

HI-FI CHOICE

140 AMPLIFIERS AND
27 TUNERS – SUMMARISED

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

PERSPECTIVES: GETTING IT
TAPED

73 CD PLAYERS –
SUMMARISED

117 LOUDSPEAKERS –
SUMMARISED

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20 HEADPHONES UNDER
REVIEW

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SUMMARISED

7 VALVE AMPLIFIERS ON TEST

114 CARTRIDGES –
SUMMARISED

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

HI-FI CHOICE

ISSUE NUMBER 63: OCTOBER 1988



Cover photograph of the Pioneer D1000 by Chris Richardson - see page 75.

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BACK ISSUES

Fill in this page for back issues of the world's no. 1 guide to buying hi-fi.

Having tested a whole bunch of cassette decks earlier in the year we were worried that this time around there would be insufficient new recorders to warrant a full *Choice* review project. We couldn't have been more wrong. New models keep a-coming faster than we can keep up with them.

We've managed to get our hands on five DAT recorders for this issue and decided to publish reviews to give you an idea of what to expect in the future. The hi-fi industry is none too happy with us because DAT has not been officially launched on the consumer market – but if you want a machine badly enough there *are* several dealers in London selling grey imports. The DAT situation is explained more fully in *Choice Sessions*, a new feature which begins on page 13.

Also this month we've tested 20 headphones at prices to suit most pockets, while for dedicated hi-fi enthusiasts we have a selection of exotic valve amplifiers under review. Getting the best from valve equipment involves careful system matching and 'tweaking' but if you've the patience the results can be most rewarding.

This month's *Aspirations* feature looks at two gorgeous Ferraris kitted out with superb in-car sound systems. Our photographer, Chris Richardson has really captured the spirit of these classic cars – a fitting tribute to Enzo Ferrari who died just a few days before this issue went to press.

We've a treat in store next month, in that we're giving you a limited edition compact disc – exclusive to *Hi-Fi Choice* – highlighting some of Decca Classics' brand new recordings scheduled for release this autumn. Trouble is, we're unable to avoid incurring VAT and other charges, so next month's *Choice* will cost £3.95. Still, it's a bumper issue featuring reviews of 30 new CD players – and with an hour-long compact disc worth £12.95 mounted on the cover we think you'll agree it's an issue not to be missed. Publication date is 14th October and we expect November's *Choice* to be in great demand. As they say in the commercials, hurry to your newsagent to avoid disappointment!

John Bamford

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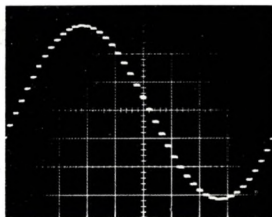
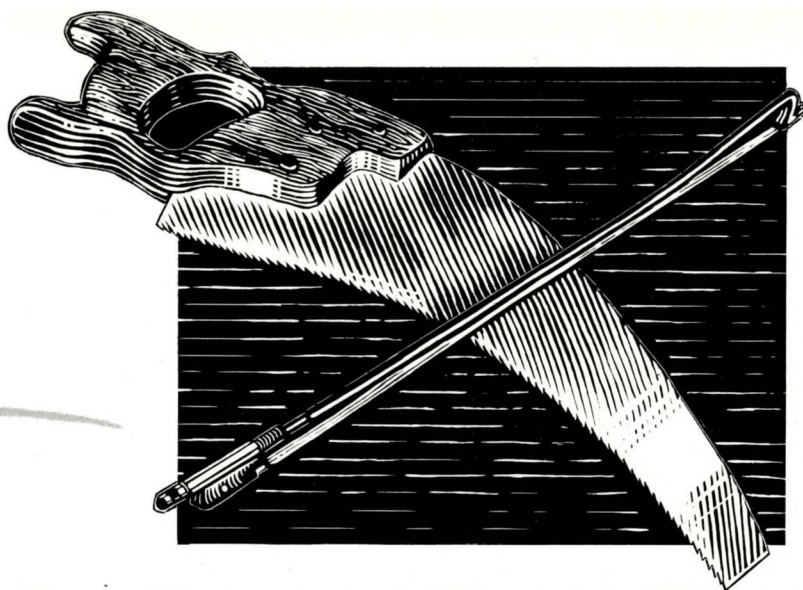


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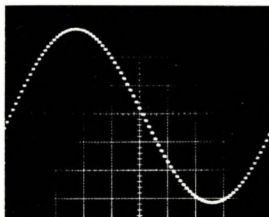
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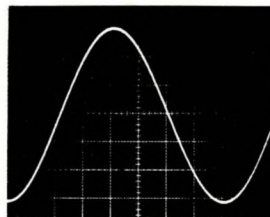
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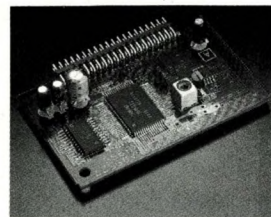
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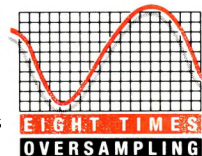
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PRODUCTS

ALL THAT GLITTERS

Monitor Audio's new metal dome tweeter, a design which the company views as its most exciting development in drive unit technology to date, is gold anodised.

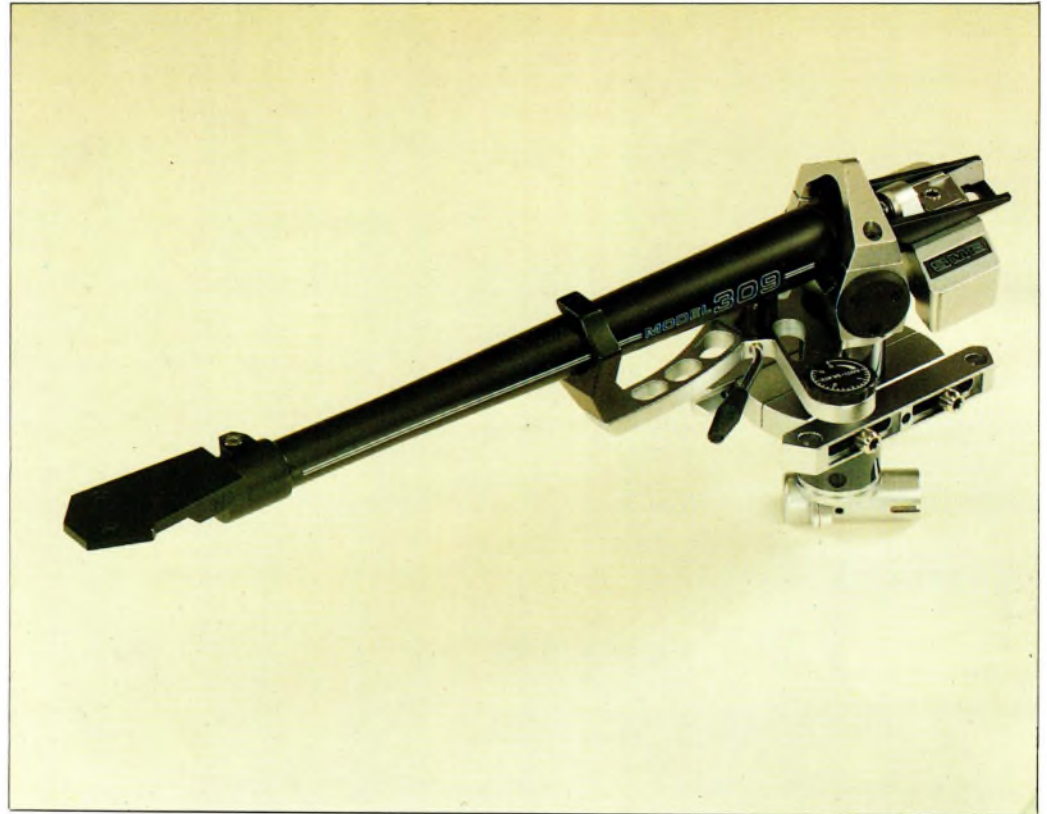
The tweeter is to be known as the *MA G95 Reference Gold* and will first be seen in two models, the *R852/Gold* and a brand new floor standing loudspeaker, the *R1200/Gold*, at the Heathrow Penta hi-fi show beginning September 15th. *R852/Gold* will cost £449 in any wood finish, the larger *R1200/Gold* £799 – again, in any choice of veneer.

