment to different tapes which underlines the benefits of experimentation with the bias pot. The Type II response is well matched to the characteristics of TDK SA, and the Dolby circuits line up well too. Prerecorded tapes are handled near perfectly from a technical standpoint, but look out for some brightness at normal bias settings with many Type IIs and IVs.

## Sound quality

The measured brightness turned into an insistent edge with female vocal material or close miked percussion at the standard settings with Type I and (to a lesser extent) Type IV tapes. On the other hand Type IIs, which demonstrated ideal alignment, were tonally neutral, and in any case delivered everything that metals were able to provide. This is not a deck that benefits from the extra dynamic range that metals, with suitable support from the hardware, can provide.

Driving a good Type II, with Dolby B and C alike, the Denon worked very well, with a consistency over a range of music that's unusual at this price level. Nor was there much to choose between Dolby B and C. On the whole, Dolby B sounded a little more open and spacious, but the difference was fairly small and was often safe to ignore.

Recording without noise reduction provided a livelier sound and much better stereo positioning, but wide ranging, dynamic material tended to be rather noise bound during quiet spells, and this option is not really feasible in normal day to day use.

With all these matters taken care of, the Denon proved impressive. Plucked bass had a tactile quality and the requisite fatness without blur or compression, at least compared to other low cost decks, whilst the treble was sharp and clear, with good differentiation of cymbals, massed vocals and so on. Prerecorded

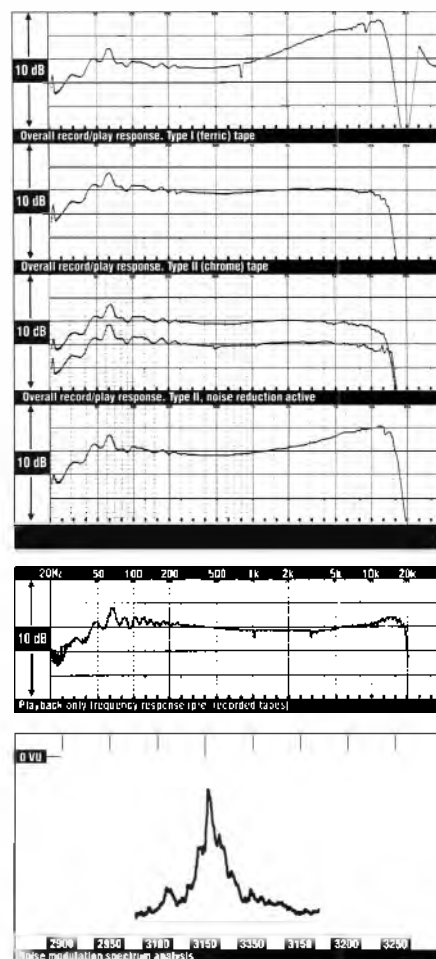
tapes were extremely well exploited by this deck.

## Conclusion

Musically ahead of its class, the Denon is a good basic cassette deck, let down only by penny pinching which inhibits usability in a presumed attempt at enhancing Denon's competitiveness. A mandatory Recommendation.

## TEST RESULTS

Dolby Level reading on deck's meters	0dB
Rec/replay response-3dB ref 1kHz	
IEC Type I	22Hz - 16kHz
IEC Type II	22Hz - 15kHz
IEC Type IV	22Hz - 18kHz
Wow & Flutter-Peak DIN wld/unweighted	0.10%/0.22%
Wow/Flutter-Peak DIN wld	0.064%/0.21%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	52dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	0.95%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	58dB
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	2.1%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	55.5dB
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	1.9%
Noise Figure of Merit (Dolby level/noise Type II)	58dB
Line input sensitivity/overload	103mV/13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	872mV/227V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	1.0%
Azimuth check R-L phase at 10kHz	50degrees
VU indication at IEC 0dB	0dB
Dimensions (wxdh)	435x12.4x27.5cm
Average wind/rewind time (C90)	2 min 36 sec
Typical Retail Price	£140



# Denon DRW-650

HAYDEN LABORATORIES LTD, CHILTERN HILL, CHALFONT ST PETER, BUCKS SL9 9UG. TEL: (0753) 888447

**Recommended**



This deck is built around the simplest possible pattern, that is two unidirectional transports just one of which is record capable. Dolby IIX Pro helps make the best of low bias tapes. Normal and double speed dubbing is available using just a single key for each speed to set the process in motion. Sequential ('relay') play is also available. On the tape search side, the deck has a mechanical tape counter with memory stop and a simple track search feature enabling the deck to locate the next track or the start of the current track. A variable bias control and fixed level headphone socket complete this rather austere package.

Like previous twin decks of this marque, the DRW-650 uses a single set of transport controls which are assigned to one transport or the other, depending on which deck was last loaded with tape or the setting of a 'deck select' key. I have praised this arrangement in the past for the useful simplification it allows of the control section, but long term experience shows that the lack of prominence given to the assignment key and the associated telltales (Marantz does this much better, as on the SD515 for example) negates the advantage of simplicity. I suspect many others, too, will find the ergonomics counter-intuitive.

Long term limitations of the Denon proto-design (as you might say) have been partly addressed. The electronic Dolby switching now remembers its setting when switched off, but there is still no timer standby feature, more's the pity.

## Test Report

The replay response test shows quite a good match between transports, though a mild midband balance shift was measured. The record/replay plots are a little wayward in the bass and mid treble, but, more significantly, the nature of the Dolby plots shows a rather peculiar error in the area of operation of the anti-

saturation network near 15kHz. Signal/noise is somewhat below expectations as is channel separation (results not tabulated) of 42dB at 1kHz, nearly 10dB below the group average. The good news concerns pitch integrity, which is of a high order for a £200 twin. Wow was not audible under normal circumstances and tape to head contact was good, leading to a feeling of stability. But the amount of flutter band energy (see spectrum analysis) turned out to be worryingly high.

## Sound Quality

In common with most other twin cassette decks, the Denon DRW-650 is at its worst when doing what it has been specifically designed to do. Dubbing performance is far from brilliant. It's OK at normal speed as you'd expect, but high speed dubs sound well and truly flattened - dynamically, spatially and tonally.

As a playback machine, the comparatively modest difference noted between the two transports in the playback response plot is effected considerably by azimuth differences and by the exaggerating effect of Dolby B processing. In short, the modest difference takes on near chasmic proportions. At best, prerecorded material sounds accurate and highly explicit. Switch to the other transport and you jump back 50 feet, and much of the detail and openness goes.

Finally, as a recorder, the Denon shows considerable strengths alongside some distinctive weaknesses. It is difficult to ignore a certain background instability, as high frequency hiss varied in level behind transient material, though inevitably this was much more obvious on headphones than loudspeakers. Musically, however, the Denon DRW-650 sounded quite good. The high frequency content wasn't wholly natural: there was a strained feeling at times, and occasional signs of excess even with Type II tapes. On the whole, though, this is one of the

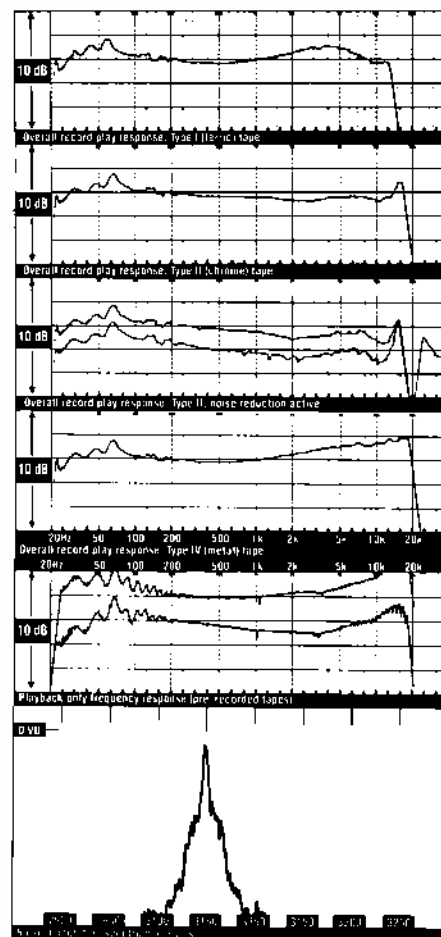
better twin decks at this price level.

## Conclusion

Good value for money, and Recommended. Sound quality ranks as pretty good, which is better than most twin decks achieve. Nevertheless, there was inconsistency of sound between the two transports and the Dolby circuits are not the cleanest around.

## TEST RESULTS

Dolby Level reading on deck's meters	0dB
Rec/replay response -3dB rel 1kHz	
IEC Type I	20Hz - 14kHz
IEC Type II	<20Hz - 18kHz
IEC Type IV	<20Hz - 21kHz
Wow/Flutter - Peak DIN wtd/unweighted	0.13%/0.13%
Wow/Flutter - Peak DIN wtd	0.08%/0.14%
Speed error	0.2%
Type I signal/noise CCIR/ARM 400Hz	51dB
& distortion 0VU	1.1%
Type II signal/noise CCIR/ARM 400Hz	57dB
& distortion 0VU	0.95%
Type IV signal/noise CCIR/ARM 400Hz	54dB
& distortion 0VU	1.3%
Noise Figure of Merit (Dolby level/noise Type II)	57dB
Line input sensitivity/overload	97mV/V >13
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	900mV/4.3V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	A=2%/B=1.5%
Azimuth check R-L phase at 10kHz	A=60 degrees/B=0 degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	43.5x12.5x27.5cm
Average wind/rewind time (C90)	2 min 47 sec/slow
Typical Retail Price	£200



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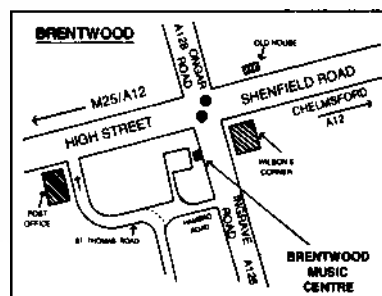
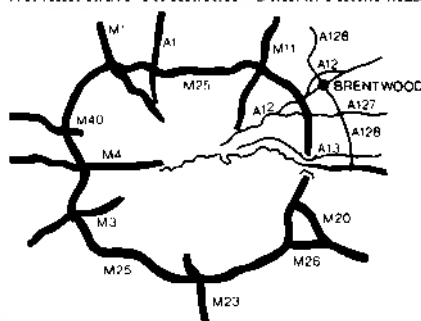
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# Denon DRW-750A

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

**Recommended**



The 'A' suffix indicates a package deal of improvements which Denon aptly describes as a 'mid-life upgrade', though the measures concerned are comparatively modest. They consist mainly of an improved wrap around cover (still no great shakes) for reduced vibration, a ceramics composite based cassette shell stabiliser and an improved Dolby IC which conjures up an extra dB or so for the signal/noise ratio. There has been one other improvement: electronic switching of Dolby B and C has been replaced by a real switch which remembers how it was set. No more setting Dolby one day and finding it unset the next.

The two transports are unidirectional mechanisms, and only one of them is capable of recording. Rather than have a set of controls for each transport, Denon has fitted just one set, plus a key that assigns them in turn to one transport or the other. This makes for a minimum of controls, but can render operation a little clumsy.

Dolby HX Pro headroom extension is included, alongside Dolby B and C, while bias can be fine tuned to the requirements of individual tape formulations. The memory stop tape counter has an electronic readout of the currently selected transport. A next/last track search device is also fitted.

Dubbing betwixt one transport and t'other can be performed at normal or double speed, and sequential play is also possible. Recording levels are set using short but high resolution bicolour 30dB meters.

## Test report

The DRW-750 is not fitted with one of Denon's finest transport mechanisms. The wow and flutter levels will cause little envy among Denon's legion of competitors, whilst the spectrum analysis plot shows some obvious flutter band artefacts. There is at least real consistency

between the two transports, though a proportion of any variation that exists is shown in the numbers as the test tape was recorded using the record capable transport.

There is nothing important wrong with the frequency responses, though alignment to the IEC test tapes is erratic and suggests some rebiasing will often be necessary, and some response modification is apparent under the Dolby B regime too. The LF response shape is well optimised, and compatibility with prerecorded material is of a high order. Note that metal tape offers a somewhat limited signal/noise performance (as usual), but that this cannot be compensated by raising the recording level since the tape is well on the route to saturation even at 0VU.

## Sound quality

Barring a certain (and programme dependent) frazzled quality in the extreme treble, this is a pretty good sounding deck. Typical of the prerecorded test tapes, the Tracy Chapman song *Mountains O' Things* sounded close and tactile, with vowel sounds clearly enunciated, though some of the consonants sounded hard or spitty. The maracas were miraculously transported forward in the mix almost to be point where it appeared to be happening inside the outer ear!

The Denon was equally effective as a recorder, though with all tape groups the sound appeared to sail very close to the wind, verging consistently on the brink of sounding edgy, if not actually distorted. The amount of information culled off tape was quite impressive however and the bass end was also of good quality, with adequate depth and tunefulness. Both noise reduction processes worked in more or less comparably unobtrusive ways.

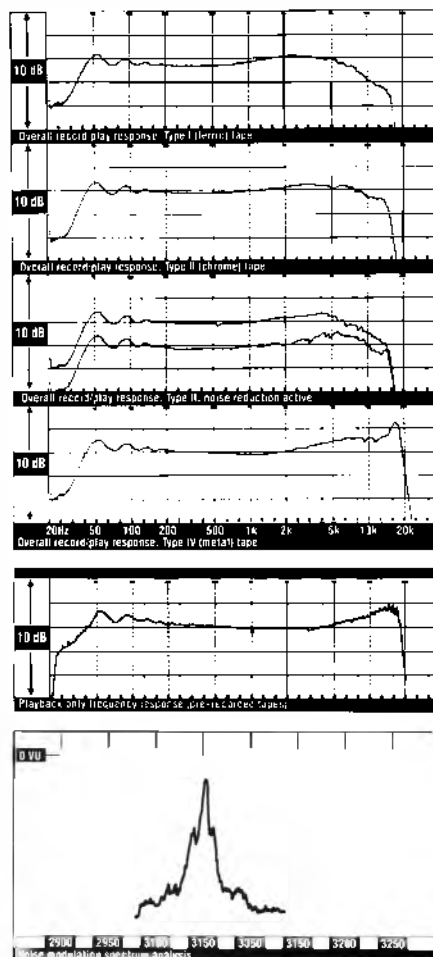
## Conclusion

This relatively expensive dual transport model has a conservative specification

which has enabled Denon to do the job properly. You can get still better at this price from a single transport model, but the gap isn't huge, and a Recommendation is in order.

## TEST RESULTS

Dolby Level reading on deck's meters	0dB
Rec/play response -3dB ref 1kHz	
IEC Type I	33Hz - 15kHz
IEC Type II	31Hz - 16kHz
IEC Type IV	31Hz - 21kHz
Wow & Flutter - Peak DIN wtd/unweighted	A 0.22%/B 0.24%/A 0.24%/B 0.29%
Wow/Flutter - Peak DIN wtd	A 0.12/B 0.15%/A 0.24%/B 0.25%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	52dB 0.75%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	56dB 1.2%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	55.5dB 2.1%
Noise Figure of Merit (Dolby level/noise Type II)	56dB
Line input sensitivity/overload	99mV/13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	885mV/3.7V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.14%
Azimuth check R-L phase at 10kHz	A=20 degrees, B=30degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	43.4x12.5x27.5cm
Average wind/rewind time (C90)	2 min 32 sec
Typical Retail Price	£249



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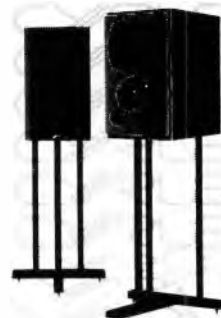


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# Kenwood KX-7030

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

**Recommended**



This design will appeal to the audiophile on a budget. The KX-7030 features three heads and a closed loop, dual capstan transport, and off tape monitoring is automatically controlled with a manual override as necessary.

Less commonly used gadgets are handled by a row of small but well spaced switches, and include Dolby B/C switching plus Dolby HX Pro, index scan (née intro scan) and A-B repeat. Various similar transport related automatic functions such as dash and play (in which the deck skips past long unrecorded sections of tape on replay), single tune repeat, zero stop, etc are available by appropriate (and inevitably difficult to memorise) combinations of main transport keys. The Kenwood will also skip up to sixteen tracks in either direction.

More interesting still is a half-way house but still extremely useful auto biasing function (there's no equivalent sensitivity adjustment). Only one button press and about fifteen seconds are required for this circuit to set record bias for your tape, another button press memorises the setting for each of the three tape types - ferric, chrome and metal.

The transport section is handled by a well designed and laid out set of transport keys, and is free of solenoid induced clicks, though the deck still feels somewhat clonky changing modes, and tape rewind is not the quietest. Headphone monitoring levels can be adjusted, and timer standby operation is permitted. Although there is no direct remote control facility, data link sockets are fitted for linked system operation with other Kenwood components.

## Test report

The dual capstan transport offers a performance standard that is on a par with the better offerings in this price band. Wow and flutter, severally and together, are decently restrained, and the spectrum

analysis looks reasonably clean, though it is not the cleanest. The various frequency responses are well tailored at the low frequency end of the audio frequency band, though each of the tape groups is about 2dB proud at the top end of the passband. Ordinarily this wouldn't matter a great deal because it could be sorted out, at least approximately, by adjusting the fine bias control that most manufacturers thoughtfully provide to cover up the inadequacies of their decks and the cassette tapes themselves. Not so here; the plots shown were produced by the deck after auto-biasing had taken place, no further tweaking is possible.

The noise and distortion numbers are satisfactory, with a full 59.5dB ultimate signal/noise available from metal tapes (three percent THD, 400Hz) and only half a decibel less, 59dB, with Type II.

## Sound quality

The KX-7030 was a success on audition. The electronics sounded transparent when auditioned with the deck in the 'source monitor' position, and turning to tape made a gratifyingly small difference. Tonal colours were fairly accurate or just perceptibly lightened in most cases, slightly contradicting the measured results.

I was particularly impressed by the Kenwood's performance at the frequency extremes. It sounded taut and clean, with plenty of grip in the bass and an abundance of detail in the treble. Indeed for abundance you could read super-abundance; the Kenwood can sound a little lacking in the organic strengths, it's a little too dry, and the detail seems almost highlighted. It is this which separates it from the best.

The KX-7030 was good enough to profit from the use of metal tapes, which gave a more positive and solid sound than Type IIs. As so often, Dolby B offered the nearest to an optimum compromise between

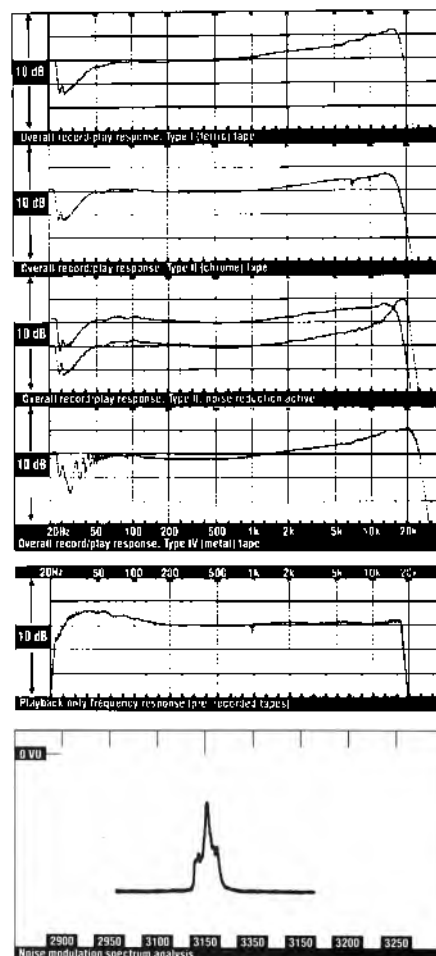
transparency and background hiss with most music, though densely scored material was often satisfactory without noise reduction altogether.

## Conclusion

An excellent £260's worth. The Kenwood can sometimes sound almost like a caricature of itself, but its fine stability and clarity carry it through. Recommended.

## TEST RESULTS

Dolby Level reading on deck's meters	n/a
Rec/replay response -3dB ref 1kHz	
IEC Type I	25Hz - 20kHz
IEC Type II	25Hz - 20kHz
IEC Type IV	25Hz - 24kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.10%/0.15%
Wow/Flutter - Peak DIN wtd	0.06%/0.14%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	48dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	53dB
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	51.5dB
Noise Figure of Merit (Dolby level/noise Type II)	n/a
Line input sensitivity/overload	127mV/>>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	925mV/4.1V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.32%
Azimuth check R-L phase at 10kHz	0 degrees
VU indication at IEC 0dB	+5dB
Dimensions (wxhxd)	44x12.7x32.4cm
Average wind/rewind time (C90)	1 mn 38 sec
Typical Retail Price	£260



# Nakamichi Cassette Deck 2

NAKAMICHI B&W (UK) LTD, MARLBOROUGH ROAD, CHURCHILL INDUSTRIAL ESTATE, LANCING, WEST SUSSEX. TEL: (0903) 750750



The rather pedantic sounding moniker *Cassette Deck Two* was presumably an attempt to avoid the singularly inappropriate and perhaps misleading title *CD2*. Prepare to be confused.