Monitor Audio claims that the technique of gold anodising the 26mm aluminium/magnesium alloy dome has resulted in improved static stiffness and resistance against deformation. The first break-up mode is at 28kHz, which compares well with the 23kHz specification of MA's existing metal dome tweeters.

Many speaker manufacturers – including, for example, TDL and Musical Fidelity – are using metal dome tweeters which Monitor Audio developed in conjunction with Elac. However, the news is that Monitor Audio are retaining exclusive rights to this latest design.

Doubtless we can expect further models incorporating the gold tweeter to be announced in coming months.

This time they're keeping it to themselves – the new gold dome tweeter from Monitor Audio.



THREE FROM SME

Three brand new models from the world's most respected manufacturer of top quality tonearms is pretty convincing evidence that the vinyl disc medium remains as healthy as ever.

Model 3 is available in three different effective lengths (nominal stylus-to-pivot) of 9, 10 and 12 inches. Priced from £495 to £575, the *309*, *310* and *312* slot in below the established *Series IV* and *V* tonearms. A detachable

headshell facility and the alternative armtube lengths along with the lower prices are expected to widen appeal to a broader market, though the physical similarity to the upmarket models is unmistakable.

Model 3 shares many of the components used in *Series IV* and *V*, including the swivelling output socket, underslung counterweight system and substantial steel yoke. The main difference is replacement of the cast magnesium one-piece armtube by swaged aluminium two-piece tubes, enabling the alternative lengths to be offered and providing some cost savings.

UK enthusiasts are likely to find the *309* the most attractive. Increasing effective length reduces the geometric tracking error of a pivoted tonearm and also the level of bias compensation necessary, but it also increases effective mass quite dramatically, as does a detachable headshell, and both compromise rigidity to some degree. That said, some Japanese enthusiasts like long, high mass arms, and the 12-inch variation

A high-end tonearm with a detachable headshell! SME's Model 309

will also have professional applications for those needing to play over size acetate discs.

SPOOKY SPEAKERS

Barely a year since the last set of 'tweaks' on AR's budget loudspeakers, the company has announced a complete range of six new *Spirit* models, from the £110 two-way *112* to the four-way £450 *162*. Whether referring to petroleum, alcohol, art nouveau statuettes or even things we wot not of, the marketing slogan 'Spirit of the Age' is still difficult to forgive.

The new *Spirits* are apparently the first range instigated directly by the UK factory for its European and Middle Eastern customers. System design is by Dave Berriman, based on drivers by AR USA's Mark Nazar, housed in pretty and subtle cabinetwork from Cambridge Industrial Design.

Key features include the 36mm thick baffle made from a dual density MDF/chipboard





'sandwich' for good rigidity and damping, and the frameless grille cloth which avoids causing reflections by using a peripheral elastic fixing band. All but the cheapest model use polypropylene-coned drivers, and all avoid unnecessary crossover network components by utilising the natural rolloffs of carefully engineered drivers.

The 112 and £140 122 are high sensitivity (90dB) models with 6.5-inch bass/mid units, aligned for close-to-wall siting.

The £180 132 and £320 152 use 8-inch bass mid drivers and again benefit somewhat from nearby wall assistance, the 152 being the 'luxury' version with real wood veneer, high power magnet, extra internal cabinet bracing and optional bi-wiring.

Back to vinyl finish, the three-way £270 142 and top of the line

Back in black, AR's new Spirit loudspeakers.

four-way, floor standing 162 are both intended for free space siting. All models have appropriate partnering stands supplied by Monotrak Engineering.

A parallel announcement – happily avoiding any involvement with the occult – introduces six new electronics components. The company's first cassette deck takes AR firmly into the ranks of complete system brands, the RD-06 joining the T-06 tuner and recently introduced CD-06 CD player (review next month) as source components for three new amplifiers (A-03, A-05, A-07), with an X-07 for (US?) receiver enthusiasts.

Reflecting current trends, the amplifiers are single board

designs with 'tuned' power supplies, MM/MC cartridge options and direct coupled speaker terminals. Electronic switching reduces signal runs on the 05 and 07 models, which both cater for video as well as audio connections. The tuner is available as a remote option with a handset that can also control A-07, RD-06 and CD-06. All retain the attractive and familiar 'slant front' styling which distinguishes AR's electronics. UK prices have not yet been finalised.

TWO IN ONE

Rotel are launching a receiver which promises to combine the qualities of their best selling RA820A amplifier and RT850AL tuner.

The £230 RX-850AL is a stereo receiver with five inputs and long, medium and FM wavebands. Tuning is digital by manual or auto scan with LED signal strength reading.

Rotel's Brian Hillier said the company wanted to produce a quality product for the first time buyer or 'non-true' enthusiast. They're also launching a £220 cassette deck. The RD-865 has Dolby B, C and HxPro, a bias adjustment function extending to plus or minus 20 per cent and many other goodies.

The receiver revival starts here: Rotel's RX-850AL.



PAUPERS' CHOICE

For those of you without a wad to wave, Goldring have come up with a new budget cartridge. Labelled an 'audiophile' product, Goldring's Elan cartridge retails for the equivalent of many a Southern kid's pocket money and effectively replaces their budget Epic model. The press release takes the trouble to mention that the £14.95 Elan is a moving magnet design (the only moving coils made for paupers are contraceptives) and says its

The Goldring Elan, a budget 'audiophile' cartridge.



Brooding in the basement, B&W's 500 Series.

FOUR MORE

B&W Loudspeakers are upgrading their 100 series with four new models under the 500 Series banner. The new digital monitors are partly the product of B&W's CAD (Computer Aided Design) system which is supposed to take us further down the road to technical perfection.

"Special attention", says the blurb, "has been paid to driver design linearity... all internal wiring being of high quality 32 strand cable." The lineup will be at Penta and goes like this: DM550 – £149, DM560 – £199, DM570 – £279, DM580 – £399.

strong points are rigidity of body, full shielding and low mass cantilever assembly. They also say it's designed for hi-fi rather than... something else.

FLAT OUT

QED have decided to appeal to the 'hide-it-hear-it' market by making a flat loudspeaker cable which upgrades their famous 79-Strand cable. The F200 low profile speaker cable uses thinner copper strands (200 in total) than the best selling 79-Strand, which are insulated in flat cable to be concealed under a carpet.





QED's Bob Abraham, said the product retains the *79-Strand* "neutral characteristic" but "opens the sound up a bit more." It's available in black or white and sells for £1.95 per metre.

BABY ROCK

Due to be launched at the Penta Show is the budget Townshend International turntable from the stables of hi-fi passionate Max Townshend.

Dubbed *TI 5* the new £350-ish turntable features arm, cartridge and acrylic lid, but the trough, as found on the *Rock*, will be an optional extra. Max has also come up with a first (as far as we know) by using a vinyl platter in the 'baby *Rock*'. The 18mm thick slab weighs "a fair bit" at around 4lbs but is said to sound great. "Kick drums really stand out - it's brilliant," gushed Max who wanted to make the whole unit out of vinyl but was held back by the price. Convinced that vinyl makes a better platter than the more expensive acrylic, Townshend International are considering a vinyl platter for existing *Rock* owners. Reach for your wallets guys.

TI are also purveying their £13 Elite Alignment Gauge which

Tales from the riverbank: complete with paddle and trough, Townshend's new outboard turntable.



calculates distortion over the whole record surface, allowing you to align your arm and cartridge with "ten times greater accuracy than is attained with a conventional two point gauge." "Remember," says the wizard, "a one degree angle offset and 1mm overhang error can cause 300 per cent increase in distortion."

The Elite Alignment Gauge, long-regarded as an essential tool for all vinyl enthusiasts, has been revamped and comes with new easy-to-understand instructions. Townshend International, Walton-on-Thames, Surrey. Tel: 0932-246850.

NEW BEARD

Beard's *M-70* valve monoblocks have been upgraded to a MkII version.

Several upgrades have been made to the *M-70* including the use of van den Hul wiring throughout, and Tiffany connectors on in/outputs. The class A amplifier will have an aluminium chassis with a durable 'gold' finish.

HEYBROOK'S TWIN PORTED BABY

Heybrook has announced a replacement for the *HB2* loudspeaker. Dubbed the *HB150* it is of a similar size to its predecessor but has a number of significant differences. Like the *Point 5* model the bass/mid unit is driven without a crossover using a Cobex phase plug which, to quote Heybrook, "gives seamless integration throughout the crossover region".

The tweeter is almost inevitably an aluminium metal dome unit but unusually, the low frequency extension of the *HB150* is enhanced by twin rear firing reflex ports which, much like the *AE1*, have radiused exits. The company claims that the low frequency rolloff point is at 40Hz - which ain't bad for a cabinet measuring 406 x 230 x 220mm (h x w x d).

Due to retail for £299 the *HB150* is available in two finishes: black ash and crown walnut veneer. Heybrook Hi-Fi Ltd, Estover Close, Estover Industrial Estate, Plymouth, PL6 7PL. Tel: (0752) 780311.

THAT'S CHEAP

That's tape continues to muscle in on the cassette market with the launch of a budget *RX* blank tape.

The ferric tape retails at £1.05 (five for £4.99) and is said to "think it's a chrome tape with a huge +4dB MOL" (maximum

output level). Like other That's tapes it enjoys the lifetime guarantee from its distributors Harman UK.

OBELISK EMERGENCE

"We kept it underground for four months," said Richard Hay of Ion Systems' new *Obelisk* range of amplifiers. The four new amplifiers, not formally aired as yet, are available from Ion Systems and are priced between £165 and £325. An external power pack can be hooked to the top of the range *3+* model for an extra £125. The range will replace the existing line-up which was found to be "too plain" according to Hay. "We've set about making it more upmarket and improving the circuitry," he said.

Obelisks aren't exactly as common as pebbles; so far the firm has twelve dealers nationwide but is hoping soon to increase that number. Ion Systems, 61 Mochdre Business Park, Newtown, Powys SY16 4LE. Tel: (0686) 25266.

A triplet of new-look Obelisks from Ion Systems.



ARTEMIZ ACTION

Roksan Engineering have officially launched the *Artemiz* tonearm. Retailing for £350 it is undoubtedly one of the most innovative tonearms to have appeared for some time. It's most striking feature is the counterweight which is attached via a unipivot bearing and hangs underneath the arm beam, the idea being that because the weight is free to move, tracking force doesn't vary with the height of the stylus. It uses a similar (but adjustable) column fixing to the Rega *RB300* making it easy

for *Xerxes* owners with that arm to make the upgrade. Roksan claim that due to the very revealing nature of the *Artemiz*, compatibility with other turntables is limited to those with very low noise floors.

At the press launch, held in central London, they also played the new *Shiraz* cartridge which uses an EMT generator fixed with three bolts in an open body. Price will be around £300 but availability has not yet been confirmed. Our first impressions of this combo were positive to say the least and we will be hassling Roksan for a review sample as soon as full production starts, supposedly some time this month.

Roksan Engineering, 21 Ddole Road, Llandrindod Wells, Powys, LD1 6DF. Tel: (0597) 4911.

DIESIS FASTBACK

The latest from Diesis products is the unusual *Duet* loudspeaker. Looking like a back-to-front Spica *TC-50* the £169 *Duet* was developed by listening rather than purely on the drawing board. Very much this year's model it features an Elac metal dome tweeter and a Sonaudax bass/mid unit.

The idea behind the unit's sloping back, apart from discouraging the placement of coffee cups, is to eliminate internal standing waves. The *Duet* is designed to work away from walls on stands; apparently Diesis will be making matching ones in the near future.

Finishes available are textured black and grey and the *Duet* should be with Diesis dealers now. Watch out for the *Choice* review in January.

Diesis products Ltd, Greysmere House, Beacon Hill Road, Beacon Hill, Surrey, GU26 6NR. Tel: (042873) 6840.



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DENON AND ON

Denon's new CD player will be up and running at the Penta show where it joins the existing lineup before the official launch in October.

The *DCD-910* is the first of three mid-priced players (the *610* and *810* follow shortly) to be released by the importers. Retailing at £299 the *DCD-910* is the most expensive of the three offering twin DACs and 16-bit/8 times oversampling technology. It has touches like a 3-inch (CD single) tray and is remote controlled with volume as well.

Tape buffs will also like the 'auto edit function' which allows them to select the correct tape length when recording. To avoid that annoying cut-off while recording, the function locates the beginning of the track nearest the centre of the disc and displays the time of the two 'halves' which is the lazy man's way of totting up the times given after the song titles!

SONY TAPE

Finding something interesting to say about yet another new range of tapes is a problem which plagues manufacturers and journalists alike. Last month TDK revamped its range; this month it's Sony's turn to restyle and upgrade the product in time for the important Autumn season. Sony claims the number two UK sales slot in both audio and video tape markets, and is certainly a major force, although rivals are apt to make similar claims in this highly competitive marketplace.

Compare the press packs from the two companies and one would be hard pressed to spot the differences. Each claims similar evolutionary incremental performance improvements resulting from magnetic material refinement and re-engineered mechanisms, sufficient to justify the relaunch. And the Infinity Shaped (IS) shell, manifest in the housings of new *Metal-ES*, *UX-Pro* and *UX-ES*, is as nice a piece of meaningless creative writing (*aka* bullshit) as I've encountered this year.

The audio range now consists of eight tapes. The sole Type IV *Metal-ES* now offers an extra dB of treble output over its predecessor. Four Type II tapes are really three, *UX-Pro* and *UX-ES* being distinguished merely by the ceramic tape guide of the former. The next one down the line, *UX-S*, looks the most interesting Type II; it has very low background (bias) noise, the flattest response and gives little away at the top end of the



dynamic range.

The Type Is show the usual graduation from the flat, cheap and improved *HF* formulation through brighter *HF-S* to brightest *HF-ES* – typical again of apparent consumer demand for a bright balance to counter the perceived 'squash' of the tape medium.