£300 is cheap for a Nakamichi, so it was no surprise to discover that the *CD2* is a two-head deck at a price level where most of Nakamichi's competitors are producing more glamorous three-head machinery. The austerity message is reinforced by the decision to use manual tape group switching.

Elsewhere, the *CD2* is about par for the course. There is a bias trim pot, Dolby B and C with an MPX off switch (but no Dolby HX Pro) and an electronic tape counter with a 'zero search' key.

But it is the details you can't see that mark the *CD2* out. These range from the minor - like automatic elimination of tape slack and the near silent transport engagement - to major points like a re-engineered capstan, an improved servo, a rigid single piece chassis and increased headroom (20dB ref 0VU claims Nakamichi) in the record/play amps. There are also less tangible benefits, of which two deserve special mention. The first is separate, independent, internal L and R bias adjusters for all three tape groups. Most decks these days have a single adjustment that forces all settings to track together. The other is an unrivalled backup which guarantees indefinite servicing to the full original specification, automatic replacement of consumables like belts and pulleys and automatic updates where available.

## Test report

Wow and flutter isn't quite as low as the remarkable Pioneer *CT-757*, and the spectrum analysis shows a number of well distributed error artefacts. But

numerically, the *CD2* still figures amongst the best in the group.

The replay only frequency response shape is fairly accurate, the major anomaly being a sharp output rise in the extreme HF area, above 10kHz, with peak level at least 4dB ref 0VU at the 18kHz measuring limit. The only other very mild effect was a slight shelving up of response above 1kHz with all tapes, including the prerecorded variety. The effect is limited in amplitude to around 1dB, but as this is a wideband phenomenon, the amount of energy involved is substantial and some aural effect can be anticipated. Signs of the promised headroom can be seen in the exceptionally low IM and Type II and IV THD figures.

## Sound quality

The Nakamichi is proof - if proof be needed - that what emerges from the loudspeakers at the end of the day is not necessarily what the numbers say you are going to get.

Prerecorded material, for example, shows a trace of grit which was not expected from the measurements. But this deck also offers range and power, and a vivid sense of instrumental colour and texture in the bass and mid that is extremely rare from any cassette deck. The bass sounds a little lean and dry, and the treble is somewhat rough in feel, even taking into account the slightly exposed treble suggested in the measurements.

The sound has real balls, but needs the superior dynamic headroom and consistency of metal tapes to make it work at its best. It is also a good idea to avoid Dolby noise reduction. Lack of Dolby tends to exaggerate the graininess of the sound, but it also helps to retain clarity and liveliness in a way that Dolby seems unable to emulate.

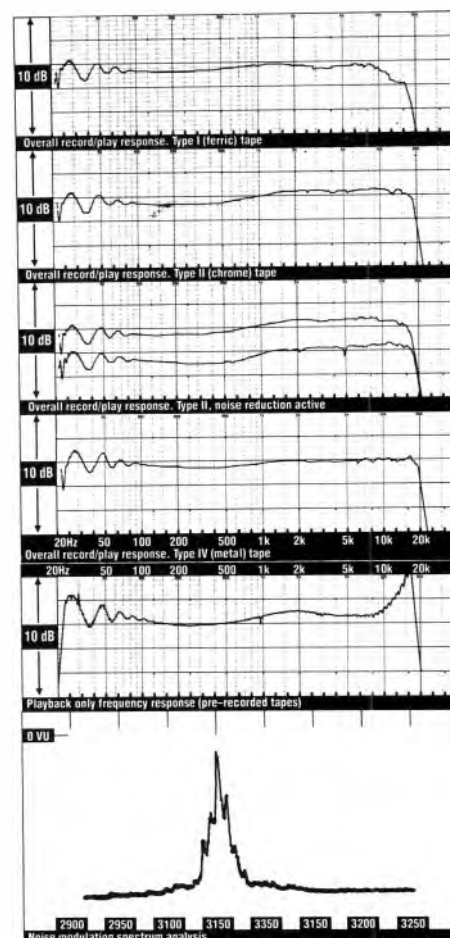
**Recommended**

## Conclusion

To describe the sound as raw but real is perhaps an exaggeration on both counts, but provides a fair flavour of the beast. Not for the fainthearted, the Nakamichi is a distinctive product in this price range, but you'll have to live without the extras.

## TEST RESULTS

Dolby Level reading on deck's meters	n/a
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 17kHz
IEC Type II	<20Hz - 20kHz
IEC Type IV	<20Hz - 20kHz
Wow/Flutter - Peak DIN wtd /unweighted	0.08%/0.17%
Wow/Flutter - Peak DIN wtd	0.05%/0.15%
Speed error	0.01%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	48dB 1.1%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	54.5dB 0.55%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	52.5dB 0.50%
Noise Figure of Merit (Dolby level/noise Type II)	n/a
Line input sensitivity/overload	70mV/13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	668mV/5.5V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.045%
Azimuth check R-L phase at 10kHz	40 degrees
VU indication at IEC 0dB	1dB
Dimensions (wxhxd)	43x10x32cm
Average wind/rewind time C90	2 min 23 sec/slow
Typical Retail Price	£350





# Rotel RD-855

GAMEPATH LTD, 25 HEATHFIELD, STACEY BUSHES, MILTON KEYNES  
MK12 6HF. TEL: (0908) 317707



The RD-855 is basically a simplified version of the RD-865 (the 845 is quite different under the skin) and shares the same basic transport mechanism and circuit. The most substantive under the skin differences are comparable to those that distinguish, say, the Rotel RA820AX and 820BX4 amplifiers: namely fewer high grade audio components, though some remain. Dolby HX Pro has been omitted from this deck, and the display is a somewhat simpler design.

No new ground is broken on the facilities front. The deck is designed for basic recording purposes and (almost) everything is concentrated on that one goal, which helps explain the much greater than usual structural solidity and the workmanlike build quality found inside. Dolby B and C circuits are complemented by a switch to defeat the multiplex (MPX) filter, the preferred method of use except in those very few cases where enough pilot tone is left on a source FM signal to confuse the Dolby circuits. Tape search aids include a mechanical memory counter (again unilluminated) and a simple track search feature which will play from the start of the current or next track. Repeat and record mute functions complete the list. Note that this is one of the few decks in this price area without a headphone socket or a timer standby facility.

The RD-855 uses large controls and not too many of them; so it is extremely easy to drive. On the negative side, the transport has extremely noisy solenoid actuators and the bright level display completely drowns the unilluminated scale calibrations, though the readout changes from green to red at 0VU which removes most of the objections.

## Lab report

The transport measured well, but the spectrum plot showed some prominent narrow band effects close to the central

3150Hz test signal peak which is almost certainly due to a capstan being slightly out of true. The electronics are very quiet but 0VU distortion is fairly high with Type IV (metal) tapes, which are not fully exploited by this deck. Head alignment is near perfect, but only Type I tapes provided an accurate response shape and even here the bass is somewhat boosted.

## Sound quality

Prerecorded cassettes betrayed the measured balance by sounding distant in the midband, often affecting vocals. At the same time, a full bass and a prominent extreme treble favoured bass lines, cymbals and other instruments whose presence is felt mainly at the frequency extremes. The balance was far from natural, yet there was an underlying clarity and honesty that makes the deck engaging and informative.

As a recording tool, the strengths of the Rotel are no less obvious. The wayward frequency response with Type II tape was reflected in a slackening of tension and concentration. On the other hand, Type I and IV tapes which measure nominally flat actually tended to sound a little bright and edgy.

Irrespective of the tape type in use, however, the Rotel proved to be a surprisingly successful recorder. One of its particular strengths was fine sounding electronics - monitored in the tape loop of partnering amplifiers with the tape stationary.

Compared to the majority of cassette decks in this price region, the Rotel sounds transparent and dynamic, the particularly strong sense of bass weight adding stability and scale to the music which on other recorders sounded rather insubstantial. The process of recording and playing back the music led to fairly obvious qualitative losses in various ways, but the fine electronics help redress the balance.

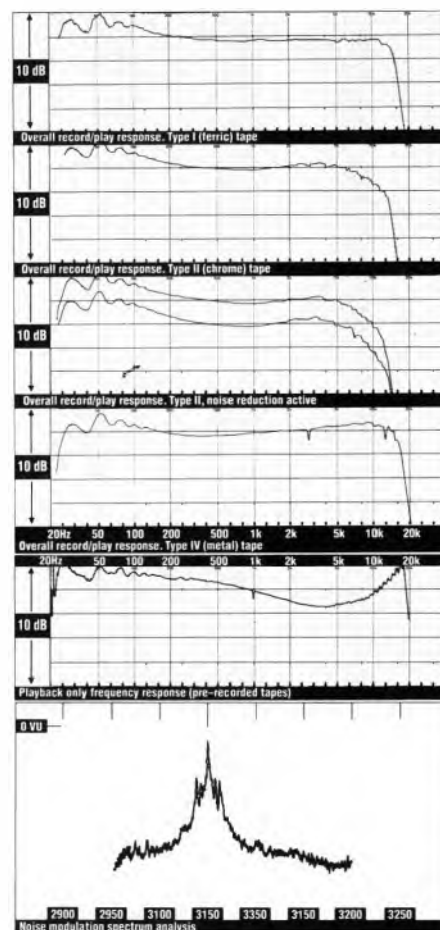
**Recommended**

## Conclusion

The tape (transport, head etc) section of the 855 is nothing special, but the record and replay amps allow the Rotel to exceed expectations. Recommended.

## TEST RESULTS

Dolby Level reading on deck's meters	0dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	20Hz-16kHz
IEC Type II	20Hz-14kHz
IEC Type IV	20Hz-17kHz
Wow & flutter - Peak DIN wtd/unweighted	0.09%/0.20%
Wow/flutter - Peak DIN wtd	0.05%/0.23%
Speed error	-0.02%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	52.5dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	57dB
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	50dB
Noise Figure of Merit (Dolby level/noise Type II)	57dB
Crosstalk + Noise ref 0VU/kHz	51dB
Line input sensitivity/overload	73mV/13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	840mV/2.2V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	1.12%
Azimuth check R-L phase at 10kHz	5 degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	44.4x11.5x32.5cm
Average wind/rewind time (C90)	2mins 22sec/slow
Typical Retail Price	£180



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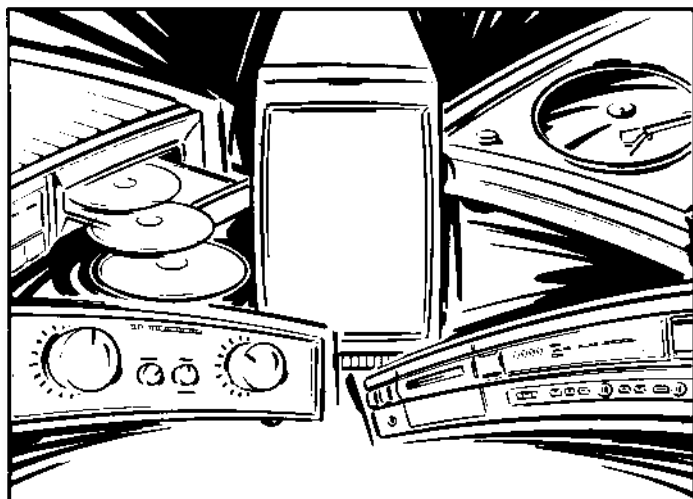
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# Sony TC-K570

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



The TC-K570 was conceived for those who take sound quality seriously but don't wish to commit both an arm and a leg to the acquisition of a seriously decent cassette deck.

First and foremost, this is a three head deck with the ability to monitor off tape whilst recording. Minor refinements include a motorised door mechanism with a cassette shell clamp. The transport engages quietly, a contrast with the clanky sound effects Sony built into previous ranges. The goody count extends to a time counter with memory stop and track search as the main search aids, and even an illuminated cassette well.

Dolby B and C noise reduction are switched by a natty rotary switch, and HX Pro processing is also included. Other features of note include an MPX filter switch and manual bias adjust. Tape/source monitor selection is manual, which is a mild annoyance. Finally, there is a three position switch which changes the display (which normally fields excellent 38dB record level meters with peak hold LEDs) to show the tape counter only, or nothing at all, a feature which serves aesthetic ends aside from any musical changes it implies.

## Test report

Here is one of the very few three-head decks which does not also have a dual capstan transport, two items that normally fit together as close as a horse and carriage. Nevertheless the wow and flutter figures are good, though what looks as though it may be capstan wow can be seen in the spectrum plot.

Signal/noise is, if anything, a little better suppressed than usual, and harmonic distortion due to tape overload is held well in check, allowing peak levels of +7VU (three per cent THD, 400Hz) with metal tapes, though the +3dB figure for Type II tapes is unexceptional. Note also the high level of 0VU intermodulation

distortion with the applied 10 and 11kHz test signals, which is a sign that the record chain is becoming seriously non-linear at this point.

## Sound quality

Sound quality of prerecorded material varied somewhat from tape to tape, presumably reflecting differences in azimuth, but at best was extremely good, with a naturally layered and extremely expressive style of delivery with free ranging dynamics and excellent control.

In other cases, the sound became grey and flat - but that's cassette for you. The inherent quality of the Sony shows the limitations of the medium all too effectively.

The CD direct input is connected directly to the Dolby noise reduction processor IC, bypassing the input buffer amp and MPX filter input level control, and this is the input to use. It is palpably more transparent and dynamic sounding, but even so the bass and midband have a sinewy quality, a heaviness or lack of airiness (as you prefer) which detracted from the source.

At the other end of the frequency band, it proved difficult to find tapes that exactly fitted the Sony's characteristics - and this includes Sony's own tapes. Rebiasing to correct the loss of mid/top presence always bought a dullness to the extreme treble. Although none of the effects described here are particularly severe, they are enough to cause some misgivings.

## Conclusion

This model is a genuine pleasure to use, with an operating feel typical of decks costing rather more. This aspect is only let down by manual tape/source monitor switching.

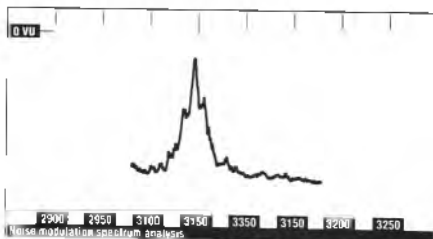
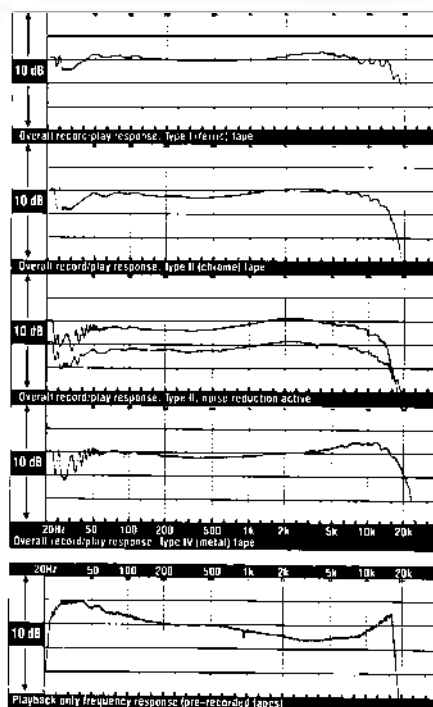
Notwithstanding the shortcomings uncovered on test, it would be bizarre not to recognise its very real virtues, or to fail to take into account the low price and

**Recommended**

excellent features count - headlined by off tape monitoring of course. Recommended.

## TEST RESULTS

Dolby Level reading on deck's meters	-2dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 18kHz
IEC Type II	<20Hz - 16kHz
IEC Type IV	<20Hz - 21kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.10%/0.19%
Wow/Flutter - Peak DIN wtd	0.06%/0.17%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	53dB 0.5%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	57.5dB 1.2%
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	57.5dB 0.75%
Noise Figure of Merit (Dolby level/noise Type II)	55.5dB
Line input sensitivity/overload	109mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	525mV/3.5V
IM distortion 10kHz/1kHz 0dB peak, 1kHz product	15.8%
Azimuth check R-L phase at 10kHz	80 degrees
VU indication at IEC 0dB	0dB
Dimensions (wxhxd)	43x12.3x30cm
Average wind/rewind time (C90)	1 min 48 sec
Typical Retail Price	£200



# Technics RS-B965

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



Here is another all-singing up-market cassette deck from the Technics stable. Styling is in the standard modern Technics scheme of dark chocolate brown with a lot of front panel sculpting and a plethora of control buttons, a number of which are extremely close together and fiddly to operate. Certain key features are all too easily overlooked, an example of which is the record bias/level calibration key the presence of which was missed during the measurement programme, which meant re-running the lab tests from the start.

The transport is a dual capstan type which is driven by a very sophisticated proprietary quartz locked direct drive capstan motor. The casework uses synthetic compounds to damp resonances and reduce microphony. Turning to the user features, the Technics spec sheet includes the aforementioned bias/equalisation set-up routine, which involves pressing the appropriate key when in record mode, which changes the meter to an alternative display mode. From then on it's a two stage match needle process. Noise reduction is by Dolby B, C and dbx, and Dolby HX Pro processing is included.

There is a plethora of minor features too: dual range meters (long and offering high resolution) and an optional peak hold readout (used when scanning CDs etc for peak levels), a time/rolling number counter with memory stop and repeat options, and track search. Headphone monitoring level is adjustable, and the eject key is powered and linked into the deck's control logic, which like the dual range meter option, was first introduced to the market (as I recall) by Pioneer.

## Test Report

It would be more than a little surprising if the Technics high tech complement of quartz locked direct drive capstan motor and closed loop dual capstan transport didn't result in very good mechanical

behaviour, and sure enough the spectrum analysis is exceptionally clean and sharp looking, with just mild discrete artefacts to detract from the near ideal showing. The various numerical figures relating to wow, flutter or both are also impressive.

The frequency responses after calibration are good, with a characteristic slight rise at the top end which is exaggerated by noise reduction - dbx especially, for which the tape was separately calibrated. The replay only response shape is also a textbook example of its type.

## Sound Quality

The powerful noise reducing effect of dbx is particularly effective at reducing mid and low frequency tape noise untouched even by Dolby C. Unfortunately, it leaves the music with a coagulated quality, short of low level detail, which reminded me of overcooked rice - and also why just about every other manufacturer has stopped using dbx on domestic cassette decks. Dolby C wasn't all that much better, but there was more presence and shape to the sound, and further improvements to be had by switching to Dolby B, or running without noise reduction at all. This is entirely feasible with most types of programme material, even open textured chamber or recital music, as the ability of the Technics to push tape to the point where other decks are in serious if not terminal trouble is one of this model's greatest joys. Ultra quiet tapes like TDK SA-X work well, but a good metal (MA-X etc) has a tauter, sharper and more dynamic quality altogether, and is well worth the extra cost - Dolby HX Pro notwithstanding.

The Technics is not merely good at shovelling on the level. It has open and surprisingly transparent sounding record and play electronics which are almost certainly an improvement over the previous range.

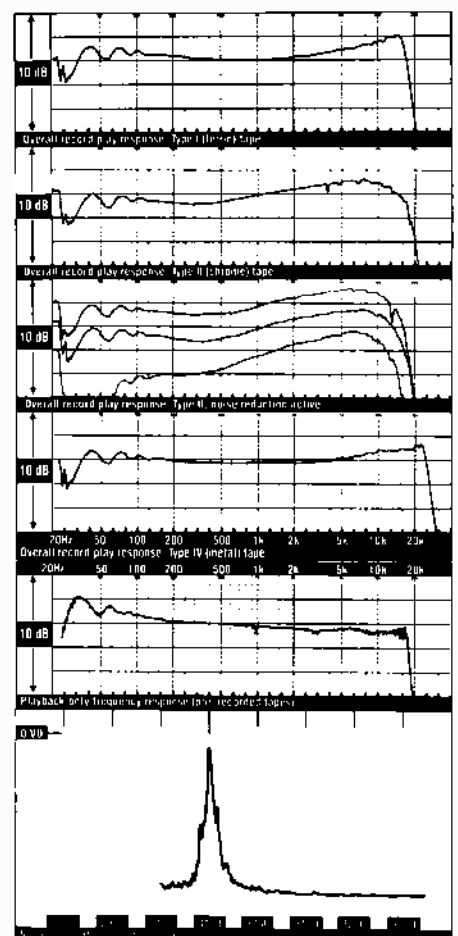
**Recommended**

## Conclusion

There are shortcomings: patchy ergonomic details and some tape mod noise in particular, but this is the best sounding Technics I can recall. It sounds excellent with prerecorded material but comes into its own when recording with high energy tapes without noise reduction. Recommended.

## TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 17kHz
IEC Type II	<20Hz - 11kHz
IEC Type IV	<20Hz - 25kHz
Wow/Flutter - Peak DIN wtd	
/unweighted	0.08%/0.17%
Wow/Flutter - Peak DIN wtd	0.05%/0.15%
Speed error	+0.05%
Type I signal/noise CCIR/ARM 400Hz	47dB
& distortion 0VU	0.95%
Type II signal/noise CCIR/ARM 400Hz	56dB
& distortion 0VU	0.55%
Type IV signal/noise CCIR/ARM 400Hz	50dB
& distortion 0VU	0.50%
Noise Figure of Merit (Dolby level/noise Type II)	59dB
Line input sensitivity/overload	92mV/>9.23V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	629mV/7.18V
TH distortion 10kHz/11kHz 0dB peak, 1kHz product	0.32%
Azimuth check R-L phase at 10kHz	15 degrees
VU indication at IEC 0dB	+4dB
Dimensions (wxhxd)	43x13.5x29cm
Average wind/rewind time C90	2 min 9 sec/average
Typical Retail Price	£350





# Yamaha KX-330

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

**Recommended**

Buy material, but a strong Recommendation is in order.



This well endowed new design, available in black or titanium finishes, is a direct replacement for the KX-300, and mates a new corporate front panel scheme to a range of features even wider than that of its predecessor. The design of the front panel - if design is the right word - makes extensive use of small and cramped controls, most of which are rotaries. Panel graphics are jumbled and the display is of high quality but again rather cramped. But whatever shortages there are of style are easily made up by what the deck offers.

The list includes a logic controlled transport with well designed controls and dedicated intro scan keys, Dolby B and C noise reduction with an MPX defeat option and the additional benefit (as an estate agent might put it) of Dolby HX Pro headroom extension circuitry. Track search is available too.

Manual fine adjustment of bias, available with all three tape groups, allows a range of different formulations to be matched correctly. This is supplemented by play trim (carried over from the KX-300) which adjusts replay equalisation before the Dolby replay circuitry, so that tapes recorded on a different and perhaps slightly misaligned deck can be corrected. Equalisation takes place before Dolby encoding so that the circuit can be used to correct Dolby tracking errors, though not independently of any treble loss due, for example, to azimuth misalignment. Usually though the play trim adjustments will put both to rights.

The record level meters cover a 32dB range with adequate resolution, peak hold and a display showing the maximum suitable record level setting for the tape group in use. A beautifully clear electronic tape counter is now used by Yamaha with memory stop and block repeat features. The deck will also return to the start of a recording with a single command. A remote control handset is also available.

## Lab report

Measured performance standards are about right at this price level. The transport is comparatively stable, though some (presumed) capstan wow is evident. Frequency responses are all well maintained into the deep bass and treble regions, but they're all dished, with a broad, shallow depression in the middle frequencies. Being broadband, this can be expected to reflect in the listening results. 0VU noise and distortion are satisfactory, but the HF intermodulation figure shows that headroom is limited in this region.

## Sound quality

This is a good-to-excellent cassette deck, clearly one of the better sounding decks in its price range with an emphasis on powerful dynamics and a crisply defined sense of detail.

There was plenty of drive but also some roughness at times, mainly with voice tone, but also noticeable with woodwind and strings. I detected little benefit in the use of metal tapes either, but on the whole there was little to complain of with the sound of Type IIs, such as TDK SA, on this deck as long as the bias level was increased a little to reduce the treble excess.

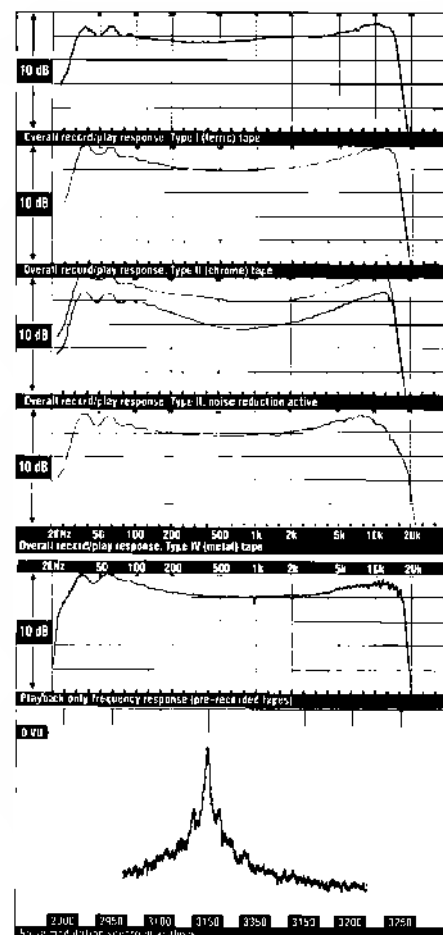
The general rule of thumb with cassette decks is that the two Dolby circuits tend to mask fine detail, dynamics and stereo soundstaging in the process of clearing up the hiss, but the losses were less marked here than in some competing decks. On the whole, the Yamaha KX-330 is one of those decks that sound better with Dolby than without, though dense, loud music which masks noise can tip the balance.

## Conclusion

This deck for the most part sounds stable and clean, with strong dynamics and a solid bass. There is a degree of roughness at times, but nothing that isn't commensurate with price. Not quite Best

## TEST RESULTS

Dolby Level reading on deck's meters	2dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	25Hz-16kHz
IEC Type II	25Hz-17kHz
IEC Type IV	25Hz-18kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.09%/0.13%
Wow/Flutter - Peak DIN wtd	0.09%/0.12%
Speed error	+0.06%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	48dB 1.2%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	50dB 1.2%
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	50.5dB 0.8%
Noise figure of Merit (Dolby level/noise Type II)	52dB
Crosstalk + Noise ref 0VU/kHz	49dB
Line input sensitivity/overload	1.06mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	537mV/3.57V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	3.9%
Azimuth check R-L phase at 10kHz	40 degrees
VU indication at IEC 0dB	4dB
Dimensions (wxhxd)	43.5x11.7x27.3cm
Average wind/rewind time (C90)	2mins 20sec/slow
Typical Retail Price	£180
+remote control optional extra	- £20





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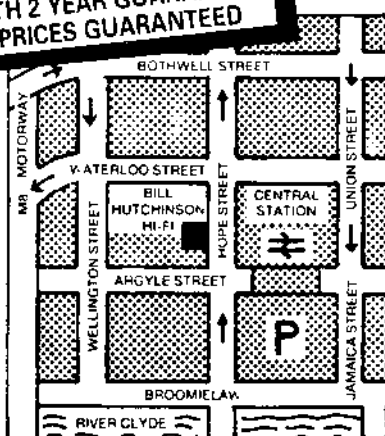
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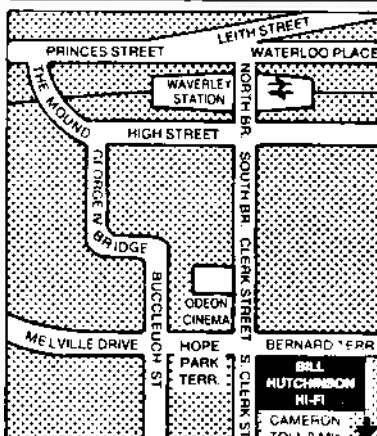
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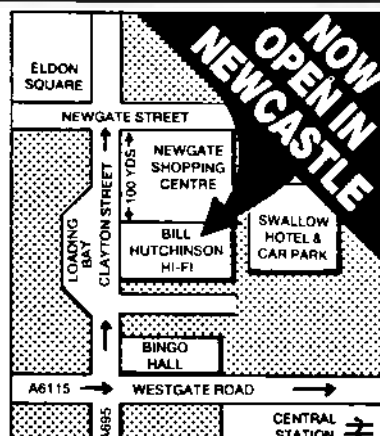
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# Yamaha KX-650

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



Designed to succeed the KX-630, the KX-650 has been built with Yamaha's customary clean cut but rather cluttered high-tech styling, relieved only by the subtle rounding of the top and bottom edges.

Headline features include independent record and play heads for monitoring off tape in real time. The only tape tuning facility is a fine bias control. Prerecorded tapes and tapes recorded on other decks with incompatible head azimuth, or slightly different Dolby level settings that would cause mistracking, can be accommodated however - not with adjustable azimuth, but with the next best thing: play trim, which gently varies the overall HF response to help it fit the Dolby replay curve. Dolby HX Pro is included.

A remote control covers most main features, and some not available from the deck itself - bi-directional intro-scan being a good example.

## Test report

The well specified transport features twin capstans and three DC motors (the KX-630 had a single capstan transport and two motors). Bias frequency has been raised to 210kHz, which reduces downband intermodulation, though the improvement this brings to sound quality is hard to quantify. The siamesed record/replay head is executed in hardened permalloy.

There are no important technical weaknesses with this deck, but there is little to trumpet about either. The Yamaha has an acceptable working dynamic range, but is not amongst the front runners as the signal/noise numbers listed later show, and which is reinforced by the best case signal/noise figure of 60.5dB (metal tape, 3 per cent THD, 400Hz). Similarly, wow and flutter levels are quite reasonable but unexciting, the spectrum analysis showing some flutter sidebands which also show up in the flutter figure and the unweighted figure for wow and flutter.

The record/replay responses are good in each case, but the Dolby C circuit is wayward, conjuring a 3dB 20kHz peak from an intrinsic response that is little over 0.5dB bright in the treble. Dolby pumping is something to look for. The prerecorded plot shows some treble loss, but because of the play trim facility, this is not a serious limitation.

## Sound quality

The last point may explain why prerecorded material could be made to sound very good on this deck, though relatively minor adjustments of the play trim were sufficient to set the test tapes employed to rights.

More than just a potentially flat frequency response is at play here though. Even with the control slightly mis-set (to simulate the errors found on other decks as they come from the box), the Yamaha offered a degree of subtlety and insight in the midband and above that set it apart. At the same time, the bass end was perceptibly bloated in feel. It wasn't out of control exactly, but it certainly lacked the precision and focus of the very best.

Naturally the Yamaha was compared to the Teac V-5000, which costs the same, and this proved to be a real battle, but one in which the Yamaha eventually prevailed.

The KX-650's noise reduction circuits, although intrusive, were less so than those on the Teac, and, in the case of Dolby C, a little more effective at suppressing HF tape hiss - and all this despite the anomalous Dolby C measurement.

More important, and this was most apparent when recording percussive material like piano (in this case some Prokofiev from Evgeny Kissin's stunning Carnegie Hall debut album), the Yamaha sounded a little more clearly focussed, with a better localised stereo image and more organic and powerful reproduction of the playing.

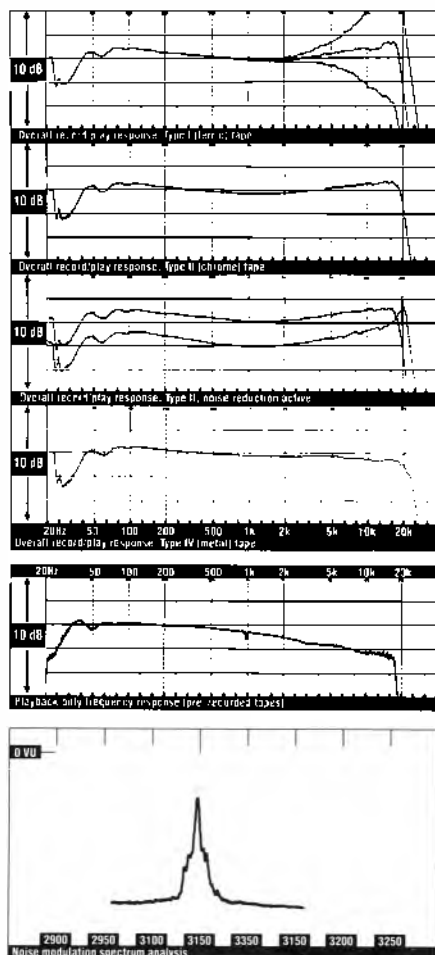
**Recommended**

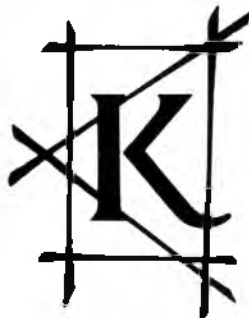
## Conclusion

At its best with metal tapes, the crude manipulative effect of Dolby noise reduction can be heard, but generally wasn't ruinous to musical health. A good all rounder, let down only by a slightly softened lowest octave or two. Recommended.

## TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	28Hz - 18kHz
IEC Type II	28Hz - 21kHz
IEC Type IV	28Hz - 22kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.09%/0.18%
Wow/Flutter - Peak DIN wtd	0.08%/0.12%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	48dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	52dB
Type IV signal/noise CCIR/ARM 400Hz & distortion 0VU	53dB
Noise Figure of Merit (Dolby level/noise Type II)	48.5dB
Line input sensitivity/overload	133mV/±13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	571mV/23V
IM distortion 10kHz/1kHz 0dB peak, 1kHz product	24%
Azimuth check R-L phase at 10kHz	100 degrees
VU indication at IEC 0dB	4dB
Dimensions (wxdxh)	43.5x12.2x27.3cm
Average wind/rewind time (C90)	1 min 12 sec
Typical Retail Price	£300





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HIFI NEWS AND RECORD REVIEW, AUGUST 1990

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*Electrical connections are inherently imperfect. The two parts of an electrical connector never fit exactly, which allows contaminants to develop and cause oxidation. This in turn will significantly impair the electron flow and signal integrity. Regular use of Kontak cleaning solution will maximize the performance of your equipment by minimizing loss of signal and power in electrical connections.*



I find myself in some difficulty with the Nakamichi *Cassette Deck One*. Possibly it is a triumphant example of Nakamichi's engineering prowess which is so solid that they can cut corners that others would not dream of cutting and still get away with it. Alternatively it is an example of Nakamichi's corporate sloth,

stick in the specifications.

The audible upshot of this mixed bag of findings was a performance standard with underlying musical strengths that easily outweighed a superficial lack of gloss. This is a deck for serious, protracted listening, perhaps on a very quiet Type II or Type IV tape without noise reduction.

The Revox *H1* is also very definitely an individual, though there is a whiff here too of not wanting to stray too far from established paths. The *H1* looks and behaves like a *B215*, and is different only in some comparatively minor details. The auto-tape tuning system is retained, for example, in an only slightly simplified form, and although not gadget prone, the Revox is a powerfully endowed and well thought through product. There are three heads and two capstans (of course), and a cassette platform that lacks any loading door, a unique arrangement that feels faintly agricultural at first but which has undoubted structural benefits. The transport is massively engineered and delivers astonishingly low levels of wow and flutter, and the deck measures well elsewhere too, apart from some rather disappointing noise figures.

This deck has a hard time justifying itself on value for money grounds, but has a wonderfully articulate and expressive midband and real strengths elsewhere.

The Pioneer *CT-93* is Pioneer's new flagship model, and extremely exactly engineered, even by Revox and Nakamichi standards. It has a particularly sophisticated auto tape setup procedure that can be easily tweaked afterwards. The *CT-93* is also Pioneer's first and (so far) best Dolby S deck, and comes with a range of powerful and

mainly useful features and a Rolls Royce operational feel. It is a worthy successor to the *CT-91a*.

## Get it while you can

One of our five models is here just for a quick looksee. This is the Sony *TC-K850ES*, which is now discontinued, but which might still be available on some dealers shelves, perhaps at a bargain price. Fitted with the usual three heads, the deck also has a state of the art dual capstan transport with a quartz locked direct drive capstan, a technology which on recent form is as successful with cassette decks as it has been unsuccessful with turntables in the past.

There is a match needle tape tuning facility which incidentally tends to give a somewhat rolled off extreme treble, though with experience it is quite easy to allow for this when making the initial adjustments. This apart, equipment levels are nothing special, but so what? The appeal of this deck is based on the integrity of its engineering and its music making abilities, which easily transcend the price.

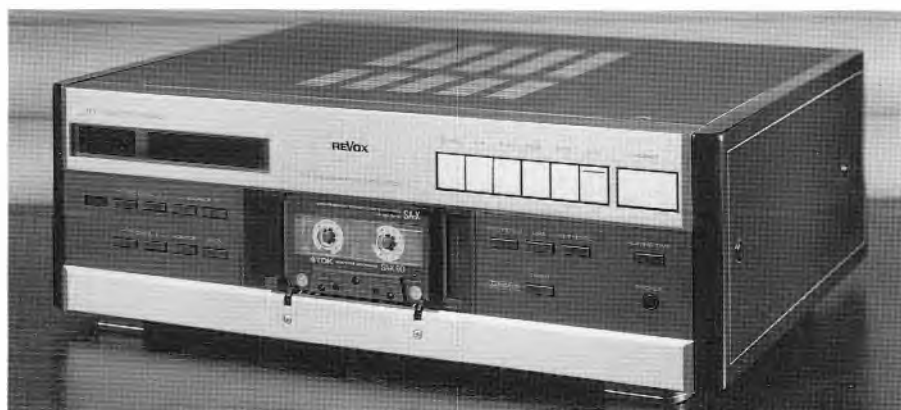
Also around the £400 level, the *GX-95II* is Akai's current flagship model and an only mildly revised version of the long running *GX-95*. The *Mk II* is the recipient of a new discrete head block and revised record/replay amplifiers, but is otherwise unchanged from the original. The extensive basic feature count includes three heads, a dual capstan, direct drive transport mechanism, plus defeatable Dolby HX Pro and display modes. An assisted tape alignment procedure is also available, and the deck, which is remote controllable, is strong on tape search aids. All this ought to have ensured that no funds were left just for the audio side of the design, but here the Akai confounded all expectations. This is a classy number that missed Best Buy by a hair's breadth.

# Moving upmarket

*This Best Buy Guide is aimed primarily at the budget price sector of the market, so the preceding cassette deck reviews concentrate on the more recently tested models costing £300 or less. Summaries on some of the more expensive recently reviewed models are included below*

the design trading heavily on old skills which even careless engineering is unable to demolish. If you take the second view, there may be reason to worry about how competitive Nakamichi will remain in the future.

What is beyond dispute however is the following. The *Cassette Deck One*, which is a three-head, dual capstan deck, has a sleek and modern appearance with the minor controls hidden away behind a flap. It is almost bereft of the traditional tape search and other operational facilities you'd expect at this price level. There is a notable lack of auto tape type sensing and of tape tuning aids apart from a fine bias control. On test the Nakamichi was little better than ordinary in some important areas, including frequency response linearity and even wow and flutter. But some of the apparent shortcomings disappeared when examined closely, a good example being the wow and flutter result which though unremarkable, should be seen in the context of a very low unweighted figure for pitch stability and a very clean spectrum analysis which shows that the designers were interested in more than just a good measurement to



*Although not exactly cheap, the Revox H1 is one of the best decks on the market.*

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If there is no doubt that CD is now clearly the leading software format for classical music, with other musical styles heading that way, there is also no doubt that at best LPs are capable of very faithful reproduction. Variable record pressing standards over the years, and the enormous variety in the quality of available record players, has always threatened to obscure this fact, but a well cut record on a decent player can sound remarkably close to the tape from which the record was made, and by inference (since tape recordings can be very good indeed) to the original performance. None of the record players reviewed here is perfect (of course not), but they mostly achieve a high level of realism.

What can cause a record player to come between the music and the listener? Because the act of playing a record involves a mechanical process, the mechanism used must be very precise. Any lack of precision causes an error to be introduced in the signal picked up by the cartridge, which basically means that dis-

replay consists of minimising these resonances, or at least minimising their audibility (since at some frequencies they will be very much more audible than others). The art of designing a record player for acceptable performance consists of deciding which resonances you can live with, and which are just too much. Sometimes, resonances are actually designed into a record player to give it a particular characteristic such as an enhanced 'kick' in the bass, or a bit of extra brightness, but this approach, while attractive, is a bit of a dead end; you inevitably lose some detail resolution in the system by introducing resonances, which cannot be recovered later in the chain.

Having chosen a record deck, there is only one thing (short of structural changes) that the user can do about vibration caused internally, and that is to change the cartridge. If the cartridge has stiff suspension and/or a heavy stylus and cantilever, it imparts a greater reaction on the record and arm, thus causing a greater level of vibration, and high compliance cartridges, all things being equal, tend to sound better than low compliance ones for this simple reason. However, all things are usually not equal, and high compliance cartridges have a bad reputation because of other, unrelated flaws in many of them. One must also bear in mind the business of arm/cartridge matching to achieve an acceptable low frequency resonance (or use arm damping), and this can limit the application of very high compliance cartridges in some instances.

As for external vibration, one can influence this considerably by choice and application of turntable support, depending on the deck chosen. A deck with good vibration isolation will be less critical but all decks react in some degree to their support, and there are many turntable tables, stands and shelves available to help solve this problem. Your dealer is usually the best person to advise on this. It is worth spending some time experimenting yourself; even little things (like whether a spiked table rests on floorboards directly above joists or in between them) can have a significant effect.

### Precise alignment

For the rest, precise alignment of a record player is vital. Set up the cartridge carefully using an alignment gauge or protractor, and ensure that tracking force and bias are set right. These two, and also vertical tracking angle (arm height, in practice) are best fine-tuned by ear. Don't be too afraid to turn up tracking force a little if a cartridge sounds edgy; it might be starting to mistrack, which is more dangerous to the record than a little extra tracking weight.