The marketing story used TGI (Target Group Index) data in an over-simplified form to reach very much a half truth: that 15-24 year olds are by far the heaviest tape purchasers and that males are heavier tape purchasers than females does not necessarily lead to the conclusion that the volume purchasers are the "male youth market aged 15-24." In fact non-housewife young females come close to the top of the list on more sophisticated analyses (Mintel/BMRB), which partly explains the rash of bright pastel coloured tapes that have been appearing recently.

BUSINESS

DEALT OUT

Subjective Audio, the high-end retailer of Palmers Green, London, has gone into voluntary receivership.

The business (*high-end audio*) just "couldn't make enough money", according to proprietor Howard Popeck. He pointed to the fact that suppliers and distributors only relied on the British market for between ten and 15 per cent of their revenue to show that high-end selling is not as hunky dory as it seems. But he bemoaned the hi-fi industry in general, saying: "Venture capitalists realise they can make more money out of a building society than in the hi-fi industry."

SHOWS

Yes we're cracking on to Christmas and hi-fi people – not being inclined to hibernation – enter a period of sustained activity at public shows.

The first is Penta, London Heathrow's gorgeous hotel, and venue for the main event of the year. Entry is free and the show runs from September 16-18.

The second is the National Sound and Vision Show 1988 which takes over the cute Last Drop Village just outside Bolton on the last weekend of September, Friday 30th to October 2nd. Cars or good legs are needed to get out of Bolton town centre to the show's various offerings but it only costs a quid to get in.

Some hi-fi will also turn up at the BBC Radio Show which runs from October 1-9 at Earls Court in London. Entry for that is a fiver but plenty is promised for your money. There'll be live broadcasting from Radios 1, 2, 3 and 4 as well as representation from local radio stations and all-the-stars; you know the sort of thing. The last for now is the Scottish Hi-Fi and Video Exhibition at the Post House Hotel, Corstorphine Rd, Edinburgh. Now in its 12th year, the show is free and promises a wide range of exhibitors.

PHILIPS' PHANTOM

Philips promise us (Scouts' honour; cross-my-heart-and-hope-to-die) that CD Video really will be publicly launched this October. That is 1988.

CDV, for the uninitiated, comprises soft and hardware technology allowing people to see what they are listening to (musicians performing) with some degree of high fidelity to the original. Polygram will

Denon's latest big-footed CD player, the DCD-910EX.

release 160 software titles and Philips will push its £499 CDV475 Combi player in a campaign to create desirability for the medium in the British psyche.

One of the obvious selling points of the video disc is the pop video which is a powerful enough phenom to have killed talking in many British pubs. Polygram will be releasing 5-inch discs at a cost of £4.99 for six minutes of digital audio/analogue video plus an extra 20 minutes of music. Eight-inch discs carry 22 minutes per side of sound and vision, while the 12-inch version can carry two hours.

CD Video was first launched to the press last autumn and shown at subsequent hi-fi shows but never pushed and never available here. Now the medium is to be 'sold' with a £2.5 million advertising campaign according to Philips. The slogan is 'Now you can see the music'. We'll wait and see...

IN BRIEF

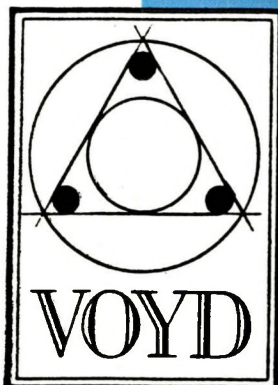
Turntable manufacturers Voyd have moved to new premises as part of their expansion programme. The firm's new address is: Anchor House, Warwick Place, Cheltenham, Glos. Tel: (0242) 574528. The move brings a showroom and dem area for Voyd who promise new products in the near future.

Sheffield has a new hi-fi dealer in the shape of Moorgate Acoustics. They will be opening up at the end of this month at 184 Fitzwilliam Street, Sheffield.

HW International of north London are now the UK's sole distributors of the American Koss headphones.



The Voyd



The Valdi



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 Cheltenham,
 Gloucestershire, GL52 2NP.
 Tel: (0242) 574528
 Fax: (0242) 570131

Voyd will be exhibiting their full range of turntables, *Reference, Voyd + Valdi* in Room 1188, The Hi-Fi Show, Penta Hotel, Heathrow, 15th-18th September 1988.

CHOICE SESSIONS

Things we hear . . . This month, SD Acoustics' revised SD1, the state of play with DAT and A&R's Arcam Delta 60 as you will hear it.

ONE STEP AHEAD

SD Acoustics keep abreast of the competition with revisions to the SD1 loudspeaker. John Bamford reports.

Around the time of last July's *Collection*, when Alvin Gold reviewed SD Acoustics' floorstanding *SD1* loudspeaker, the manufacturer hinted changes were afoot.

This happens all the time, of course. You criticise a certain aspect of a product's performance, and the manufacturer pipes up in defense. "Ah yes, we noticed that too; in fact we're about to announce a design modification which cures the very problem you've just highlighted."

However, in the case of the *SD1* it was not the review in *Choice* which led SD Acoustics' bossman, Steen Doessing to reassess the sound balance of the speaker. Although widely regarded as a good value, high performance monitoring speaker, the *SD1* has regularly been criticised for sounding rather hard and brittle in the upper registers. For many listeners the *SD1*'s remarkable transparency and explicitly detailed sound has been too great to resist – but the trade off has always been a somewhat cool, soulless presentation of the music which in poorly matched systems could lead to considerable listener fatigue.

Indeed, in the past, system matching has proved critical to get the best from the *SD1*, though this hasn't necessarily meant choosing dull sounding components to offset the speaker's bright tonal balance. As Alvin pointed out in his *Choice* review, it's a question of "picking components whose inherent quality is good enough to sustain the magnifying glass view the *SD1* tends to give. The *SD1* is simply very demanding of the quality of partnering amplifiers and source components."

The design update, which has been on the drawing board for some time, mainly involves modifications to crossover components and layout. However, the reason it's taken so long for SD Acoustics to implement the revisions, is that they've also taken the opportunity to improve the cabinet construction, thereby making this a true 'Mark II' *SD1*. The aim was to make wholesale improvements to the performance rather than simply altering the cosmetics of the sound.

I'm not sure whether they've wholly succeeded in their aims as I've not had the old and new models side by side for direct comparison. I'm well acquainted with the 'old' *SD1*, sure enough – in fact a friend of mine owns a pair – but audio memory is notoriously unreliable when overall qualitative judgements are concerned. And in terms



Revisions to the SD1 have brought about a warmer, less aggressive musical presentation.

of dynamics and detail resolution the *SD1* was always top league, – so whether the revised model is actually better in these important areas I feel unqualified to judge. What is immediately obvious in firing up the new *SD1* is that the subjective tonal balance has been altered considerably.

Although remaining essentially 'cool' in character, the revised *SD1* possesses a much more civilised top-end which clearly has an effect in the upper midband too. Previous criticisms that the speaker sounds hard and too up front can now be largely scrapped. The *SD1* retains its speed and attack, but the forward balance is much alleviated making it an easier speaker to listen to long term. Before, I could admire the speaker for its clarity and superb resolution; now it's a speaker I feel I could live with.

The main cabinet of the *SD1* has been strengthened by using denser panels (SD claim reduced cabinet coloration), while improvements to the crossover include upgraded components in the negative path of the treble arm. The inductor has been repositioned to minimise magnetic field effects, and the low loss capacitor in the treble arm has been replaced with a polypropylene type, selected after extensive auditioning of capacitors of all shapes and sizes. The high pass characteristic of the midrange arm has also been altered to provide a fuller lower-mid balance.