That seems to have covered most of it except for one thing; how do you choose a record player? Listen! Try a few, listen for things that you like and don't like. Specifically, listen for detail in the music, as this is the one component which is easily compromised by a record player. There are many references to detail, and especially ambience detail (the feeling of space and natural acoustic around the performers, assuming of course they were recorded in one), in the reviews that follow. A perfectly detailed record player would have no 'character' of its own, and would be the most accurate. But nobody has made it yet...

## Choosing and Using ... Turntables

*Thinking of buying a record player? Richard Black explains what makes record players tick, guides you through the maze and explains the whys and hows.*

tortion of some sort is being added. Almost all of a record player's 'sound' is due to a lack of mechanical precision - a small amount is due to electrical effects in the cartridge, wires etc.

The critical part of a record player is the cartridge generator. Here, the relative movement of the cantilever and the cartridge body defines the output signal. Any unwanted movement (ie, not dictated by the modulation of the record groove) produces a distorted signal. Unfortunately, because the cantilever must be restrained in the cartridge by a springy suspension, its movement causes a reaction on the cartridge, pushing it away. A similar reaction acts on the record. This results in a small loss of signal but if simple signal loss were the only effect we would be much better off. As it is, high frequency components of this (alternating) reaction force cause the record, arm, subchassis, platter and every other part of the record player to vibrate, to a greater or lesser extent.

As long as this vibration is not frequency selective, we're still OK, but in general every mechanical component has a tendency to resonate at certain frequencies, and this causes the vibration to have a different amount of effect at different frequencies.

Therefore, the unwanted relative movement of cantilever and cartridge body is different at different frequencies too, and the signal becomes 'coloured' affected by rings, buzzes and whistles due to the resonance of various record player components.

The art of designing a record player for accurate

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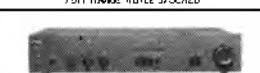
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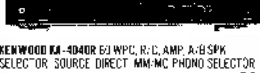
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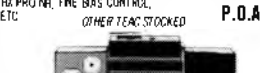
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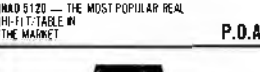


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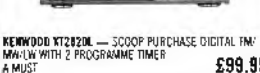
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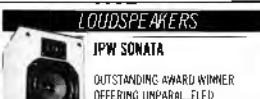


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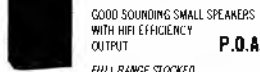
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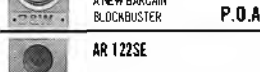
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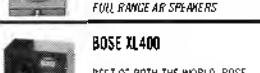
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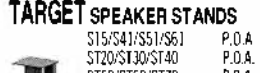
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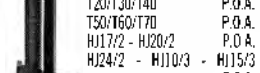
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# Ariston Pro

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**Best Buy**



Since the introduction several years ago of the *Q* deck, Ariston has proved quite a successful contender in the budget turntable stakes. The *Icon*, reviewed here last year, shows one direction in which the company has moved: towards increased simplicity of operation. The *Pro* deck, on the other hand, is more minimalist, with all the money spent on sound quality, leaving the user to lift his/her own arm at the end of each side. Horses for courses. . .

The *Pro* is simplicity itself. It is based on a thick slab of Medite, which acts as plinth and subchassis all in one. This sort of construction is not uncommon - the Rega decks, for example, are similar in concept - but Ariston has added a few little touches to improve on the basic performance of the solid deck. For one thing, the plastic trim which surrounds the deck also has a sonic function, acting as a 'peripheral wave trap' which reduces the effect of resonances within the Medite. Since Medite tends to be rather a lively material at frequencies where it matters (not least in the upper midband, where the ear is very sensitive), this is likely to be beneficial.

One problem with any solid deck is mounting the motor so as not to induce hum breakthrough to the platter and arm. Some manufacturers use compliant mounts to give some decoupling, but Ariston has taken a different tack and fitted a DC motor - the sort of thing one finds in a cassette recorder. This generates lower levels of vibration, and what it does produce is at higher frequencies and more easily kept out of the system, so motor breakthrough is less of a problem than it might be. This motor also has fine speed control, as it happens, but only the dedicated user would wish to remove the

bottom from a *Pro* and fiddle around with a fine screwdriver to achieve that end.

Ariston's platter is an unremarkable metal casting in one piece, with the bearing pin ready-fitted at the factory. A decent quality standard-type arm is fitted to the *Pro*, and the whole sits on four compliant feet, which provide the sole suspension. A rubber mat is used, and Ariston supplies an Ortofon OMB10 cartridge ready-fitted.

## On Test

The *Pro* has many fine qualities. It produces a well-balanced, clear and open sound, which never becomes harsh or congested. Bass is well defined and - especially with the deck on an isolation base - remarkably free of oppressive thuds on transients. This makes it a good performer with percussive music (piano, for instance) which is easily degraded by any such flaw. In very complex passages, the *Pro* can start to sound a little woolly, but on the whole, its separation of different-sounding instruments is commendably good. Replacing the cartridge with a Glanz MFG 310 brought up the deck's qualities even more clearly. Whatever the music, from Fifties rock to small ensemble jazz to full orchestra, the *Pro* is a very neutral deck, the sonic evidence belying its low price.

Lab tests show that the *Pro* behaves well in respect of the basic parameters; wow and flutter is particularly good for a budget deck, and rumble is also good. The arm bearings seem a little sticky, but not badly so. Vibration isolation is moderate at low frequencies, improving higher up, and the disc impulse is typical of a rubber mat - not bad. The arm is fairly well behaved, and the arm resonance plot shows no particular evidence of high frequency deck resonances.

## Conclusion

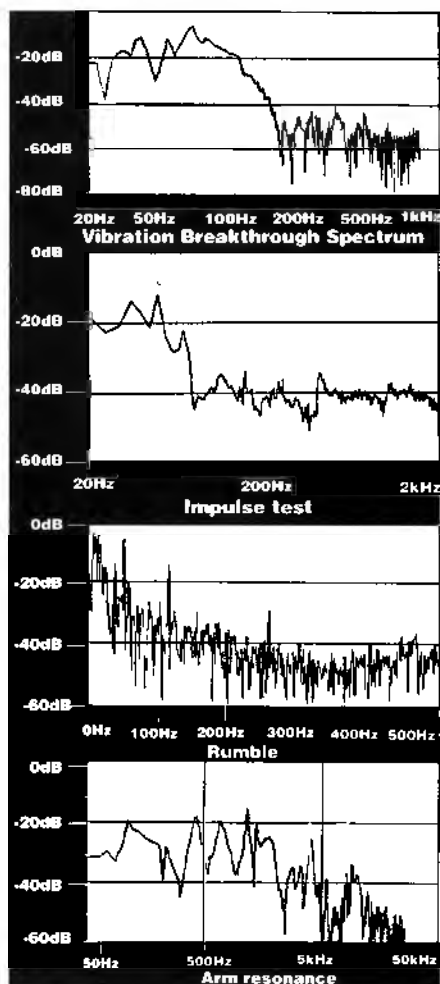
The *Pro* is well made, simple and effective. It is sonically pleasing and likely to give good and long service. Best Buy.

## TEST RESULTS

<b>Motor Section</b>	
Type	solid, belt drive
Platter type	one-piece metal, rubber mat
Build and finish	good
Mains connection	captive lead
Speeds	33/45 (switched)
Wow and flutter (DIN wtd)	0.05%
Speed error	0.4% slow
Start-up time	2s
Rumble (DIN B wtd)	-75dB

<b>Arm</b>	
Approx. effective mass	12g
Type	fixed
Adjustments provided	overhang
Build and finish	good
Ease of set-up/use	very good
Friction approx, lat/vert	20mg/50mg
Bias application method	calibrated dial
Bias force, rim/centre	180mg/220mg
Downforce calibration error (2g)	-0.15g
Cue rate up/down	0/2s
Arm resonances	good
Arm damping method	none

<b>System as a whole</b>	
Size (h x w x d/clearance for lid)	14 x 42 x 34/7cm
Ease of use	very good
Acoustic breakthrough	good
Vibration breakthrough	quite good
Shock resistance	good
Subjective sound quality of system	good
Typical price inc. VAT	£180



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# Dual CS505 Mk IV

RAM PROJECTS, UNIT 27, STRETFORD MOTORWAY ESTATE, BARTON DOCK ROAD, STRETFORD, MANCHESTER, M23 0ZH. TEL: (061) 866 8101

Reviewed by: *John M. Johnson*

Supplied by: *John M. Johnson*

Reviewed on: *10/10/85*



Dual's 505 is built very much in the style of the Sixties, on a sheet metal subchassis which is supported on springs - the description 'suspended' might be misleading as it suggests something a bit more refined. Still, the measure does build in some resistance to vibration feedback, and the deck is also noted for being immune to shocks. Naturally, Dual has updated the appearance of the MK IV version somewhat to fit in with current trends, and the deck's surround is now veneered Medite instead of the plastic moulding once employed.

The platter on the 505 is a simple metal casting, with an integral 'subplatter' around which the belt runs. Drive is from a small motor at the left front corner of the deck, and variable speed is provided by a rather cunning feature; rotating a small knob concentric with the 33/45 selector causes the drive pulley to expand or contract, thus varying its diameter and hence the speed of the platter. The adjustment is uncalibrated, and Dual provides a stroboscope to allow accurate setting under mains lighting.

One distinctive feature of the 505 has always been the arm, which has bearings housed in an impressively strong-looking yoke at the rear. This is retained in the Mk 4, but is not as chunky as it once was, and the arm itself seems less secure than of old. However, it is still a well made item, and if the detachable headshell seems a little flimsy, it is no worse than par for the course. As always, the arm lift/lower lever is mounted at the right of the deck, and is totally safe in operation, being damped both up and down. An Ortofon OM20 is fitted (badged as a Dual cartridge), without the weight plate, and in fact the arm will not accommodate cartridges heavier than about 5g unless an additional

counterweight (available from Dual dealers) is fitted.

Construction of the CS 505 is to Dual's usual high standards, and the deck is famously robust and reliable.

## On Test

Like everyone else (it sometimes seems), I grew up with a CS 505 - but sentiment aside, it's easy to see why the deck is so perennially popular. It's not perfect, it's not even remarkably good in any particular area, but what it does wrong is mostly fairly harmless and what it does right is most likeable.

Good points include a fair degree of excitement in suitable music; for example, Little Feat sounded lively, upbeat and generally invigorating. Weak points include subtlety and detail, and although both of these improve somewhat if the cartridge is upgraded, the deck is not really very strong on clarity. Large bands and orchestras rapidly become thick and muffled as the texture grows, and the bass can sound a little strange at times, varying between thinness and muddiness depending on programme. A note I made when comparing the deck against master tapes sums it up; 'you get a fair idea of what's going on'.

No particular horrors showed up on the test bench. Speed is pretty stable, and the deck was delivered running only 0.3% fast. Rumble is not great, but adequate. The arm seems OK, although the main resonance is quite low and not well damped. Vibration breakthrough benefits at low frequencies from the sprung support.

## Conclusion

It's still a highly competitive product, and if the Dual CS 505-4 fails to inspire awe, it

does at least impress as a competent all-round performer. If this is as far as the budget goes, it fully merits its Best Buy rating.

## TEST RESULTS

### Motor Section

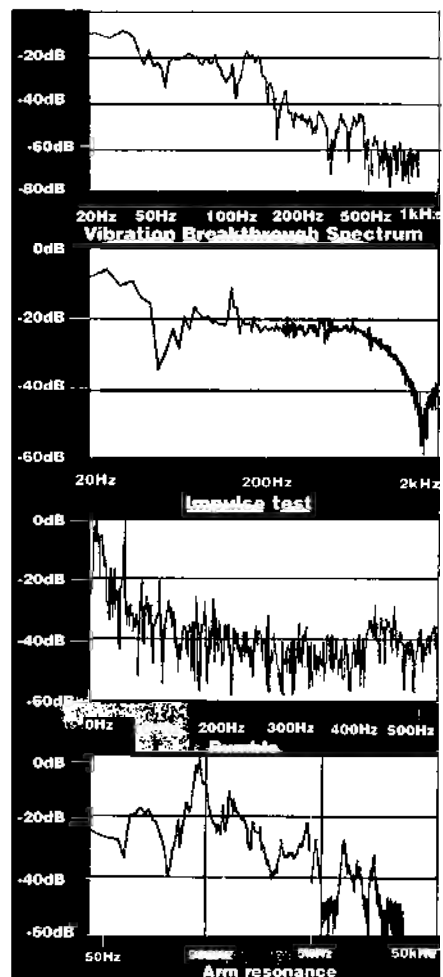
Type	suspended subchassis, belt drive
Platter type	one-piece aluminium, rubbermat
Build and finish	good/good
Mains connection	socket for outboard transformer
Speeds	33/45 switchable
Wow and flutter (DIN wtd)	0.06%
Speed error	adjustable; supplied at +0.3%
Start-up time	3s
Rumble (DIN B wtd)	-72dB

### Arm Section

Approx. effective mass	11g
Type	fixed, detachable headshell
Adjustments provided	overhang
Build and finish	good
Ease of set-up/use	good
Friction approx, lat/vert	15mg/30mg
Bias application method	calibrated dial
Bias force, rim/centre	180mg/160mg
Downforce calibration error (2g)	+0.1%
Cue rate up/down	0.5s/1s
Arm resonances	fair
Arm damping method	none

### System as a whole

Size (h x w x d/clearance for lid)	15 x 44 x 38/6cm
Ease of use	very good
Acoustic breakthrough	fair
Vibration breakthrough	fair
Shock resistance	good
Subjective sound quality of system	good
Typical price inc. VAT	£160



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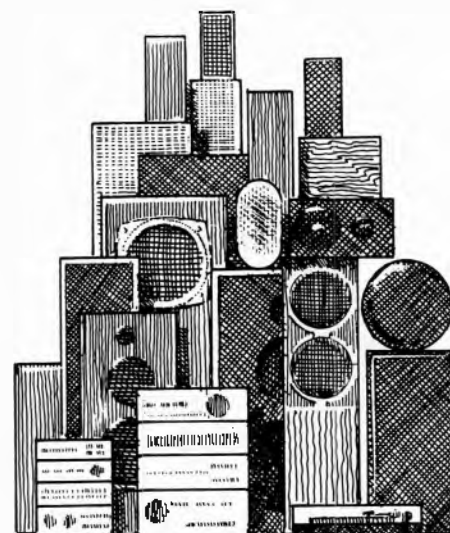
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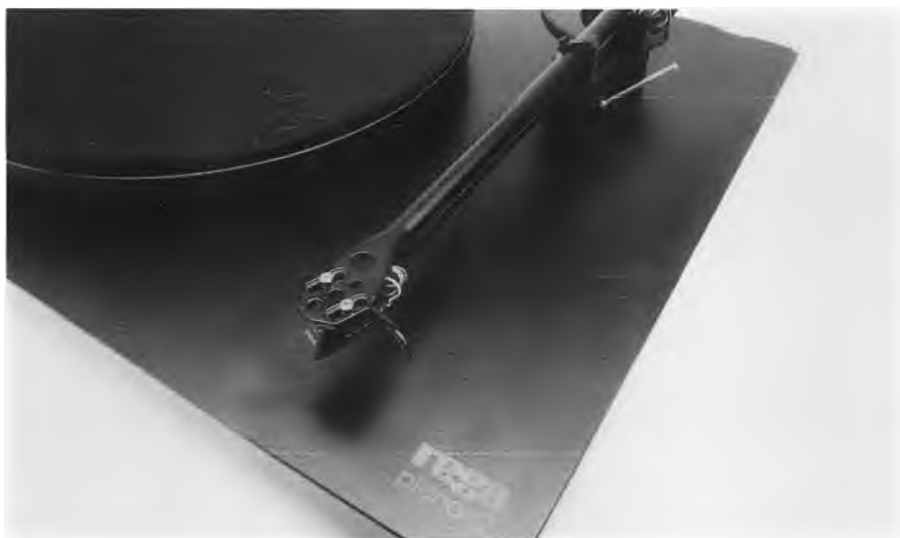
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# Rega Planar 2 and 3

REGA RESEARCH LTD, 119 PARK STREET, WESTCLIFFE ON-SEA  
SS0 7PD. TEL (0702) 333071



Since 1984 the RB300 arm has been a standard fitting on the Planar 3 deck. The Planar 2 now comes with a simplified version of the new RB300 arm, called the RB250 which is also sold in its own right as the Moth arm. The quality of the design is evidenced by the fact that this is easily the oldest review in the entire guide, the original appraisal having been conducted by Martin Colloms back in issue 43.

This simple turntable design comprises a solid chipboard plinth covered in tough matt black laminate. Three fairly stiff stepped rubber feet provide a stable tripod foundation while the high quality lid is directly hinged to the chassis plinth with neither springs nor isolation. A plain main bearing with thrust ball showed close tolerances, with no detectable play.

Belt-driven via a rubber cord, the inner platter hub is a reinforced plastic moulding, the uppermost projection forming the tapered centre spindle and the outer platter boss. The platter is made of heavy plate glass (less thick in the Planar 2), surmounted by a thick felt mat. In a simple and ingenious gravity suspension, a second drive belt is looped to support the slow speed synchronous drive motor and suppress vibration coupling to the platter.

The Planar 2 RB250 arm has the same excellent bearings and one-piece cast arm tube as the RB300 but has been simplified by using a conventional rotating counterweight which is partly decoupled. The leadout cable is fixed and the chassis earth combined with one of the signal grounds; the arm lead being terminated with phono plugs. Effective mass is around 11.5g including the supplied

stainless steel mounting hardware, suitable for moderate compliance cartridges or even modest moving coils.

Rega recommends that the deck should be placed on a light wall mounted shelf, rather than 'coffee table' or floor cabinet and we found this to be good advice.

## Lab report

The platter was clearly well founded as the minimal low frequency ringing on the disc impulse response showed. The initial transient was poorly damped, however, which is a characteristic of thick felt mats.

Almost no metalwork was present in the unit and this meant very little hum field screening was provided. Consequently hum levels were poorer than average and the choice of cartridge will need a little care. Weighted wow and flutter was satisfactory but linear wow was on the high side at 0.21 per cent, this measured without the mat as the felt is of slightly variable thickness. Speed was fairly accurate, but slowed a significant 0.4 per cent under load, with some overshoot after recovery due to motor suspension tension rocking. Startup was average for a belt-drive at 4.5 seconds.

Rumble levels were just satisfactory for the price averaging -71dB with the motor off. Acoustic breakthrough was about average and the lid was found to be influential here; results were better when it was entirely removed. Vibration isolation was also poorer than average.

The arm was well finished with very good geometry. It was easy to set up and use, and demonstrated low bearing friction. Bias compensation was set to sensible levels and the cue worked well.

**Best Buy**

Downforce calibration proved satisfactory.

## Sound quality

Belying traditional assumed relationships between a number of technical parameters and sound quality, the Rega proves that a well developed, subjectively-assessed balance of performance counts for more than technical excellence with regards to any one parameter.

On the debit side the Rega did suffer from a modicum of programme wow, particularly on rock programme, but this was not considered serious at this price level; a mild loss of stereo depth was also noted, together with an accompanying impairment of low bass definition and evenness. Conversely it sounded 'musical' in a balanced and coherent manner.

With the latest arm the Planar 2 sounded more confident. In the upper bass it was very articulate while mid and treble were notably smooth and sweet with better detail than before. Presentation of detail was considered well above average and little inferior to 'super-fi' models.

## Conclusion

The Planar 2 offers a fine subjective performance and is both very well made and finished, which places it firmly in the Best Buy category. The Planar 3 is also good, but does not offer quite the same value, though a Best Buy rating is also appropriate here, particularly in view of the excellent RB300 arm.

## TEST RESULTS

Motor section	
Type	manual, belt drive
Platter type	glass
Build and finish	very good
Mains connection	captive 2-core
Speed options	33/45 rpm (manual change)
Wow and flutter (DIN wtd)	0.09%
Speed error	0.4% fast
Start up time	4.5 secs
Rumble, (DIN B wtd)	-71dB

Arm	
Approx effective mass	11.5g
Type	universal detachable
Adjustments provided	overhang/lateral angle
Build and finish	excellent/very good
Ease of set-up/use	very good/very good
Friction, typical lateral vertical	less than 25mg/15mg
Bias compensation method	internal magnet
Downforce calibration error, 2g	-0.07g
Cue rate up/down	0.5/1.5 secs

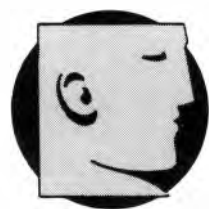
System as a whole	
Size (wxdxh) clearance for lid rear	45x36x12.3cm/7cm
Acoustic breakthrough	- average
Subjective sound quality of complete system	above average
Hum level/acoustic feedback	average/fairly good
Vibration sensitivity/shock resistance	average/good
Price Planar3/Planar2	£249/185

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# Systemdek IIX/900/ IIXE/900

SYSTEMDEK LTD, UNIT 34, KYLE ROAD, IRVINE INDUSTRIAL ESTATE,  
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The Systemdek *II* is one of those designs that has been evolving for a quite a period of time and despite awarding both the *IIX* and the *IIXE* Recommended status back in February 1989 the changes to the two decks in the intervening period mean that it would be fairly pointless to re-run the original reviews.