Sad to report, these improvements don't

come free: the price has been increased from \$1,050 to \$1,150 per pair. But the manufacturer was quick to point out that this is the first increase in over two years – and you can't really argue with that. More to the point, it remains an awful lot of speaker for the money. Although deep bass is rather lightweight given the size of the enclosure, there's little else around at this price that produces the image scale and hear-through clarity of the *SD1*.

Existing owners who would like a less aggressive sound balance can obtain new crossover components and modification instructions for \$27.84 inc P&F. Apparently you don't even have to know what you're doing, the instructions are simple to understand, and as long as you can tell which end of a soldering iron gets hot the crossover mods can be implemented in just a few minutes.

DELTA 60 UPDATE

As mentioned last month, A&R have made some last-minute detail changes to their new Arcam Delta 60 amplifier. Alvin Gold has been comparing two models

In Martin Colloms' review of the *Delta 60* (issue 62) he finally came down against a formal recommendation (For what it's worth, his experiences mirror mine exactly and I agree with everything he said.) In case you need reminding, he wrote that he regretted he was unable to assess a revised production sample, since the review model came from an early and by implication immature preproduction batch.

I was asked to add my threepenny's worth for the simple but probably adequate reason that I too listened to one of these preproduction amplifiers, but now I've also had a chance to hear a revised model. Indeed, I can take some of the blame for the changes that have been made as I gave A&R Cambridge some of the first (perhaps the first) negative feedback they received on the *Delta 60*.

My reservations with the early model were ones I have previously expressed about certain low distortion/high feedback amplifiers from other sources. The amp sounded taut and well controlled, but ultimately perhaps too taut and too well controlled. The sound failed to 'breathe' naturally, there was an emphasis on transients and a loss of colour, image specificity and depth, both tonal and spatial. Yet for all the loss of detail – and it wasn't as severe as this might suggest – the amplifier always seemed to sound crisp and in control.

The suggestion that the amp sounded like a high feedback design seems to have been



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System demonstrated at the Light of Sound Show, 11-14th Sept, Olympia, Stand No. F152 and the Hi-fi Show, 15th-18th Sept, Room No. 1187, Heathrow, Penta Hotel.

near the mark because the company promptly did some redesign work, the main part of which was to reduce open loop gain and negative feedback around the amplifier. Other supposedly minor changes have been made to the specification of certain components, notably capacitors, and there has been some rejigging of sensitivities, noise level and overload margins, though whether they are cause or effect I have been unable to establish. I suspect the latter.

However, the important part is what, not why, and judged by the sound quality of the revised amplifier, the prognosis for the future of the *Delta 60* has to be more favourable than before. I've been using the second amplifier for some weeks, and have given it a thorough trial. Apart from one blown fuse (my fault), it has worked consistently from the start. It took a few hours to really loosen up, as did the first one, and it did just that: loosen up. If my sample is representative of models now going into shops (as I believe it is) the amplifier is now usefully sweeter and more subtle sounding, with less of that dry tightness that was the aural fingerprint of almost all transistorised amplifiers.

So the *Delta 60* makes good, but does it now merit a Recommended flag? I find this one hard to answer. Of course, the purely practical reason for this is that I don't have MC's encyclopaedic database of knowledge on currently available amplifiers which he acquired by carrying out last month's review project. It's doubtful if anyone else in or outside the industry has either. But this wouldn't normally prevent me giving an opinion.

The real reason for my equivocation is that since the *A60*'s (the *Delta 60*'s predecessor) day, the market is now much more competitive. Whilst the *Delta 60* is stripped for action by dropping some of the paraphernalia of the *A60* – the tone controls are the obvious example – in my opinion it still hasn't taken full advantage of the fact. There are two or three amplifiers available at roughly *Delta 60* prices – some covered in the same report in Issue 62 – which can still rung rings around the *Delta*.

I concede that in most comparisons the Arcam is going to look like the more reliable, better made proposition, the more serviceable, and probably the more versatile into the bargain. But the *Delta 60* still lacks a certain something, a sense of liquidity and ease perhaps, that it really needs to prosper at the tail end of the penultimate decade of the 20th century.

WHERE'S THAT DAT?

The music industry hates them, and you're not supposed to be able to buy them – but if you hunt around London's West End you will find a few DAT recorders in the shops. John Bamford explains the current state of play.

Unless you're a regular reader of the specialist hi-fi press you may be unaware of the furore surrounding Rotary-head Digital Audio Tape (R-DAT) recorders. To say that the current state of play is confusing would be a gross understatement, the overall picture having been blurred significantly by some outrageously inept reporting in some of our better regarded Sunday newspapers. Such is the far reaching nature of the national press that some people still ask me

whether it's worth buying a CD player when they've heard that the Japanese have a new invention called DAT up their sleeves.

We've stirred up a hornets nest by deeming to review five DAT recorders in this issue. Although these machines are a fact of life, the fact is you're not supposed to be able to buy them. Indeed, the future of DAT worldwide is still far from certain.

In a nutshell, the music industry is scared stiff of DAT because they see it as a perfect medium for piracy and unlawful bootlegging of copyright material. Of course, being a digital tape system, it follows that once you've made a recording you can copy it many times over. Record companies are terrified.

What appears to have been conveniently forgotten during all the legal bickering over whether DAT recorders should be made available to consumers is the fact that the general public have had access to 'domestic' digital tape recorders for a good few years already. Anyone owning a video recorder with around £600 to spare can buy a digital processor (made by Sony, Sansui and others) allowing them to record onto VHS or Beta video cassettes. Admittedly less convenient than DAT, this is a cheaper option than DAT and tape costs are astonishingly low. You can record up to eight hours on one VHS E240 cassette running at half speed. I haven't seen any evidence to suggest that the availability of such digital technology has caused a boom in the bootlegging business, have you?

And the way in which domestic DAT machines have been engineered makes them little more than glorified cassette decks anyway. The sampling rate of 48kHz has deliberately been set so as to be incompatible with the direct digital output of CD players, so anyone wanting to copy a compact disc must necessarily put up with a finite level of sound degradation as the digital signal is first decoded by the CD player and then re-encoded by the DAT recorder. So exactly what is all the fuss about? Maybe the music industry would like Philips to un-invent the compact cassette too?

Although DAT recorders are available in Japan, the medium has failed to 'take off' there in spectacular fashion – a situation which can be expected to be replicated elsewhere in the world. If people want to make tapes for listening to in cars or on personal stereos they're going to have to have an ordinary cassette deck anyway, so DAT recorders are bound to be aspired to only by the type of audio enthusiasts who in days gone by might have aspired to owning a high quality open reel recorder – primarily for making uninterrupted recordings of concerts from FM radio. It's difficult to imagine the Japanese being able to produce DAT recorders for as little as £90 in our lifetime, so the format is sure to be limited in consumer appeal.

Now that the threat of CBS's Copycode system (which would have prevented totally the recording of copyright material from CD) appears to have vanished once and for all, the RIAA (Record Industry of America) has threatened to sue any manufacturer selling DAT recorders in the US. According to a report in the American hi-fi magazine *Stereophile*, Marantz and other companies announcing DAT marketing intentions have received formal warning letters from the RIAA's law firm threatening legal action if they launch DAT machines "to be used to

record our clients' property." The listed clients, according to the report, include CBS and PolyGram Records.

If this was intended as a scare tactic, it appears to have worked, because companies who had announced the launch of machines suddenly did an about turn. In the US only TEAC – and it's going to be a \$5,000 plus semi-pro machine. Meanwhile companies such as H/K, Onkyo and Marantz are trying to persuade their Japanese suppliers to follow TEAC's lead.

Back on these shores, the situation is much the same, in that no-one is prepared to launch DAT until the legal position has been clarified. Professional sound engineers have access to Sony machines through official Pro outlets Sony Broadcast and HBB, along with other brands from specialist outlet Playback in Percy Street, London W1. Meanwhile, the rest of us have to sit and wait to see what agreements can be made between the major electronics manufacturers and the music industry.

So how come some DAT recorders – mainly Sony models – are appearing for sale in hi-fi shops when DAT has yet to be launched to the consumer market? Well, the machines you'll find displayed in shop windows up and down London's Tottenham Court Road are grey imports. We chose to include a handful of DAT recorders in this issue because the machines do exist, and if you're desperate enough to want to buy one there's nothing to stop you reaching for your cheque books. What you must understand, however, is that the Sony machines are not guaranteed by Sony UK, so if the worst happens and your DAT recorder breaks down (whether this be next week, next month, or next year) who is going to repair it? If you think you can trust the shopkeeper to replace the machine then fair enough – but we'd advise you get a written guarantee that this is what will happen in the event of any machine failure.

Our sincere thanks to Playback who loaned us some of the machines for this month's tests



DAT could be just what many audiophiles are looking for. But exactly when it will be officially available in the UK is anybody's guess.

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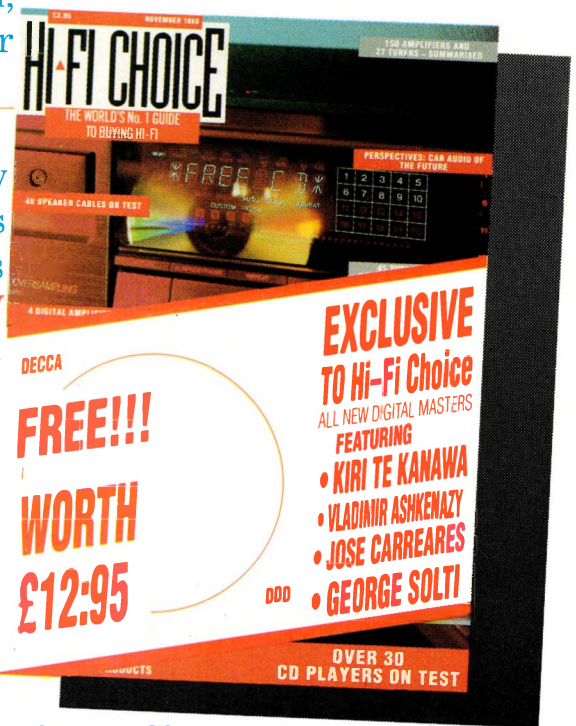
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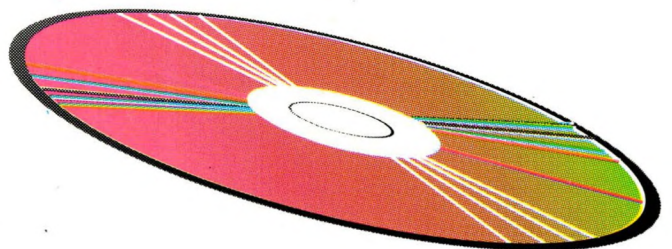
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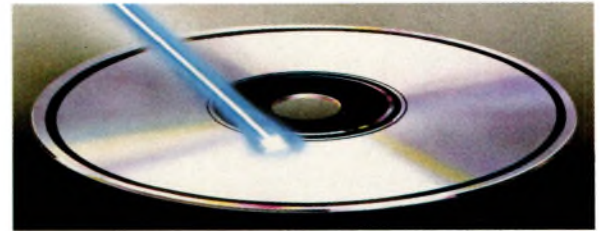
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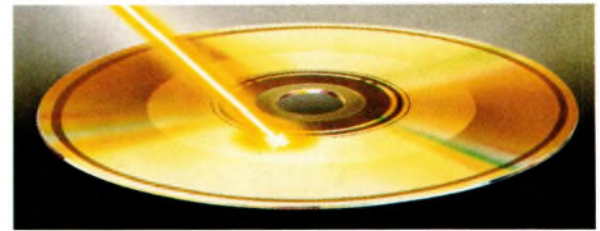
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READERS WRITE CHOICE ANSWERS

BURNING DOWN THE NS-1000M

We would like to congratulate you on what continues to be an excellent publication. Unfortunately, however, we were dismayed by an alarming comment in the 'one-name' system review of your August Issue.

In describing the Yamaha NS-1000M speakers, which you acknowledge as being a "stalwart design" and of "particularly good material value", you go on to indicate that their high performance owes much to the rigidity allowed by the use of beryllium in both of their mid-range and treble drivers. You then commented that if these speakers ever caught fire "the amount of beryllium oxide



The NS-1000M: who'd want to burn a pair of these?

produced could be sufficient to kill many people".

We must respectfully inform you that, with an extremely high melting point of 1285°C, the minute amount of pure beryllium used in our diaphragms (0.63gm coated in a 5 micrometre glass layer) is not likely ever to cause harm to people in the home. The average house fire is only ever likely to develop a maximum temperature of between 900°C and 1200°C and any escape by residents would have to be effected long before these temperatures are reached to ensure their safety. In fact beryllium vapour could not be released from a speaker on fire until well above the 1285°C melting point to the extent that the Fire Research Stations informs us:

"This amount of beryllium

could never pose an additional toxic threat, especially given the greater danger already present from the onset of any domestic house fire."

As you noted so admirably, Yamaha NS-1000M speakers were distinctly ahead of their time when launched and we are happy to say that they still achieve the highest level of performance today, 14 years later, with no reports worldwide of any incidents where people could be at risk.

We hope that this corrects the impression that you no doubt inadvertently gave your readers and we look forward to reading more in-depth reviews of Yamaha technology in *Hi-Fi Choice* in future.

IAN GALLOWAY,
SALES & MARKETING MANAGER,
YAMAHA ELECTRONICS (UK) LTD.

Paul Miller's comment was not meant to be taken as deliberate scaremongering, more to point out that beryllium oxide is one of the most dangerous compounds known to mankind. The fact that Yamaha has the technological expertise to manufacture beryllium drive units is astounding – and that's intended as a compliment!

In case our comment has caused some potential NS-1000M owners to feel hesitant about buying them, I will add that it remains one of my all time favourite loudspeakers. Indeed, until moving recently into a larger listening room I've been enjoying NS-1000Ms at home in my own system since 1982. – Ed.

THE GRILLE FACTOR

Congratulations on an interesting loudspeaker review in issue 59. However, should you really be so kind to manufacturers who provide acoustically poor grilles for their speakers? The list of models "best used with the grilles left off" is depressingly long, with B&W, B.I.Q., Goodmans, Infinity and many more given the benefit of a 'grilles off' assessment. I know that for the real hi-fi freak (or person of distinctive taste) it's all right to use naked loudspeakers, but in most households the grilles will stay

on, in the interests of safety (of speaker cones), appearance and domestic harmony.

Although the test measurements appear to have been taken (correctly) with grilles on, the impression given (perhaps wrongly) is that they were removed for listening if this helped. Please do the listening tests and ratings 'grilles on' – that way you are addressing most of us out here, rather than the select few. It would also mean that if a good speaker is ruined by a lousy grille it would get a lousy rating, and the manufacturers might give the subject a bit more attention.