However, such is the status of the Systemdek that there was no way we could put together this guide without including a review, so samples were duly packed off to the homes of Messrs Kennedy and Benham for re-evaluation. We'll be taking a look at all three Systemdeks in our forthcoming turntables issue, but as that isn't due for publication until early next year this brief re-appraisal will have to suffice.

The manual speed change *IIX/900* will now give you just 25 pence change from your £200 while the recent changes in VAT rates leave the *IIXE/900* at the rather bizarre price of £299.63 for the glass plattered variant and £358.38 for those who want the new acrylic platter, of which more latter.

## Design matters

The basic deck is a three-point suspended design employing three more or less undamped springs used in extension rather than compression and a fairly heavy alloy subchassis along with a Medite subplatter.

Once the deck has been placed on a suitable support (Mana turntable tables give excellent results) final levelling is carried out by means of three Allen bolts situated on top of the plinth.

However it is at this point that

difference between the latest variants, distinguished by the numbers 900 after the name, and the ones we reviewed back in 1989 begin to make themselves known.

Whereas the original deck had a teardrop shaped Medite armboard, the latest samples come complete with an oblong alloy platform, different boards being available depending on your choice of arm, although I doubt many users will venture much beyond the Moth arm or Rega RB300 fitting that seem to produce such good results with this deck.

## Platter factor

The other most obvious change is in the platter material, a new, 18mm thick acrylic platter taking the place of the old 10mm glass unit, although the latter remains available as an option.

The bottom of the acrylic platter has been recessed so that your records end up at much the same height as with the old glass platter. For those of you wishing to purchase the new acrylic version Systemdek can provide spare platters for £65 each.

Look inside the deck and a number of other changes are apparent. Most obvious is the complete change of motor unit. Whereas the older decks used a 110volt, slow speed 24-pole synchronous motor, the new units come complete with a 240volt unit, the extra torque no doubt being extremely welcome.

The pulley material has also been changed, the older aluminium pulley having been replaced by a light weight nylon model. The extra welly will be particularly welcome with the outboard power supply equipped *XE* variant which

could on occasion be a little slow to get going, something which is certainly improved with the 900 version.

Drive is transferred from the pulley to the platter by means of a flat belt. With the *X* variant speed change is accomplished by moving the belt up or down the split diameter pulley while the *IIXE* has the luxury of electronic speed change by means of a switch on the power supply casing.

## Sound quality

Perhaps the biggest difference in sound is to be found at the top of the range with the *IIXE/900'AP'*. The addition of the acrylic platter gives the new version a considerable edge over the old glass plattered versions and makes the deck one of the very best on the market at its price point.

The basic model was always well received but the upgrades have resulted in a deck which makes the original sound woolly and vague. The new model has a greater dynamic range than its predecessor and is a detail extractor of the first order. However, the deck's real strength lies in its mid bass which is among the best available and certainly makes the *IIXE* look like a mega bargain.

Interestingly the glass plattered version is also quite an improvement over the older models, although not to the same degree as the deck fitted with the acrylic platter. Dynamics and detail have improved quite considerably and certainly show that the differences brought about with the new 900 variants are not just down to the changes in platter material.

## Conclusion

The actual awarding of Best Buy or Recommended status will have to wait for a full technical re-review of the decks in our next turntable issue, and explains why this is one of the few pages in this guide without a full set of test results. But for now we are more than content to heartily endorse this deck, safe in the knowledge that it will undoubtedly do extremely well in any mid or budget system and indeed for the price it must represent one of the vinyl bargains of the year.

The *IIXE/900'AP'* also offers extremely good value and will no doubt retain its official Recommended status and even stands a good chance of winning one of those coveted Best Buy stickers.

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# Thorens TD280 MkII

**Best Buy**

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In the 1990 *Hi-Fi Choice* turntables issue, Alvin Gold commented favourably on the sheer amount of turntable one gets for the money in the *TD280*, and I can only agree. A glance at the deck and its instruction manual reveals that the package includes an arm, an Ortofon *OMB 10* cartridge, and a deck which features semi-automatic operation and electronic speed selection with a two-phase generator driving the motor.

Several smaller manufacturers charge the price of this turntable, and then some, just for a two-phase drive add-on! It just goes to show how important economies of scale can be. Thorens makes huge numbers of record decks, and can afford and justify full mass production tooling for its products. The various models also share certain parts, which of course reduces cost, and why not design turntables along given lines so that one can mix and match components? It makes sense, especially if the ingredients are good.

Over the last year the *TD280* has attained Mk II status, hence the new review, but in essence it hasn't changed very much. It is unusual for a Thorens product in not having a suspended subchassis of some type, using instead four springy feet for isolation. However, other features are more in keeping with the house style, including the two-piece platter with plastic subplatter, the controls layout and the general appearance.

The arm fitted to this deck is the *TP28LS*, a fitted item that appears to be becoming standard issue on the cheaper Thorens models. Although it feels slightly tacky, this arm is basically well made and easy to use and set up.

The *280's* controls are slightly different from many Thorens decks by virtue of the arm auto-lift at the end of the side. At the

left of the plinth, in addition to the 33/45rpm selector, is a 'start' button which will restart the deck after the auto-lift has stopped it. It also allows the arm to drop if the cueing lever is flicked, and makes the deck pretty much foolproof in operation.

## Test Results

First impressions of the *280* are of a pretty raunchy deck - not terribly subtle, not stunningly free of colorations, not the clearest sound in the world, but with plenty of punch and attack. Changing to an *AT-15* cartridge tamed the response a bit, but the impression remained that the *TD280* is not the world's most neutral deck. On the other hand, given the price it sells for, and likely partnering systems which may not be over-strong on impact and force, it could well be ideal.

In fact, on the whole the sound is very good, just a tad coarse. The acoustic breakthrough plot gives a clue to this in the high levels of feedback at 100Hz and 300Hz. However, measurements are mainly exemplary, rumble let down slightly by vibration coupling through the plinth.

## Conclusion

If the above sounds a bit disparaging, consider this: the *TD280* is lively and liveable-with, excellently made, easy to use and very affordable. It would be hard not to confirm its Best Buy status.

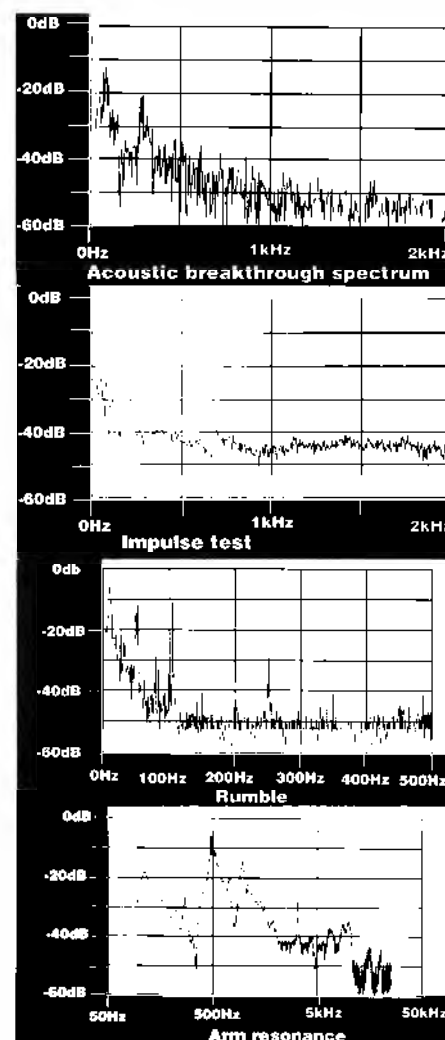
**Editors note:** Since this review was first run the *TD280 MkII* has been updated, an Audio Technica *AT-95E* cartridge replacing the Ortofon and the rubber mat changed for a felt model. The updated deck, known as the *TD280 MkII (UK)* will be reviewed in our February issue.

## TEST RESULTS

<b>Motor Section</b>	
Type	belt drive, integrated, semi-automatic
Platter type	two piece plastic/metal/rubber mat (felt mat on later <i>TD280 MkII (UK)</i> )
Build and finish	very good
Mains connection	connector from outboard transformer
Speeds	33/45rpm
Wow and flutter (DIN wtd)	0.05%
Speed error	-0.3%
Start-up time	3s
Rumble (DIN B wtd)	-67dB

<b>Arm Section</b>	
Approx effective mass	12g
Type	fixed
Adjustments provided	overhang, azimuth, cartridge height
Build and finish	good
Ease of use/setup	good
Friction approx, lat/vert	<20mg/20mg
Bias application method	calibrated dial
Bias force rim/centre (1.5g ellipt)	160mg/180mg
Downforce calibration error (2g)	-0.1g
Cue rate up/down	0.5s/2s
Arm resonances	moderate
Arm damping method	none

<b>System as a whole</b>	
Size (h x w x d/clearance for lid)	158 x 440 x 350mm/90mm
Ease of use	good
Acoustic breakthrough	moderate
Hum level	good
Vibration breakthrough	fair
Shock resistance	good
Subjective sound quality of system	good minus
Typical price inc VAT	£180





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# Dual CS503-2

RAM PROJECTS, UNIT 27, STRETFORD MOTORWAY ESTATE, BARTON DOCK ROAD, STRETFORD, MANCHESTER M23 0ZH. TEL: (061) 866 8101

**Recommended**



In a way, the 503-2 seems like a modernised version of the classic CS505, of all new construction but retaining the traditional Dual feel and appearance. The deck is a smart, slimline unit made mostly of Medite with high quality black vinyl wrap and a 'smoked' lid and is very well finished to Dual's usual standards.

Within the plinth, the works of the deck are built on to a sheet steel subchassis, somewhat decoupled by a very stiff suspension. The bearing is factory-assembled, and all the user needs to do to set the deck up is remove the transit wedges, fit the platter, fit the counterweight on the arm and balance the arm. Power is supplied from an outboard adaptor, a small transformer-in-a-plug.

All the controls on the 503 are located on the right-hand side of the deck. Moving the arm from its rest towards the platter starts the motor, and the arm lift/lower lever is mounted near the front of the deck, making use extremely easy and convenient. At the end of each side, the arm lifts and the motor stops. Speed is selected by a two-way switch.

Dual's arm retains the traditional look, with its C-section bearing yoke at the rear. It is not a particularly sturdy item, but it seems to have been well made and the bearing shows no signs of play. Unusually for a budget arm, it has spring-applied downforce, which helps make the deck immune to shocks. The headshell is removable, should one wish to upgrade the fitted Ortofon OMB10 cartridge.

## On Test

Compared with the CS505, or indeed with various other turntables on the market at not much higher prices, the CS503-2 is a little disappointing. The best budget decks these days require no apology, no (or very

little) mental adjustment to the fact that one is listening to a relatively small sum of money playing the record. That cannot honestly be said for the 503. Starting from the beginning, surface noise is distinctly more audible with this deck than with most others. That implies that various resonances are at work adding their little zings and buzzes to every bit of information on the record. When the music starts, it tends to be coarse, confused and muddled, with sounds like full orchestra becoming harsh and strident at the first hint of a crescendo. Bass is rather unclear, and the performance tends to sound altogether untidy.

At best, the midrange is quite open and reasonably neutral as long as the music is not too loud, but the high treble persists in sounding coarse and lacking detail, while bass is often muddy when there's a lot going on. Even in music which has little or no intrinsic subtlety, the 503 seems to create a barrier of colorations. The deck has no one particularly offensive vice; it's just indifferent in most areas.

Lab tests show reasonable behaviour in the areas of speed, rumble, disc impulse and arm characteristics, but a high sensitivity to vibration.

## Conclusion

Although the CS503 is an impressively finished product, it lacks the feeling of structural solidity which has tended to characterise the 505 through various incarnations. The plastic moulding on which the arm and controls are mounted, for instance, is very floppy. On the other hand, the deck is clearly sufficiently well made to last for many years and resist a certain amount of unkind treatment.

Despite this, it is a fact that the CS503-2 is very cheap, good material value for

money and from a firm with a good reliability track record. It therefore comes Recommended - but do see if you can't stretch to the CS505-4 at least.

## TEST RESULTS

### Motor section

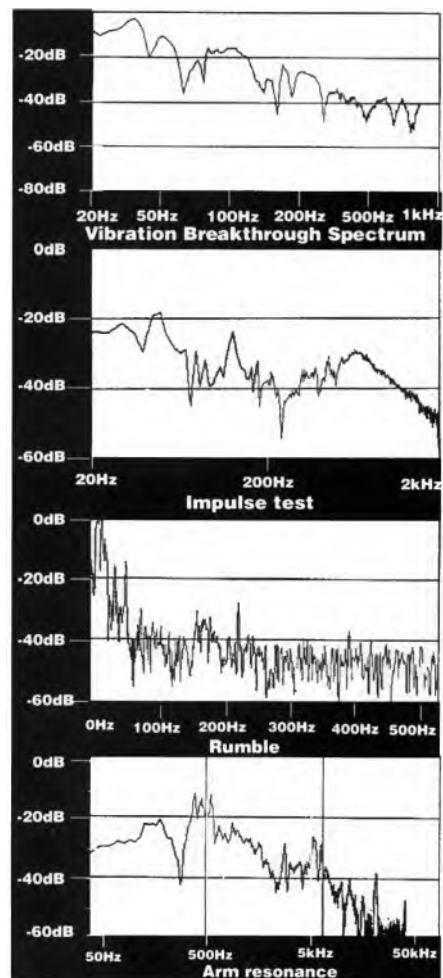
Type	semi-suspended, semi-automatic, belt drive
Platter type	one-piece metal, rubber mat
Build and finish	good
Mains connection	socket for external transformer
Speeds	33/45 (switched)
Wow and flutter (DIN wtd)	0.1%
Speed error	0.4% slow
Start-up time	2s
Rumble (DIN B wtd)	-78dB

### Arm

Approx. effective mass	10g
Type	fixed
Adjustments provided	overhang
Build and finish	good
Ease of set-up/use	very good
Friction approx, lat/vert	10mg/15mg
Bias application method	calibrated dial
Bias force, rim/centre	190mg/180mg
Downforce calibration error (2g)	0
Cue rate up/down	0.5s/1s
Arm resonances	good
Arm damping method	none

### System as a whole

Size (h x w x d/clearance for lid)	13 x 44 x 37/6cm
Ease of use	very good
Acoustic breakthrough	moderate
Vibration breakthrough	moderate
Shock resistance	good
Subjective sound quality of system	fair
Typical price inc. VAT	£140



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NAD 1240 PE	£149.95			Thorens TD280 MkII		£169.95	AMPLIFIERS		
NAD 2240 PE	£199.95	Aria ADWX 111	POA	Thorens TD168V		£219.90	ARCAM A50		£169.95
Pioneer A400	£229.95	Aria ADWX888	POA	Thorens TD150VBC		£259.90	ARCAM A500		£159.00
Pioneer A300	£159.95	Aria ADWX999	POA	Thorens TD316 MkII		£229.90	Dual PA5030		£99.00
Rotel RA810A	£109.95	Aria XK007	POA				Dual CV6010		£89.00
Rotel RA820AX	£159.95	Aria XK009	POA	Bose AM5		£549.95	Dual CV6030		£99.00
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Rotel RA840BX4	£249.95	Denon DRM400	£129.95	B&W DM610		£199.95	Rotel RA870BX		Special
Rotel RC850	£139.95	Denon DRM500	£159.95	B&W DM620		£309.95	Sansui AUX201		£99.95
Rotel RB850	£160.95	Denon DRM600	£199.95	E115500		£155.00	Yamaha AX430		POA
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Sugden A48III	£339.00	Kenwood KX3010 HKPRO	£399.95	Celestion SL851		£409.00	Hitachi DA-005		Special
Sugden P28	£210.00	Kenwood KX910	£399.95	Celestion SL600S		£820.00	Hitachi DA-009		Special
Stereo Ulysses	£550.00	Marantz SD45	POA	Coleston SL700		£1349.49	Onkyo DX3500		£199.00
Sumo Polaris P-Amp	£695.00	Revox B77II C/Reel	POA	Crown Vega		£100.00	Philips CD473		£149.95
Technics Stocked	POA	Rotel RD845	£139.95	Infinity SL Series		POA	Rotel RCD820B		POA
Yamaha AX330	£99.95	Rotel RD855	£179.95	JBL LX86		£599.95	Sony DCD 227ESD		Special
		Rotel RD865	£229.95	JBL HP520		POA			
		Sony TCK 520	£169.95	JBL XE 1		£109.95			
		Sony TCK 570	£199.95	JBL XE 2		£149.95			
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		Yamaha KX250	£149.95	Pro 4		£190.95			
		Yamaha KX330	£169.95	Pro 5		£190.95			
		Yamaha KX530	POA	Pro 6		£190.95			
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# Rotel RP-855

**Best Buy**

GAMEPATH, 25 HEATHFIELD, STACEY BUSHES, MILTON KEYNES  
MK12 6HR. TEL: (0908) 317 707



An honest-to-goodness budget deck, this Rotel model requires an absolute minimum of setting up. Just put on the platter, fit the belt over the motor pulley and mount a cartridge — preferably using a protractor rather than Rotel's slightly 'ho-hum' instructions for alignment. Then set the correct tracking weight and bias, choose a record and away you go.

The RP-855 is isolated from the buffets of life only by four slightly springy feet, and has no suspension adjustment built in. One adjustment that is built in, slightly surprisingly, is speed control in the shape of two screwdriver slots — accessible from underneath, but needing a very small screwdriver. Delivered running one per cent fast, our review sample benefited from some adjustment, and Rotel thoughtfully provides a stroboscope disc to make this job easier.

As is common with Japanese decks, the platter bearing is ready assembled, and in this case it feels like quite a high quality support. The platter is made of cast and machined aluminium, not damped but with sufficient casting imperfections on the bottom surface to stop it ringing very clearly.

The motor - DC servo - is mounted in a mechanically favourable position, opposite the arm mount. Finish on the deck is good, if unremarkable, in black ash, topped with a slightly 'ringy' lid on spring hinges. The unit feels reasonably solid and seems well made all round.

Supplied with the deck is an arm and an Audio Technica AT 110E cartridge, a perfectly capable budget transducer. The arm feels slightly cheap and cheerful, but then it is cheap and the bearings seem perfectly OK. The headshell is detachable and locks in place firmly with a collet and socket screw. The counterweight is cali-

brated, as is the bias dial. The raise/lower lever is damped both down and up, a feature that would not go amiss on upmarket decks.

## Test results

Apart from the speed error mentioned, the test results showed little to worry about. Rumble appears a bit high, but in fact a good deal is electrical hum, picked up in the wiring somewhere between cartridge and amplifier, and hardly at a sufficient level to be irritating in practice. Otherwise it's good and the ears bear this out, whatever one's preconceptions about Japanese budget decks. The sound is well defined, clear, detailed and reasonably balanced in the bass, maybe not in the super-deck league but quite impressive for the price. The arm is often a weak link in a package like this, but I didn't hear any particular arm characteristics.

The RP-855 was tried under various conditions, with different cartridges (including the one supplied), and some consistency was found in the sound but with variations in certain areas depending on siting. Because the feet provide only limited isolation, the deck suffers from a degree of structural feedback if not further isolated with a proprietary table, and loses a little in precision as a result. Nevertheless, under any conditions the feeling of information being masked is only very slight.

## Conclusion

Rotel's RP-855 is pleasant to use and enjoyable to listen to. At the front of a modest system it will serve well and should see you through a couple of upgrades to the rest of the system, too. In particular, the cartridge (though good of its kind) can be upgraded to advantage. At the

competitive price of £200 the Rotel RP-855 clearly merits a Best Buy rating.