On a different tack, I liked your article on kit amps and wondered whether you had considered doing one on kit speakers; Wilmslow Audio do some very interesting ones.
ALASDAIR BEAL,
LEEDS.

This seems like a fair comment and we will look into it. And yes, kit speakers would make a good 'Focus' subject.

A CONTRADICTION SET UP

Being a fastidious reader of *Choice* I was surprised to notice rather contradictory statements in two of your issues about the setting up of the Roksan Xerxes turntable. The first was last year's *Collection* which states "... while comparatively simple set-up is an added bonus ...". The other is in the *Directory* where you say "Setting up is critical, and for experts only" I for one am confused and would appreciate some clarification.

K. T. LLOYD,
LONDON.



The Roksan Xerxes, an innovative alternative

When the Xerxes was in its early days Roksan did make the point that it was comparatively easy to

set up, but the comparison was made with the likes of the Linn Sondek which to the uninitiated is a 'real pig' to set up. However, the Xerxes is an unusual beast and some knowledge of the principles at work is required before the novice can attempt this job. One of its practical virtues is that, given reasonable care, it stays in tune for considerably longer than many of its sprung counterparts. Undoubtedly, the reason that Alvin Gold mentioned that set-up is critical is that the Xerxes can go from sounding merely great to superb when an expert has tweaked it.

DIGITAL DIVERSIONS

I'm looking for a new tuner and pre/power amplification combo and have been considering the American Adcom GFA-555 and GTP-500 tuner/preamp. However, I have been told that it's best to buy either an integrated amplifier (ie Luxman LV-117) or preamplifier (Sony TA-E77ESD) with built in D/A converters in order to use a DAT player when they become more available (and affordable).

I am a bit confused as I know DAT units, like CD players, have built in DACs and therefore one should be able to use them in an aux input on analogue only amps. I would appreciate your thoughts on this matter.

ROBERT LEHMAN,
SINGAPORE.

You're quite correct in assuming that DAT players are equipped with DACs as are CD players, but as to how many of them have digital outputs remains to be seen. It's five years since compact disc players first appeared and so far only about 50 per cent of them have digital outputs, and as you have found only a very few amps have digital inputs. Digital amplifiers do duplicate the DACs already fitted in CD and DAT players, but may also offer improved sound if digitally connected, however, one of the main rationales for such amplifiers was expected to be to facilitate direct CD to DAT digital dubbing and this has been outlawed (by the music industry). You would do much

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But don't take our word for it just listen to what the press have to say:

CD-93.

"The luxury presentation extends under the glossy exterior, with the extensive use of die-castings for both the base and the substantial smooth-acting disc drive."

"This is undoubtedly a CD player with real class."

HI-FI CHOICE, MAY 1988.

CD-73.

"Although the price is fairly high, this player showed considerable merit in our tests, and will suit the needs of many."

HI-FI NEWS & RECORD REVIEW, APRIL 1988.

"Overall I found the machine thoroughly musical. It was hard not just to sit back and listen to the music rather than keep on taking notes."

"For £450 the CD-73 represents excellent value for money and would make a sensible upgrade from even the best of the £250 players. Its particular strengths are its imaging and smoothness."

NEW HI-FI SOUND, JUNE 1988.

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better by selecting one of the better integrated or pre/power amps. We're not au fait with what's available in Singapore but would imagine that most of the Japanese brands can be found and we would suggest you check out the Rotel BX series, the Harman Kardon 655 Vxi, and the latest Cyrus amps from Mission which were very well received in last month's issue.

On the tuner front both the Hitachi 5500 models are worth finding as are the Pioneer F91 and Sony ST-S700ES.

FINE TUNING

I'm looking for ways to improve my system which consists of: Dual CS503/1 turntable, Hitachi HA12 amplifier, Mordaunt Short MS25Ti loudspeakers, as well as an AiwaADF260 cassette deck. I am slightly disappointed with the system and suspect that the amplifier is letting it down. Could you suggest a sub-£200 replacement that would be compatible with the above components?

Your *Directory* suggests that it would be worth changing the cartridge on the 503/1 and I wondered what would be a sensible upgrade from the Ortofon that comes with the deck.

Lastly, my present speaker stands are wooden Pioneer *Audio* stands; would decent metal stands really make much difference to the sound, and how much do I need to spend on them?

JOHN WHEELER,
SUTTON, SURREY.

You may by now have seen last month's issue of Choice which majors on amplifiers and will give you an idea of the latest options. Unless you are looking for loads of power there are some very good amps available for less than £200. A few notables from our last test were the Mission Cyrus One, Creek 4040 II and the Rotel RA820BX3, all excellent amplifiers that will stand you in good stead for future upgrades.

On the cartridge front you could do a lot worse than buying an OM20 stylus and simply swapping it with the OM10 you already have, thus avoiding the hassle of fitting a new cartridge. The OM20 went down well with our panel when reviewed and should provide a significant improvement in sound quality.

Finally, yes, good quality stands do greatly improve the standard of fidelity of almost any loudspeaker. What you need is a stand that is physically suited to your speakers, ie one that will support the speaker so that the tweeter is at ear level for your given seated height and one that has a top plate area that is nearly as large as the base of the speaker. In this case the Monotrack Engineering M4 at £55 or Heybrook HBS1 at £75 would seem to fit the bill.



The OM20, there aren't many upgrades that are easier.

BLISSFUL IGNORANCE

Having been blissfully ignorant of the world of hi fi for some ten years (when I last bought a system) I suddenly went berserk in WH Smiths and bought every hi-fi magazine in the shop.

Well done chaps, you appear to have created an almost perfect magazine. (*Almost! Ed.*) I shall look forward to being tortured each month by goodies I can't afford.

Anyway, may I ask for some help in selecting a system in the £700-£800 price range consisting of a CD player, amplifier and loudspeakers. I am fairly happy with the idea of the Marantz CD-65DX and Celestion DL8 II speakers, however, I am not sure about an amplifier. Is it possible to under-power a loudspeaker?

I note the DL8 IIs have a rating of 150W and wondered if my original choice of a Marantz PM35 would be too limited to drive them. I would be grateful for any advice on the amp issue re power rating and any suggestions you may have for a system to suit my budget.

G. BEDWELL,
LOOE, CORNWALL.

In certain situations it is possible to under-power a loudspeaker. For instance, if you tried to drive the 1ohm Apogee Scintilla speakers with a Marantz PM35 the latter would at least blow a fuse if not expire completely, as would the majority of amps. But Apogees are thankfully the exception to the rule and most

speakers can be driven successfully by most amplifiers. However, a low powered amplifier may damage a pair of loudspeakers if it's driven into hard clip, which means that it's feeding in a heavily distorted signal. At this point the sound emanating from the speaker will be loud and pretty unbearable but this is unlikely to occur under normal circumstances (unless you throw a lot of wild parties).

The 150W rating ascribed to the DL8 IIs is a maximum power rating and not a very useful guideline for amplifier selection. What's more relevant is the sensitivity of the speaker which is measured in decibels per watt or dB/W as it's better known. This is the sound pressure, termed decibels, measured at one metre for an input of one watt (2.83V), thus the higher the dB/W rating the more efficient the speaker.