## TEST RESULTS

### Motor section

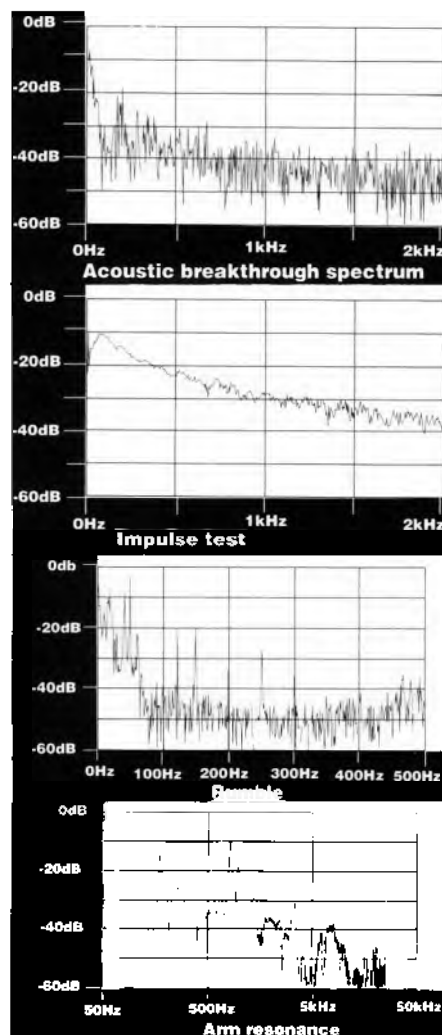
Type	manual belt-drive motor unit
Platter type	cast metal, rubber mat
Build and finish	good
Mains connection	captive 2-core lead
Speeds	33/45rpm
Wow and flutter (DIN B wtd)	0.05%
Speed error	+1%
Start-up time	1s
Rumble (DIN B wtd)	-67dB (see text)

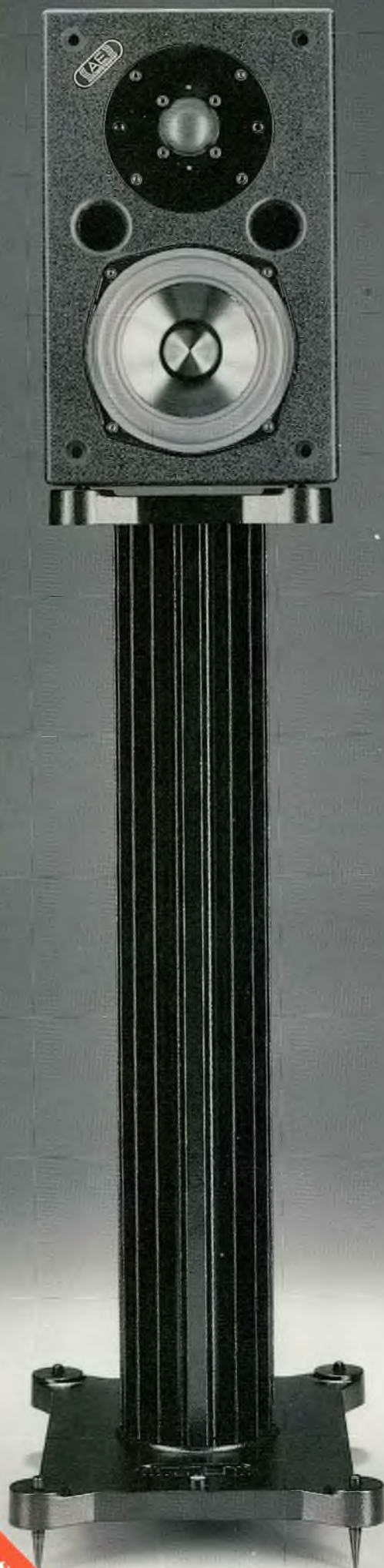
### Arm section

Approx effective mass	9g
Type	fixed
Adjustments provided	overhang, azimuth
Build and finish	average/good
Ease of set-up/use	good
Friction approx, lat/vert	60mg/40mg
Bias application method	calibrated dial
Bias force rim/centre (1.5g ellipt)	135mg/180mg
Downforce calibration error (2g)	0
Cue rate up/down	0.5s/1s
Arm resonances	average
Arm damping method	none

### System as a whole

Size (hwxwd/clearance for lid)	140x430x360mm/75mm
Ease of use	good
Acoustic breakthrough	fine
Hum level	audible
Vibration breakthrough	average
Shock resistance	good
Subjective sound quality of system	good
Typical price inc. VAT	£200





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**David G. Präkel, Hi-Fi Answers, March 1988**

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# Rational Audio Aura 01

**Recommended**

AUDIOTECH, AIKMANHILL FARM, LINTFIELD, BANK, NR. COALBURN  
LANARKSHIRE M11 0NJ. TEL: (0555) 824 99



Czechoslovakia may not be a world-leading supplier of hi-fi equipment, but the country has a long tradition of fine engineering, and with the demise of the arms race it seems at least one factory needed to find a product to replace its line in military radar gear; the result was the Rational Audio *Aura 01* turntable.

Actually, the *Aura 01* is really a combination of turntable and amplifier, but the amplifier does not concern us here. Suffice to say that it is a compact and simple 20W/channel integrated unit with an automatic loudness control.

The photograph is sufficient evidence of the *Aura*'s unusual styling. Its basis is a U-section of sheet metal, on which are mounted the bearing, the motor (supported on springs) and the lid. The latter carries the arm mechanism, a simple lateral tracking device which runs on guide rails, arranged so that when the lid is raised the arm automatically returns to the start position, ready to be cued up at the start of the next LP. Instead of going for great rigidity, the *Aura* uses a short section of soft plastic tube as the 'arm', with a T-shaped piece of metal pushed into it on which the cartridge is mounted. Cartridge adjustment for lateral tracking and azimuth consists of pushing this T-piece in and out of the tube, an adjustment which is a nuisance and apt to drift.

Unusually at the price, the *Aura* has an acrylic platter, mounted on a true inverted bearing. However, the bearing shaft is rather long and thin, and like the rest of the system, rigidity is not amazing. Still, the styling is certainly different, and I see no reason why the deck should not be reliable. Decoupling from external vibrations is effected only by four rubber feet. The deck is supplied with a Linn K5 cartridge fitted.

## Test results

The most serious flaw of the *Aura 01* is its high rumble (hum) level, which should certainly be reduced (as we go to press Rational Audio has announced that it will be doing this). This proved an irritation on audition, especially as I was using loudspeakers with good bass response. Bass feedback is also a bit of a problem, and some additional decoupling is advisable. Nevertheless, the *Aura* has some very good points in its performance, including a startling degree of midrange transparency and detail which is normally only heard in decks costing four times the price and more. There is very little masking of low level information, and it is remarkably easy to hear differences between instrumental timbres in music for large ensembles. With the deck on an isolation platform, and making some allowance for the rumble, bass is quite punchy and informative too, though not outstanding. It is at higher frequencies that the deck really excels.

Tests confirm the very high motor breakthrough, but apart from this and the poor rejection of vibration, the deck performs quite well. Wow and flutter is moderate, the disc impulse shows good platter damping (as expected of acrylic), and the arm resonance plot shows that the arm hardly resonates, certainly not in the 1kHz-ish region where most conventional arms ring. The arm has the usual problem of lateral trackers in rather different vertical and horizontal effective mass, which gives arm/cartridge resonances at about 8Hz and 12Hz - not too bad - and lateral friction is a little high.

## Conclusion

For all its weaknesses, this deck does some things so well, and is altogether such a

pleasingly different bit of design, that it deserves Recommendation - but a cautious one, just the same!

## TEST RESULTS

### Motor Section

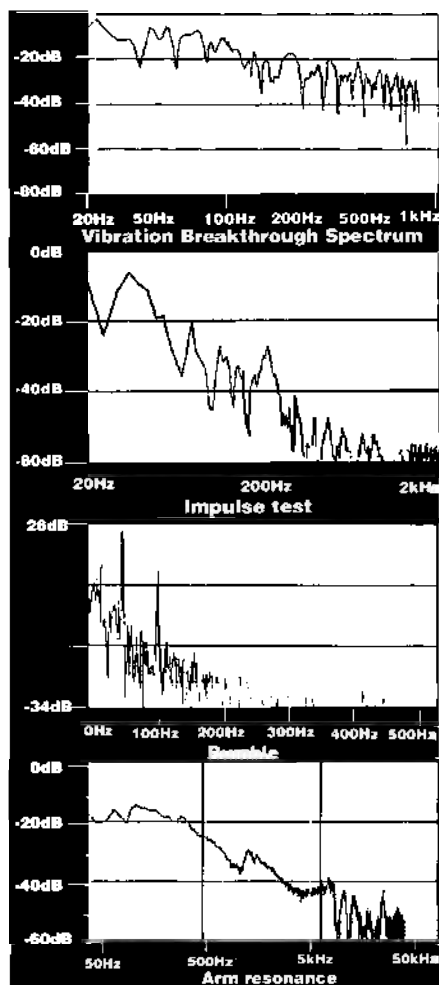
Type	belt drive
Platter type	solid acrylic on plastic subplatter
Build and finish	good
Mains connection	captive lead to matching amplifier (see text)
Speeds	33/45 (manual change)
Wow and flutter (DIN wtd)	0.1%
Speed error	0.5% slow
Start-up time	1s
Rumble (DIN B wtd)	-53dB

### Arm

Approx. effective mass	22g lateral, 10g vertical
Type	fixed, lateral tracker
Adjustments provided	overhang (see text)
Build and finish	good
Ease of set-up/use	moderate/good
Friction approx, lat/vert	50mg/<10mg
Bias application method	n/a
Downforce calibration error (2g)	0
Cue rate up/down	instant/instant
Arm resonances	very good
Arm damping method	none

### System as a whole

Size (h x w x d/clearance for lid)	13x35x31/3cm
Ease of use	very good
Acoustic breakthrough	good
Vibration breakthrough	poor
Shock resistance	fair
Subjective sound quality of system	very good in parts
Typical price inc. VAT	£180 plus £14 for power supply



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# Revolver Rebel

S.E.E. LTD., BEWSEY BUSINESS CENTRE, BEWSEY ROAD,  
WARRINGTON, CHESHIRE. TEL: (0925) 571173



Reviewing the *Rebel* in *Choice* two years ago, Alvin Gold commented on poor speed stability. It seems ironic, therefore, that on unpacking the new review sample, I found that the motor pulley was clearly bent, visibly wobbling as it rotated. Indeed, some months ago I covered the deck for another publication and had the same problem. I obtained a replacement - but it seems poor if two out of three decks have the same problem. Is it transit damage? Whatever, it demands attention.

The *Rebel* is simple in concept and execution. It consists of two Medite sheets, the upper one comprising the subchassis and the lower the plinth. They are separated by compliant mounts to give the deck some suspension and hence isolation. The lid and motor are mounted on the plinth; the arm, bearing and power switch on the subchassis. Although the deck is simple, it has some impressive details, particularly the bearing, which is a very close fit and shows no tendency to rock. The platter is rather unconventional, consisting of a plastic moulding with concentric ribbing underneath. It is very light, but its resonant behaviour if struck is quite good, with no particular frequencies audible. It sports a mat made of thin felted card, called a 'Starmat', and it comes supplied with a 'Pig' record clamp. This ingenious gadget simply pushes down over the spindle to hold the record firmly on the mat.

Mounted right at the rear of the deck is a synchronous motor, a higher speed unit than that more commonly used, which drives the platter via a round-section belt around its periphery. S.E.E. claims that this configuration results in the belt damping resonances in the platter, which sounds reasonable. However, it is rather easy to knock the belt off while changing

records. Speed change is by selecting pulley diameter, easy enough when the motor is visible. The *Rebel's* arm is a fairly standard item with a fixed headshell. It is not amazingly rigid, but seems quite well made. An Audio Technica AT95E is fitted - an old favourite. Several finishes are available, including white (ugh!), black, and the black/blue marbled unit supplied for review, which is agreeably different.

## On Test

It took little time to establish that the bent motor shaft was plenty audible, and the sample was rapidly banished to the lab. However, when working properly, the *Rebel* is rather a pleasing deck. It retains one problem, of audible motor breakthrough, but apart from that the sound is mostly good. There is a slight feeling of 'one-note' bass, due no doubt, to selective feedback (and variable, therefore, with siting), but that is kept at a reasonably low level and is not offensive.

Otherwise, the *Rebel* is a clear and neutral performer with a good 'punchy' sound which will certainly please some tastes in music, and sufficient resolution of complicated musical structures to appeal to most listeners. It is slightly short on subtlety and finesse at times, but it doesn't become overtly harsh or shouty.

Wow and flutter is adequate and speed is quite accurate, but the motor breakthrough is clearly reflected in the poor rumble figure. Some liveliness is shown on the arm resonance plot, but not sufficient to cause real concern. Vibration breakthrough is moderate.

## Conclusion

The *Rebel's* qualities of detail recovery and overall life and energy make it an appealing deck, but it is compromised by

**Recommended**

rumble to a degree which is audible. Recommendation is in order given the price - but check that pulley!

## TEST RESULTS

### Motor Section

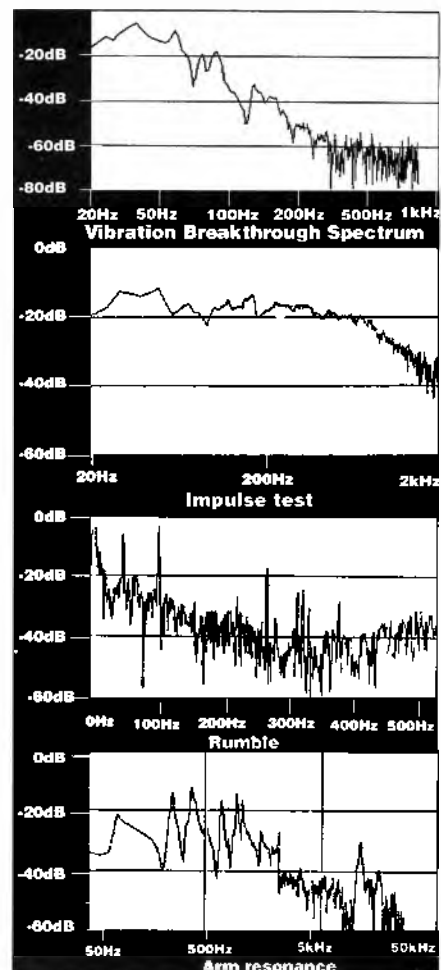
Type	semi-suspended subchassis, belt drive
Platter type	one-piece plastic moulding, felt mat
Build and finish	good/very good
Mains connection	captive lead
Speeds	33/45 (manual)
Wow and flutter (DIN wtd)	0.06%
Speed error	-0.15%
Start-up time	1s
Rumble (DIN B wtd)	-68dB

### Arm Section

Approx. effective mass	12g
Type	fixed, fixed headshell
Adjustments provided	overhang
Build and finish	good
Ease of set-up/use	OK
Friction approx, lat/vert	20mg/15mg
Bias application method	calibrated dial
Bias force, rim/centre	180mg/200mg
Downforce calibration error (2g)	-0.1g
Cue rate up/down	0/1s
Arm resonances	fair
Arm damping method	none

### System as a whole

Size (h x w x d/clearance for lid)	13 x 42 x 37/7cm
Ease of use	good
Acoustic breakthrough	fair
Vibration breakthrough	fair
Shock resistance	good
Subjective sound quality of system	good
Typical price inc. VAT	£180

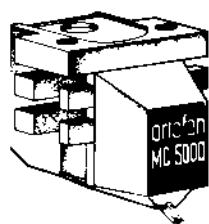


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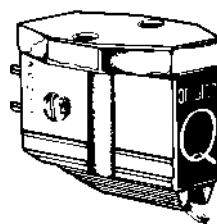
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# Tonearm roundup

Read on for a summary of some of the tonearms that have made the Hi-Fi Choice grade over the past few years.

The tonearm is of course a fundamental part of every record player, but on more esoteric models it's necessary to purchase a separate arm. We've covered the models made by the major turntable manufacturers in the *Moving Upmarket* piece (page 209), but that doesn't include the specialist companies that only produce tonearms. We haven't the space to give you details of all the arms on the market but the following are the better known examples.

## Rega RB300/RB250 - Best Buy

The Rega RB300 (£139) and its sibling the RB250/Moth (£95) is the definitive budget super arm, it's as much at home on a Systemdek as it is on a Roksan Xerxes. Its one piece cast aluminium tube, bearing housing and headshell combine with preloaded ball race bearings to form a very rigid main beam. For reasons of rigidity arm height can only be adjusted with the aid of large washers on the arm board. Sonically it's a top flight performer; it's notably dry and neutral with excellent control throughout the range. Transients were excellently reproduced and it offered a very well focused sound stage with very good depth. Its only significant failing was a slight mud-

dling of detail on complex passages. The RB250/Moth offers a similar standard but lacks the RB300's resolution.

## Helius Cyalene - Recommended

Helius is a small specialist tonearm company and the Cyalene (£1,495) is its flagship product. It has an unusually streamlined shape and high surface area bearing designed to channel energy created by the cartridge into the subchassis. It has a substantial tapered arm tube that's made out of two different metals in the form of an inner and outer skin, and a fixed headshell with one of the most insignificant fingerlifts in the business.

Reviewed on the *Voyd Reference* the Cyalene made a very good impression. It's extremely neutral and incredibly informative, each record's character is revealed with a sense of ease that eludes most tangential arms. It's basically a very accurate and characterless product that, when attached to a good turntable, is capable of yielding the finest results.

## Naim ARO

The ARO (£700) is a unipivot arm, that is its only bearing is a single point, which means that it is a tad unstable but has negligible friction. The bearing itself is jewelled to ensure minimal contact friction and the arm is very well made with a beautifully finished arm tube and simple headshell (drilled in three places for the Linn Troika cartridge).

Specifically designed for use on the

Linn LP12 this is how it was tested. Its basic character seems to be slightly bright and forward with a slight presence lift that will suit some systems much better than others. A good match for the LP12 but not suitable for all tastes and decks.

## SME 309 - Recommended

The 309 (£569) is one of three arms derived from the *Series V* and uses many of the same component parts but has a removable headshell. The 309 is 9 inches long, the 310 10 inches and the 312 12 inches, the latter being suitable for playing 16 inch lacquers.

In the company of few other arms, it seems to hold the cartridge with a firm grip, without using that grip to impart its own character to the sound, which therefore comes across cleanly and naturally. Some critics complain that the 309 'slows down the music', but my feeling is that real music does not have the so called 'speed' of many a hi-fi system. Evidently well made, well presented and assuredly well liked.

## SME Series V - Recommended

SME calls itself the maker of the world's best pickup arms, and it's difficult to argue against that. There may be better sounding arms but there are few that are better made or as easy to set up.

The flagship of the range is the *Series V* (£1,247), which uses preloaded stainless steel ball race bearings. The tapered main beam, in thin wall cast magnesium, is a one piece structure incorporating the headshell, bearing assembly and a slide for the counterweight. Confirming its aspiration to set a new reference standard, it has the ability to show just how coloured and tonally unbalanced many other arms are. It appears to have very little of its own false emphasis and subjectively it reveals the vinyl disc to a surprising degree.



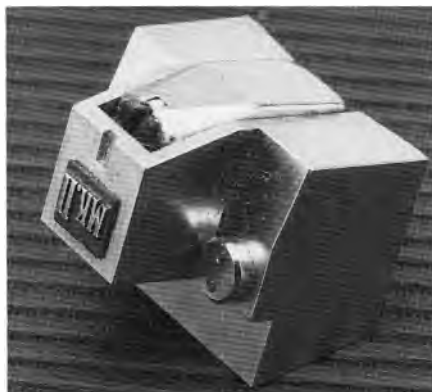
The unipivot Naim ARO.



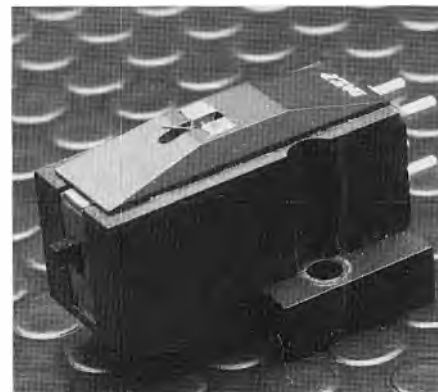
Audio-Technica's competent AT-OC5.



Dynavector's 1.7mm cantilever'd 17D2.



Dynavector's flux damping XX-1L.



# Into the groove

Much the same arguments for the existence of high-end turntables apply to cartridges as the two are obviously interdependent. So if you want to know why analogue addicts keep buying cartridges read the intro to the *Moving Upmarket* piece on high-end turntables. But to put it in a nutshell, it's because records sound great.

Cartridges fall into two groups; high output models, capable of working directly into any amplifier, and more expensive low output models. Typically low output cartridges use the moving coil (MC) principle of operation, have better mechanical integrity and tighter tolerances, and give better performance at a higher cost. Most budget amplifiers and most valve amps need some form of step-up to cope with their low output.

High output designs use the moving magnet (MM) principle and can be used with any amplifier that incorporates a phono stage. As a general rule low compliance (stiff) MCs work best in medium to high effective mass tonearms and high compliance MMs prefer medium to low mass arms.

## Audio-Technica AT-95E - Best Buy

At £19 the AT-95E is one of the cheapest ostensibly hi-fi cartridges available and has formed the basis of many 'badged' budget cartridges. It's a cheaply made

*The cartridge is an essential part of every record player, here we round-up some of the better models that Hi-Fi Choice has tested in recent times.*

MM with a removable stylus and a shank mount elliptical tip which is decently finished and well aligned.

Without direct comparison its sounded pretty good: lively and dynamic, a bit rich and heavy, but also quite clear and open. Treble lacked refinement and extension.

## Audio-Technica AT-OC5

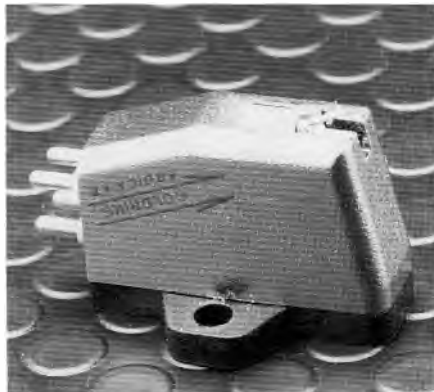
The OC5 (£123) is AT's follow up to the highly successful AT-15 moving coil cartridge, it has adopted the aluminium body of previous AT-OCs along with neodymium iron magnets and 6N PCOCC coils.

Sonically it's very competent and neutral for the price, it tracks very well and extracts an impressive amount of information from records but somehow misses the point when it comes to musical involvement. It's almost too neutral, its predecessor, although considerably more ragged, managed to find the life and gusto in the music that the OC5 omits. It's probably better suited to turntables that have a distinct character of their own.

## Audio-Technica ART 1 - Recommended

The moving coil Art 1 is AT's flagship cartridge, it incorporates a plethora of technical innovations and costs a hefty £800. AT has attempted to reduce all body resonances with a ceramic armature mould, a very rigid grey titanium shell and a lower skirt fashioned from a rubber

*Goldring's low output Eroica MC.*



like polymer. Even the boron cantilever is reinforced.

It offered a feeling of tactility, groove stability and sharp stereo focus, blending excellent treble definition with a rare subtlety and refinement. There were occasions when the soundstage appeared a little flat and vocalists too reserved, but on the whole, it was very convincing. It was also singularly insensitive to surface noise, another related factor in its ability to retrieve very delicate nuances.

## **Audio Note Ioliv - Recommended**

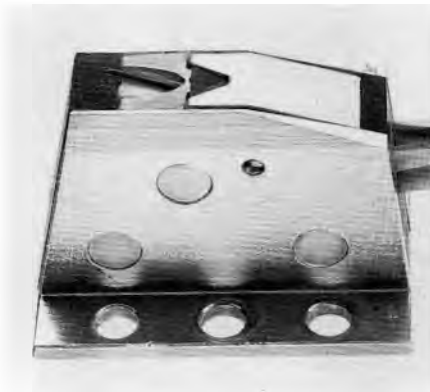
The Audio Note *Ioliv* is a very low output MC that was originally designed and built in Japan but is now being handmade in the UK. It's a refined and even esoteric design that weighs a ton (18g to be precise) and costs a bomb (£1,350). It uses a tapered titanium cantilever which is attached to a tiny vdH type 1 stylus and produces such a low output that you have to have a well matched step up transformer, mere high sensitivity MC stages aren't up to the job.

Sonically it's one of the very best, phenomenally dynamic and fast, capable of extracting information from the worst pressings and deserving of the best partnering equipment available.

## **Dynavector 17D2 - Recommended**

The 17D2 (£280) is a moving coil cartridge with incredibly short 1.7mm diamond cantilever, this material being chosen for its stiffness, high speed of sound and very low dispersion (self damping). Output is low but not unmanageable, it is a little

*Audio Note's handmade beauty the Io.*



fussy about arms, and will excite certain models quite mercilessly, but suitably matched it is quite in the forefront for detailed, clear, natural sound.

The 17D2's response shows a very small treble lift, which may 'enhance' detail slightly, steer clear if your system is already a bit fierce. Clearly a top flight cartridge that will not be embarrassed by the finest partnering equipment.

## **Dynavector XX-1L - Recommended**

The XX-1L (£680) is a low output version of Dynavector's XX-1, an MC with a boron cantilever, micro ridge stylus and distinctive flux damper switch on the front. In the midband it sounds exceptionally clear and detailed, and has no hint of harshness or distress when tracking high levels of modulation. Subtle ambience information in well preserved and stereo imaging is very solid.

The flux damper switch has little effect; the sound was marginally preferred with it switched in. A very clear and neutral cartridge, which notwithstanding the 20kHz lift, sounds balanced and non-fatiguing.

## **Empire Benz Micro MC-2 - Recommended**

Bearing more than a passing resemblance to the vdH MC-Two, the £699 Benz is a lower output cartridge with a 0.27mm diameter boron cantilever and micro-edge stylus. Magnets are neodymium iron and compliance is quite high for an MC.

It shares the vdH's delicately detailed and wonderfully transparent sound, but enjoyed a richer warmer bass and high

*Ortofon's Quasar - affordable high end.*



frequency notes were nicely differentiated without sounding bright or clinical. A trace of extra verve and treble sparkle would be appreciated however.

## **Glanz MFG-310LX - Best Buy**

The 310 is a moving flux cartridge, an ingenious variation on the theme of the moving magnet principle that has the same high output as an MM. The body is plastic and metal, the stylus detachable and the aluminium cantilever supports a line contact stone.

Therising treble response is best tamed with an unusually low load resistance, and under these circumstances the 310 slightly accentuated surface noise but extracted remarkable clarity, detail and treble extension. There is a considerable feeling of naturalness though it is a touch colored.

## **Goldring 1000 Series**

Goldring's 1000 Series consists of three moving magnet cartridges with the same body but different removable styli. The 1012 (£50) has a Gyger III tip and (with a 33k load resistance) a slight screechiness in the upper treble but good 'body' and well extended bass. Complex pieces are less well handled but the 1012 is a good enough all rounder to warrant formal Recommendation.

The 1022 (£70) has a Gyger II profile and suffers the same HF coloration as its siblings but makes up for it with nice bass and good imaging, electric guitar sounds especially good. Not as neutral as some but forthright and listenable - Recommended. At £90 the 1042 with its Gyger S stylus didn't offer an adequate standard to deserve Recommendation.

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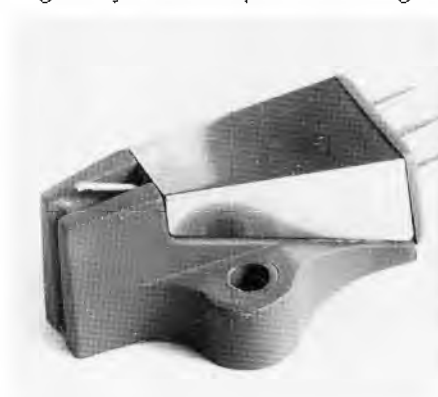
Ortofon's ultra neutral MC3000MkII.



Roksan's solid little MM - Corus Black.



Rega's Elys has three point mounting.



## Goldring Eroica LX - Recommended

The *Eroica LX* (£120) is the low output version of the two *Eroica* MCs that Goldring produces, and consistently the one that reviewers prefer. Though it doesn't exactly major on subtlety, detail retrieval is reasonably good if a bit veiled and it can sound a little hard. But in the right context it can sound very exciting, particularly with rock music, though it isn't neutral enough for acoustic instruments to be fully appreciated.

It's still good value for money however and works well in decks like the Systemdek HXE/900 AP and Voyd Valdi.

## Linn - various

Linn makes a variety of cartridges ranging from the budget K5 up to the nearly £700 *Troika* and all have done consistently well in our reviews, all models achieving either Best Buy or Recommended status. Standout models are probably the Best Buy K9, and the *Troika*, the later moving our reviewer to comment that "ex Karna users have been seen with glazed expressions indicating smug self-indulgence the morning after fitting a *Troika*."

## Ortofon 510 - Best Buy

Ortofon's £30 510 is the cheapest in its 500 series of MM cartridges, it has a basic elliptical tip and a tight fitting removable stylus assembly. It seems to show up different characteristics depending on programme material, rock'n'roll seemed well served in transient speed, while a classical piece provoked comments of 'twanginess' on transients. Both had good body and clarity but surface noise is emphasised somewhat. Against master tape the 510 acquits itself very well considering the price, with little weight lost and a good spread of capabilities.

## Ortofon MC3000 MkII - Recommended

Considered at one point to be one of the most neutral cartridges on the planet Ortofon's MkII MC3000 (£850) 'improvement on perfection' has a sintered alumina body, a Replicant 100 stylus (which has a very close resemblance to the cutting head of a mastering lathe) and an incredibly strong magnet.

It's one of a select few whose sound is sufficiently close to the master tape as to cast as many doubts on the record as on the playback equipment. Its clarity, detail, cleanness of attack and revelation of ambience is superb. If you want an 'exciting' cartridge look elsewhere, if you want an accurate one that allows music to be exciting for itself, try this.

## Ortofon Quasar - Recommended

Top of Ortofon's Q family of cartridges the moving coil Quasar (£300) is fitted with a similar Replicant stylus to the MC3000mkII and has an all metal body. It has good resolution of detail within complex textures and excellent delicacy where appropriate, but it is slightly bright and the performers seem to be brought forward somewhat. With full blooded rock'n'roll (AC/DC's *If you want blood...* perhaps - JK) it is quite at home, conveying plenty of power and impact without becoming confused or harsh.

A very competent all-rounder which combines detail, neutrality and ease with no obvious weakness, the Quasar represents very good value.

## Rega Elys - Recommended

An unusual fixed stylus moving magnet, the *Elys* (£74) can be mounted at three points on a Rega or similarly drilled

headshell as it has a threaded insert above the stylus. It's also worth remembering that it is phase inverting.

Subjectively well extended at frequency extremes it has tight stereo focus and low susceptibility to background noise, and its LF performance is likely to upset some partnering amps/speakers such as the wealth of bass detail. Though there were times when strong percussive sequences felt slightly 'cold' or 'tizzy' its inherently rich, smooth and musical presentation should win it many friends.

## Roksan Corus Black - Recommended

With a beefed up version of the Goldring 1000 Series body the MM Corus Black (£110) has a Gyger II tip and threaded inserts instead of the usual mounting holes.

It has a capacity for lively and energetic reproduction, adding a degree of detail recovery and subtlety that its relations fail to achieve. It can still become harsh in loud passages and it's not always precise on transients, but these effects are kept under control reasonably well. It deserves Recommendation.

## Shure VST V - Recommended

Something of a hit with our reviewer who ended up buying one, the VST V (£173) is an MM cartridge with a (fixed) micro ridge stylus and a beryllium cantilever, not to mention a 'dynamic stabilizer'. It inspired comments like 'excellent transients', 'good treble extension' and 'good body and clarity to sound'. The main criticism was of very slight coloration and forwardness, but in general the sound is exceptionally clean and assured. It proves quite conclusively that MM cartridges can compete with MCs.

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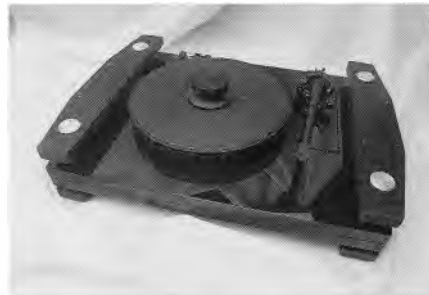
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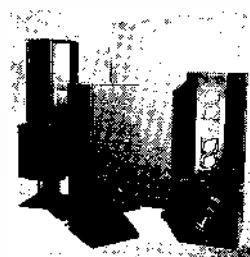
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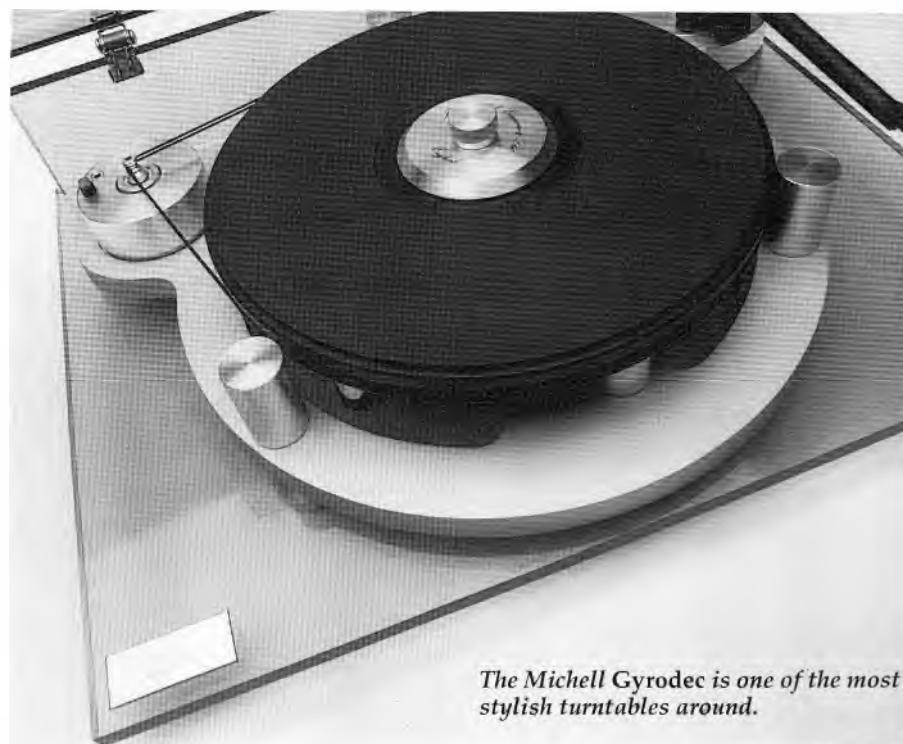


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Despite attempts to kill it off by the record industry, the larger players within the hi-fi industry and indeed most of the media, the vinyl record still remains a firm favourite amongst audiophiles around the globe. Record players are still considered by many to offer the highest fidelity available, and regular readers of *Hi-Fi Choice* may have noticed that many of the heads of large Japanese corporations, including Pioneer and Nakamichi, use serious turntables as their main source, not to mention virtually every *Aspirations* candidate we've featured.

When you consider that turntables have been under constant development ever since the introduction of the gramophone at the turn of the century, it's no wonder that the cream of today's turntable, arm and cartridge combos offer such a high standard. However, its reign is now threatened by the Compact Disc, which with its unarguable ease of use and scope for profit has been a hit with the record companies and mass market alike.

There are, however, plenty of good quality turntables and arms being made by specialist companies around the world. The emphasis these days seems to be on quality of construction and, as a result of CD which has done a lot for the turntable's progress, ease of use. Esoteric decks with only one speed or those that require you to move the belt from one platter to another, are dying out and being replaced by electronically driven machines with high pride of ownership value, even the old tweaky designs are smartening up their image as befits the most interesting looking of hi-fi components. These sort of



*The Michell Gyrodec is one of the most stylish turntables around.*

## Moving upmarket

*Turntables are rather different from the other products in this guide, in that models tend to remain current for far longer. Here we present a round-up of some of the more expensive decks which have caught our attention over the last few years.*

*The Alphason Sonata comes complete with the 'S' shaped HR100S tonearm.*

refinements increase costs of course, but the market seems to be more interested in high-end products than the budget decks that were once so popular.

One might ask why people spend upwards of two or three thousand pounds on a format that is so poorly supported on the software side. But that would be to ignore the fact that many people own substantial collections of LPs which they want to get the most out of, and that both the secondhand and specialist (mail order audiophile records such as are sold in regular issues of *Choice*) markets are growing rapidly. Good examples of classical LPs from the Fifties and Sixties sound phenomenally realistic and attract substantial prices on the secondhand market.

Anyhow, to get to the point of this feature, the Best Buy issue logically enough concentrates on the more affordable products on the market, and there isn't enough space for the all £500 plus record players that we have recommended in recent times. Thus the following is a selection of those designs which have impressed us in the last couple of years or so.

### Alphason Sonata/HR100S MCS

Taking things alphabetically the first deck on the list is the Alphason Sonata (£835) with its HR-100S MCS arm (£550) and optional Atlas power supply (£400) which we reviewed in issue 79. The Sonata uses a suspended cast iron subchassis and two motors with three suspension towers sticking up above the plinth, the platter is made of a fairly heavy composite material that's designed to be as acoustically dead



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Our selection from this year's awards—

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✓ Arcam Alpha III Amplifier *	£199.90	✓ Roksan Radius Turntable	£399.00
✓ Pioneer A400 Amplifier	£239.95	✓ Roksan Tabriz Tonearm	£165.00
✓ Audiolab 8000A II Amplifier	£410.00	✓ Audio Technica AT110E Cartridge	£23.95
✓ Mission 760 Loudspeakers	£99.90	✓ Roksan Corus Blue Cartridge	£65.00
✓ Cyrus 780 Loudspeakers *	£179.90	✓ Audio Technica ATOC5 Cartridge	£122.95
✓ Arcam Delta 2 Loudspeakers *	£339.90	✓ Audio Technica ATHL1A Headphones	£17.95
✓ Aiwa ADF410 Cassette Deck	£99.99	✓ Sennheiser HD480 Headphones	£44.99
✓ Yamaha KX250 Cassette Deck	£149.95	✓ Sennheiser HD530 Headphones	£74.99
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as possible. A cast iron record clamp is also supplied. The 'S' shaped *HR100S* was Alphason's first product back in 1981 and it was the first one piece arm tube and headshell arm on the market. The *MCS* is a refinement of that model featuring a titanium arm tube and has a 13g effective mass making it suitable for use with medium to high compliance cartridges.

Without the power supply we said "Clarity, detail and dynamics all seemed good and the frequency range gave no feeling of limitation. The 'master tape test' showed the *Sonata* to be pretty much on par with or better than other decks in this price range." Adding the *Atlas* PSU inspired the following response, "The sound is brought into focus more clearly and there's a better sense of what the Americans call 'intertransients silence'. True bass weight and power, only marginally lacking without the *Atlas*, are brought out better than ever". We concluded by saying, "With a good partnering arm this is a very fine deck indeed. Its performance is lifted into the top flight by the *Atlas* power supply, and the whole package is confidently Recommended."

## Kuzma Stabi/Stogi Reference

Next on the list is the Kuzma *Stabi* (£995) with its *Stogi Reference* arm (£899), this Yugoslavian deck is an impressive looking beast painstakingly made out of solid oak, indeed if it were made this side of what is left of the iron curtain it would probably cost twice as much. It's a suspended subchassis design with four springs that can be easily adjusted from above, its motor is driven by a split phase power supply and, unusually, it includes a fine pitch adjustment facility.

The *Stogi Reference* arm is a substantial beast with a tapered aluminium arm tube, by virtue of its size, shape and construction it's designed first and foremost to resist resonance. It is also very well built, if a bit less glamorous in finish than the deck itself.

The combination's sonic qualities were not hard to find, "it is a very clear, neutral deck, capable of extracting a great deal of information from the vinyl. Against the reference it was possible to discern a loss of some detail and ambiance, especially in very heavy textures, but in isolation the *Stabi/Stogi Reference* is highly revealing... the combination of violin and piano can be tricky to reproduce when the piano is thundering away in the bass, while the



*The deck that started it all in the first place - the classic LP12.*

violin explores its higher reaches, but these components sorted this out as well as almost any... Taking all into consideration it certainly warrants Recommendation."

## Linn Sondek LP12/Ekos

The Linn *Sondek LP12* (£759 with *Valhalla* power supply) was the deck that changed western preconceptions about the importance of source components and it has been in production for nearly twenty years. Based on an early Ariston, it is a fairly simple suspended deck with a pressed steel chassis and long wooden armboard. It is a precision engineered product with good attention to detail ensuring excellent reliability. Setting it up is a painstaking process that's not for the unenthusiastic and a whole body of lore has grown up around the mystic art of getting an *LP12* to boogie. Up until a couple of years ago, when the *Ekos* arm (£1,097) was introduced, the classic arm for this deck was Linn's *Ittok* (£560) which has recently been updated. This was a benchmark tonearm throughout the Eighties and having been designed for the purpose works very well on the *LP12*.

The *LP12* is available with a variety of arms and power supplies, a recent budgetish alternative being the *LP12 Basik* (£599) which is a 33rpm only deck with the most basic power supply that Linn produces. From there bigger and better power supplies can be added until you arrive at the top of the range *LP12/Lingo/ Ekos* combination which commands a serious £2,235 price tag.

*Choice's* most recent review covered this combination and included the following comments. "The deck is apt to make a very good impression, whether heard with the *Troika* cartridge (as here)

or any other capable transducer. Detail seems on the whole to be good, pitch stability is excellent, and frequency range is nicely balanced, if possibly a little dull by some standards... on recordings of quite complex music, there is a lack of very low level detail, a feeling that the sound is slightly muddled... the *Lingo* does confer a greater feeling of stability and hence better resolution in the bass, but still not to the level of the best around... the *Ekos* arm is a good match for the deck and indeed a good arm, period. At no time did I feel that I was listening to arm resonances... the *LP12* can sound highly convincing at best, but in the area of detail most noticeably, it fails to impress when compared with the most neutral decks now available."

Other reviewers have, however been more enthusiastic, the deck's charm lies in its ability to musically communicate, it makes you tap your feet and has a superb sense of timing—as CD has shown there's more to musical enjoyment than a flat response.

## Michell Gyrodec

J A Michell Engineering has been making turntables for longer than most but its acrylic and aluminium decks remain as distinctive as ever. The company's top turntable, the *Gyrodec* (£659), was launched in 1981 but has undergone several modifications. It now features an inverted bearing, a carbon and vinyl loaded acrylic platter and a power supply housed in its own clear perspex box. The platter is given extra inertia by six gold plated weights that hang underneath it and the circular cast alloy subchassis supports a perspex armboard. The combination of clear perspex and silver metalwork makes for a very stylish looking player that's

aesthetically suited to arms like the SME IV but still works very well with the less sexy Rega RB300.

In issue 55 its sound quality was described thus. "It offered a smooth, almost liquid quality through the midrange, and although of no greater inherent resolution than others, it did sound more progressive in its response to dynamic shadings, if not as hard hitting during the really loud bits... It has a light touch, but a sure and refined one too. Stereo placement and focus are stable. Lack of really strong dynamics and moderate resolution prevent it matching the best, but it remains a fine and likeable turntable."

Since this review the deck has been upgraded, with a new bearing and PSU. Look out for a full review in a forthcoming issue.

## Oracle Delphi IV

Oracle is a Canadian turntable company whose products have been sold in the UK for quite some time now. In the *Sondek*'s heyday it was one of that turntable's few apparent competitors and it remains a well regarded brand.

The sexy *Delphi IV DS* (£3,250 in black/gold, £2,500 in silver) is its top player and was reviewed in pre *DS* form in our 1990/91 *Collection* issue.

"Gone is the gooey mat to be replaced by a hard methyl methacrylate surface bonded to the aluminium/composite platter... its mild contouring helps iron out warps as the disc is pressed home by a screw down clamp... a seven layer alloy/epoxy resin based subchassis is used, it incorporates an inverted bearing together with a peripheral counterweight to compensate for changes to the one piece platter/matt.

"Sonically it has character, certainly, but it's character that suits the sparkling demeanour of MCs like vdH's high output MC *Two*... I could not help but notice some slight softening of the deepest, earthiest bass notes, and a subtle but quite detectable muting of the very highest treble... Yet spin a well recorded disc and the *Delphi IV* will demonstrate just how bright and positive a state of the art deck can sound. There was no hesitation in the raw but natural edginess of the trombone just as the slap of bass was given free rein, striking deep into the natural ambience of the recording... despite certain technical shortcomings it remains true to the emotivity of the music... It's a fabulous but eminently sensible piece of engineering"



*The Pink Triangle PT TOO Export, complete with Aerolam subchassis and that distinctive acrylic platter.*



*You'll get detail-a-plenty from the Roksan Xerxes.*

## Pink Triangle PT TOO Ex

Pink Triangle is a relatively small London based turntable company that made its name with a 'neutral' alternative to the *Sondek* in the early Eighties. It now makes three models including the new *Anniversary* which features a subchassis mounted motor, and some rather cheeky but effective upgrades for the Linn *Sondek*. However, the current version of the deck that the company built its reputation with is the *PT TOO Export* (£676), which we reviewed and Recommended in issue 91 (February 1991).

"The Pink Triangle design relies on the use of relatively non resonant materials and constructions. To this end, the subchassis is made of Aerolam, a honeycomb based material which is claimed to approximate to a very large surface area and thus be capable of dissipating energy easily... the deck uses an acrylic platter (PT claims to be the first company to use acrylic in this way) and an inverted, jewelled bearing... the suspension is very free and easily adjusted... Sonically it has

a remarkably open and detailed quality, lacking almost entirely the feeling of veiling, compression and lack of ambience that most record players exhibit. It shines especially in complex music, where one can easily distinguish details which are all too often blurred almost out of existence... It is just possible to discern some coloration and slight loss of ambience and imaging detail when compared with the *Anniversary*... The *Export* has the classic PT virtues of exceptional clarity, neutrality and detail.

## Roksan Xerxes/Artemiz

Roksan Engineering is one of the younger companies in this group but its *Xerxes* (£785) turntable has established itself as one of the major contenders in the British record player market. Its approach is pretty radical, a stiff suspension supports a heavy Medite top plate which further decouples the arm and bearing with a near continuous oval slot through the board. A low torque motor sits on its own bearing and is restrained by a spring, this

allows it to kick start the two piece aluminium platter but minimises energy transfer. Last, and probably least, you can remove the LP locating spindle and thus minimise mechanical connection between disc and platter.

Roks also makes an unusual tonearm called the *Artemiz* (£635) which has a pendulum like decoupled counterweight and horizontal bearings that are loose unless the stylus is being pulled by the vinyl groove. It has two less expensive brothers, the *Tabriz* (£165) and *Tabriz zi* (£255), the latter incorporating the same decoupled counterweight as the *Artemiz*.

In issue 91 we described its sound quality as follows, "it seems very open and detailed... bass is perhaps a little shy, but images are sharp and clear and there is no instant 'character' to complain of... however, compared with master tapes the deck can sound bright, performers are brought forward and highlighted, but they tend to become a bit two dimensional in the process".

Other reviewers have however been more enthusiastic, in issue 67 the *Xerxes*' sound quality was described thus; "When a note stops the *Xerxes* stops too - it has less overhang than almost any upmarket turntable... stereo resolution is particularly fine... the sense of control is apparent at all volume levels, but never impedes the liveliness of the music."

Like the *LP12* the *Xerxes* has a character which suits some tastes better than others, its followers call it 'fast' its detractors call it 'bright', you'll have to make up your own mind which camp you fall into.

## Townshend Rock Reference/Excalibur

Townshend International made its name with a turntable called the *Rock* which incorporated a device invented at the Cranfield Institute of Technology. This controls tonearm and cartridge resonance by virtue of a paddle attached to the headshell which sits in silicone filled trough that sweeps across the platter. The system allows the arm to move across the record but damps out unwanted vibrations in the cartridge and gave the *Rock* a rock solid sound. Added to this, the plinth and platter were made of gypsum filled steel.

The *Rock Reference* (£2,300) is a refinement of that original design, with an even heavier platter (18lb) and a subchassis that's isolated with three dashpots spring/

damper assemblies. The *Excalibur* (£745) arm has internal silicone damping and an integral paddle at the end of the headshell, bolt on paddles are available for other arms.

Soundwise; "it's very hard to fault the *Reference*, as I'm no longer sure where the limitations of the record player leave off and those of record cutting system begin... sound quality is definitely very close to master tape. The tape still has a free and open quality not absolutely rendered by the deck, but for once the true weight of the attack on a piano is brought across... The *Rock Reference* is in a class of its own in recovering bass detail: it's also unexcelled, though maybe equalled, in higher frequency regions... The feeling of replay equipment character is less with this deck than with any other."

## The Voyd

The *Voyd* uses both familiar and novel approaches to the job of extracting information from the vinyl groove. Like the Pink Triangle it has an acrylic platter and works on the principle that energy is best dissipated by channelling it into the subchassis, which in this case is a substantial aluminium 'C' section. But unlike any other design on the market, it uses a split phase power supply to drive three high torque motors which invest the light-

weight platter with very high inertia, apart from this the motors give the subchassis considerable lateral stability.

*Voyds* come in three different guises, standard *Voyd* (£1,570), *0.5* (£3,368) and *Reference* (£5,950), the *0.5* denoting the halfway point between the other two models. As you work through the range power supply, platter material, subchassis and even motors are beefed up until you get to the *Reference*, a substantial turntable in anybody's book.

Sonically the *Voyd* takes the Pink Triangle style neutrality route a stage further and brings in awesome dynamics and outstanding detail retrieval. It manages to combine power with finesse, creating deep densely populated soundstages. Its detractors call it 'slow' but this is because it has the time to express a note fully without blurring it into the next, unless the music is fast it won't sound fast.

Such is its skill in rendering tonal colours that one is inclined to listen to acoustic music just for its sheer realism. That said rock'n'roll kicks ass just as effectively, the dynamic impact of it is truly mind blowing. Up there with the *Rock Reference*, the *Voyd* has very little character of its own, it may not be quite the match of that deck in the bass but it can perhaps show it a thing or two when it comes to the rest of the band.



*The Voyd has won many friends with its open, articulate sound.*

# Glossary

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

**AM:** Amplitude modulated — see 'Medium Wave'.

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

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

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

**Alignment protractor:** A device used to minimise the lateral tracking error of a cartridge/arm combination.

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

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

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

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

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

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

**Bass:** Lower part of the frequency spectrum.

**Belt drive:** The turntable motor has its rotational speed geared down to the required platter speed (33 1/3rpm for

LP discs) by a rubber or similar resilient belt which runs round a small pulley on the motor shaft and a large pulley attached to or part of the platter.

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

**Bias: (tape)** This refers to a high frequency current passing through the record head which allows the audio current also passing through the head to produce reasonably linear magnetisation of the tape at all levels permitted by the combination of each machine with the tape. The lowest level of bias is required for ferric cassettes, a slightly higher one for ferrichrome, an even higher one for chrome or pseudochrome, and the highest for metal.

**Bit Stream:** the use of single Sign Bits controlling a switched-capacitor DAC to generate a Pulse Density Modulated output. This is achieved via oversampling, truncation of each 16 bit word into 1 bit 'chunks' and the redistribution of errors (noise) via noise-shaping.

**Bitstream:** a generic term given to those DACs utilising a Pulse Width Modulated output but whose noise-shapers may not operate over the full 16-bit dynamic range.

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

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

**Chipset:** a handy euphemism for the decoder, oversampling filter and DAC that comprise the CD player.

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

**CLV or Constant Linear Velocity:** the rotational velocity of a CD is constantly adjusted so that data passes over the laser at a fixed rate, ie, at a constant 'linear' velocity. The exact velocity differs from disc to disc but usually lies between 1.2-1.4m/sec. The frequency of the recovered data is compared with a crystal reference and the difference is used to speed up or slow

down the rotation of the disc.

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

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

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

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

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

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

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

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

**De-emphasis:** an emphasis or boost is occasionally applied upon recording (max +9dB at 16kHz) to reduce hiss and noise upon de-emphasis within the CD player.

**Digital:** the use of a binary code (ie, 1's and 0's) to represent, store and transmit an analogue audio waveform.

**Digital Output:** a datastream adhering to S/PDIF and transmitted in biphasic-mark code, allowing the CD player to be upgraded with an external DAC. The digital output on a player may be coaxial or optical in design but the coding is identical.

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

**Distortion:** Literally this can mean any deviation from the original, but usually refers to harmonic rather than intermodulation distortions.

**Dither:** a low level triangular-distribution noise that is added to convert harsh-sounding granulation distortions into an innocuous background hiss. The S/N ratio may deteriorate slightly but distortion is much reduced.

**Dolby:** Covers various signal processing/ deprocessing systems, but normally refers to the B and C noise reduction systems used in cassette record/replay, and the B system used for music cassette replay. Also Dolby S Type, the latest form of noise reduction.

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

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

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

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

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

**Effective mass:** The inertia, or mass-controlled resistance to movement, of a device. Particularly important with regard to tonearms.

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

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

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

**Equalisation:** (tape) This refers to the necessary change in frequency response required of an amplifier so that overall flat frequency response is obtained from a tape medium. Equalisation is required both on record and replay. Any tape recorded on a good cassette recorder should have the same inherent response when played back on another correctly set up machine, since all playback



equalisations should have been standardised. These standards are normally specified by the time constants of the circuits involved, eg 70µs or 120µs (microseconds)

**Farad:** Measure of capacitance.

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

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

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

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

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

**Hz (Hertz):** One Hz equals one cycle per second and is a measure of frequency which corresponds to musical pitch (the higher the frequency the higher the pitch)

**HF:** High frequency.

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

**Harmonic distortion:** The addition of unwanted harmonics to the required signal

**Hum:** A low frequency interfering sound produced by breakthrough or interference from mains wiring or circuitry

**IEC:** An international standards body

**Impedance:** Measure of resistance (and reactance) in alternating (ie, audio) signals. This is important in the compatibility of both cartridges and headphones with amplifiers. For convenience sake it's measured in ohms.

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

**Intermodulation (IM):** A form of distortion arising from two or more signals producing nonharmonic signals that correspond to the sum or difference of the two frequencies.

**Jitter:** an uncertainty in the position or timing of digital transitions (or edges) caused by interference or poor clock recovery. Digital jitter gives rise to unpleasant distortions after D/A conversion.

**Kilo(k):** Prefix meaning one thousand.

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

**LED:** Light Emitting Diode; an indicator light.

**LF:** Low frequency

**Load or Loading:** The impedance (including resistive and reactive components, ie, ohms, mH pF) seen by one component looking back to its inter-connected component.

**'Loudness':** An equalisation circuit fre-

quency switchable on amplifiers which is designed to compensate for presumed hearing characteristics at low listening levels by boosting bass and treble.

**LSB:** or Least Significant Bit, the difference in amplitude between one quantisation level and the next. This is the final bit on the far right of each 16-bit digital word.

**MASH:** or Multi-stage noise-Shaping. A two-stage process developed by NTT and utilised by Technics (among others) to redistribute the quantisation noise caused by truncation in the bitstream process

**Medium wave:** An AM transmission band incapable of high fidelity signals

**Micro- (µ):** Prefix for units, meaning 'one millionth of'.

**Midrange, Midband:** The central part of the audible frequency range where the ear is most sensitive.

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

**Modulation:** The audio signal is 'stored' by means of modulations within a medium, eg the 'wiggles' in the groove of a plastic disc, or the magnetic coding on a tape.

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

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

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

**MSB:** or Most Significant Bit. Equivalent to 32768 LSBs in amplitude. This is the sign bit on the far left of each 16-bit digital word.

**Multibit:** an older style converter that uses 16 or more sequential current sources to build up the audio waveform in response to each 16-bit (or greater) digital word. These DACs suffer from glitches as each current source turns on and off while low-level accuracy is dependent on the precise matching of individual resistive elements. Bitstream DACs overcome these limitations.

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

**Nano (n):** Prefix meaning a thousandth of a millionth of.

**Noise:** Random unwanted low level signals.

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

**Noise-shaping:** a form of digital feedback used to redistribute unwanted quantisation noise towards higher frequencies.

**Octave:** Two-to-one ratio of pitch or frequency.

**Offset angle:** The angle measured between the centre line of the pickup cartridge and the line which joins stylus

and arm pivot point.

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

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

**Oversampling:** the mathematical generation of intermediate sample values to effectively double and re-double (etc) the original 44.1kHz sample rate.

**PDM:** or Pulse Density Modulation represents the audio waveform as the variation in density (or number) of analogue pulses per sample period. More pulses increase the average level of the audio signal at that point in time and vice-versa.

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

**PEM:** or Pulse Edge Modulation. A bitstream variant developed by JVC that employs two PWM datastreams which are combined to effectively lower the required clock rate.

**PFM:** or Pulse Flow Modulation. Pioneer's interpretation of true PDM operation.

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

**Pico (p):** Prefix meaning one millionth of a millionth of.

**PLM:** or Pulse Length Modulation. Sony's version of bitstream where just seven binary values are used to control a PWM DAC.

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

**Power amplifier:** The part of an amplifier that provides power to drive the loudspeakers. Usually integrated, it is sometimes a separate component.

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

**Presence:** A quality of forwardness or immediacy in a sound balance, generally related to an upper-middle frequency response boost.

**Print-through:** A pre- or post-echo of a loud signal created by magnetisation occurring from one layer to an adjacent layer after the tape has spooled or been recorded.

**PWM:** or Pulse Width Modulation. The correct term first coined by Technics who truncate from 16- to 3.5-bits, producing 11 binary values which generate any one of 11 Pulse Widths from the bitstream digital to analogue converter.

**Q:** A measure of the magnitude and shape of a resonance; the higher the Q, the sharper and more severe in amplitude the resonance.

**Quantisation:** with CDs' 16-bit code there are two to the power of 16 or

65,536 different quantisation levels available to describe the audio waveform once per 44.1kHz sample period. Errors in the allocation of each quantisation level result in quantisation noise and distortion. Truncation in the bitstream process produces huge amounts of quantisation noise.

**Reflex:** A system of bass loading (using port or ABR) which offers improved efficiency and bass power handling at the expense of subsonic control compared to a sealed box.

**Rumble:** The low or medium frequency sound produced mechanically by any moving parts in a turntable, mainly the motor and platter bearings.

**Sensitivity:** The volume of sound output for a specific electrical voltage input.

**Separation:** As between the two channels of a stereo pickup; see Crosstalk.

**Shibata:** A special stylus extending the elliptical to a 'line-contact' type of profile.

**Signal to noise, Signal/noise, S/N:** The difference in total output when an applied signal is removed.

**Stylus:** The specially shaped piece of diamond in contact with the groove and connected to the cantilever.

**Subsonic:** Below the audible range; ie, below 20Hz.

**Square wave:** A signal which consists of a fundamental plus a (theoretically infinite) series of odd (3rd, 5th etc) harmonics in a precise phase and amplitude relationship

**SSN:** or Single Stage Noise-shaping as developed by Philips uses either two or three feedback loops together with a unicolor to redistribute quantisation noise in one step

**Stop-band Noise:** signals outside the audio or passband related to the 44.1kHz sample frequency and its multiples.

**THD:** Total harmonic distortion.

**Tracking error:** The discrepancy between the truly tangential angle at which a record is cut and the slightly off-tangential angle at which it is tracked by a stylus on a pivoted arm during some parts of the arm's travel.

**Transient:** Signal of very short duration.

**Treble:** Upper part of frequency spectrum, typically above about 3kHz.

**Tweeter:** A small drive unit designed to operate over the high frequency range.

**Ultrasonic:** Frequencies above audibility, ie greater than 20kHz; also supersonic.

**Vertical tracking angle (VTA):** The angle at which the plane of motivation of the stylus is set with respect to the vertical when viewed from a side elevation of the cartridge. Should match the 20° cutter standard.

**Weighting:** A factor or function that is applied to a measurement to increase its relevance and usefulness, often seen as A or B Wtd.

**Woofer:** A drive unit that operates over the bass portion of the audio range.

**Wow and flutter:** Low and high frequency pitch variations (from poor tape transport or turntable platters with speed drift).

# DEALER GUIDE

## ENGLAND

**VAUDIO** 36 Druid Hill,  
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Tel: 0272 686

ATC, Acoustic Energy, Ruark, AVI, Exposure,  
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## NOT ALL GREAT SPEAKERS ARE GREAT BIG SPEAKERS.



For more than twenty years, we've challenged notions of what a loudspeaker can and can't do.

The new Infinitesimal Micro may be more challenging than most. For you would expect its diminutive size to be equalled by diminutive performance.

That is the farthest thing from the truth.

Its performance is anything but meek. Indeed, it traces its lineage to a speaker system 7½ feet tall. And a little closer to earth, it borrows much from the critically acclaimed, three-piece Modulus system.

Of course, you can hear all that.

### THE SIZE OF MUSICALITY

Each Infinitesimal Micro satellite speaker is just slightly larger than a thick paperback book. So it stays virtually out of sight and out of the way. Yet hardly out of earshot. In fact, a pair of Micro satellites can bring your recordings to life with unexpected depth, presence and clarity. At the heart of the Micro system are an ultra-efficient, polypropylene-coated 3½" midrange cone and a wide-dispersion ¾" polycarbonate tweeter for full, rich midrange tones and sparkling, extended highs.

Even the cabinet is a work of high technology. Its walls are made of non-resonating polypropylene to prevent any interfering vibrations from coloring the music. And the satellite's stepped enclosure (modelled after the Modulus system) allows the sound waves of the woofer and tweeter to

merge into one coherent wavefront, creating a three-dimensional soundstage with every instrument and vocal in its proper place, left-to-right, front-to-back.

### THE LOWDOWN ON BIG BASS

Rounding out the range of sound is the Micro Subwoofer. It can reproduce low-end frequencies clear down to 50Hz... for full, deep, dynamic bass that is not only heard, but distinctly felt. This, courtesy of an ultra-efficient 8" dual voice coil woofer cone firing into a tuned, vented enclosure. (The dual voice coil sums up the bass frequencies of the left and right channels for a powerful, clean low-frequency signal.)

And since bass frequencies are non-directional, you can place the Micro's sleek, low-profile Subwoofer anywhere you like. Even out of view. Regardless, the bass will seem to be emanating directly from the satellites as part of the total musical image.

### A PERFECT FIT

Infinitesimal Micro was specifically designed to fit in where larger or more costly systems just don't. That's why you'll find it to be an ideal choice as video speakers or part of a surround-sound home theater system.

So before you invest in speakers that cramp your style (and your music), try the Infinitesimal Micro on for size. Inch-for-inch, there is no more satisfying musical value in a compact three-piece system than this.



### INFINITESIMAL MICRO SATELLITES:

Frequency Response:	150Hz - 22KHz ± 3 dB
Crossover Frequency:	5000Hz
Efficiency:	87 dB @ 1 watt, 1 meter
Nominal Impedance:	6 ohms
Power Rating:	10 - 50 watts RMS
Drivers:	3½" (8.9 cm) Polypropylene-coated paper midrange ¾" (1.9 cm) Polycarbonate tweeter
Cabinet Finish:	Dark grey polypropylene
Dimensions:	4.8" W x 7.6" H x 4.8" D (12.2 x 19.3 x 12.2 cm)

### INFINITESIMAL MICRO SUBWOOFER:

Frequency Response:	50 - 150Hz ± 3 dB
Efficiency:	87 dB @ 1 watt, 1 meter
Nominal Impedance:	6 ohms
Power Rating:	10 - 100 watts RMS
Driver:	8" (20.3 cm) dual voice coil woofer
Cabinet Finish:	Dark grey vinyl
Dimensions:	20" W x 7.25" H x 11.38" D (50.8 x 18.4 x 28.9 cm)

Phone or fax Infinity UK for nationwide dealerlist.



**We get you back to what it's all about. Music.**

because people like music

MISSION