Getting back to your situation, the DL8 IIs have a sensitivity rating of 87.5dB/W which is reasonably efficient and the Marantz PM35 rated at 45W will be adequate for the job, but neither component is suited to particularly high volume levels. An alternative system we'd suggest you listen to would be the Rotel RCD 820BX2 CD player, Mission Cyrus One amplifier and Heybrook HB1 loudspeakers. Almost as important are the ancillaries and we would recommend Heybrook HBS1 speaker stands, Mission speaker cable and Myst TM interconnect. If you have difficulty tracking down the latter, Monster and Audio Technica make good alternatives which are easy to come by. If you particularly want a matching amplifier and CD player then consider Rotel's RA 820BX3 which is less expensive than the Cyrus and a very nice little amp. Prices for these components can be found in the Directory at the back of this issue.

MIDDLE GROUND

I have followed your reviews for some time and, in fact, bought the Rotel RA820BX2 and Sony CDP 710 with your assistance.

However, my system (which includes Mission 7011 speakers and Linn Axis turntable) leaves much to be desired in stereo imaging and depth as well as timbral qualities. Since classical music is my mainstay and CD my

preferred medium I really feel I must upgrade for better results.

Quite frankly I cannot afford the likes of Audio Research - yet. In the meantime I have difficulty relating mid-priced equipment into the audio scheme of things.

I would appreciate it if you could give me an idea of what lies in the middle ground between the likes of Rotel/Cyrus and Audio Research/Krell. I am looking for speakers, amplification and if necessary a better CD player.

JOHN MEAKIN,
ILFORD.

In sound quality terms the middle ground between the two extremes you mention is heavily oversubscribed by mainly British high-end manufacturers. There is a vast array of equipment to choose from and generally, but not always, price is indicative of sound quality. One positive exception to this rule that we at Choice have come across are the valve amplifiers made by Audio Innovations (reviewed in this issue). They start at around £300, and seem to have a transparency rarely found in other amps, and you could do a lot worse than routing out one of their dealers and having a listen.

Alternatively, on the transistor front one of the strongest companies seems to be Musical Fidelity who make pre/power combos that start at around £600, but they also make considerably less which should satisfy your requirements.

In order to achieve the three dimensional imaging you're after you will also need some well designed speakers mounted on rock steady stands and fed via good quality cable. We would suggest that you listen to some of the following speakers in the context of your CD player and the above amplifiers: Musical Fidelity MC-2, Snell Type K and Monitor Audio R852/MD, these retail for between £300 and £400 and are revealing enough to make the most of future front end upgrades. As far as the player itself is concerned we would suggest you stay with your Sony for the present and see how it sounds with new amplification and speakers as these will allow it to show its true colours and you'll be able to assess whether an upgrade is really necessary.

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ASPIRATIONS

Take down the hood, push down your foot, turn on the music and get out of the city. Dan Houston gets in a Ferrari; Chris Richardson photographs.



State-of-the-art sound systems for classic cars. From the top: Sony CDX-J10, the Daytona's cockpit, Sony CDX-A20 autochanger, Sony XR7300 cassette/radio.

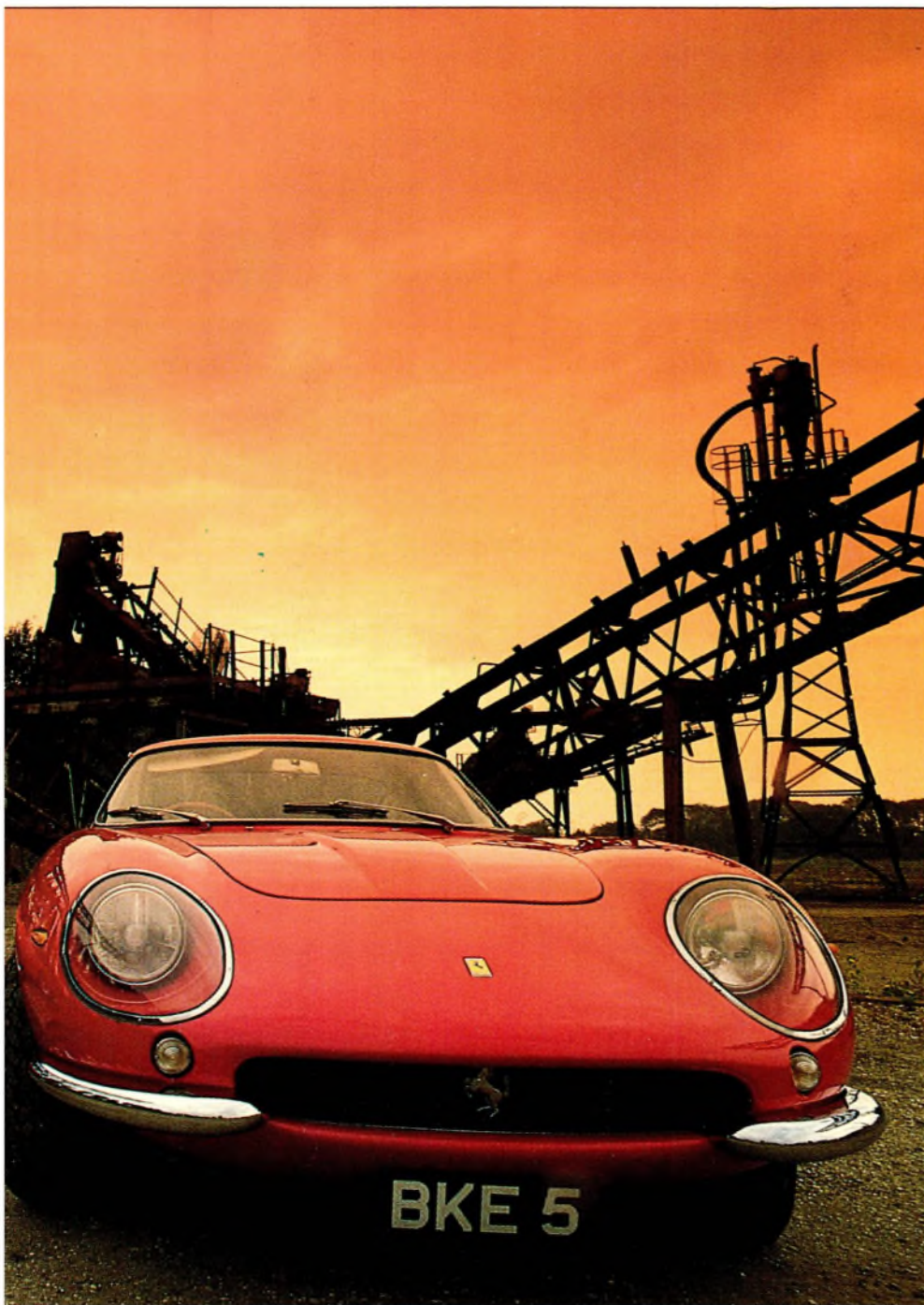


MUSICAL

Machines



The legend lives on, Ferraris at bay



However soft your bottom you would be discouraged from leaning against these cars. Apart from the weather the only things allowed to grace their shape are lambscloths and chamois.

Both Ferraris, the 1966 275 GTB and 1973 Daytona Spyder are in what is known as 'concoirs' condition; their interiors smell of well-kept leather; their Cardinal-red coats gleam; and under the bonnets their chromed and painted V-12 engines

look better than new. The 275 stood particularly proudly, having just won the English Ferrari Owners' Club Concoirs prize in its class when we went to see them.

The pair are owned by Bruce Owen, the International Six Metre class world champion yachtsman who has kept them in as original condition as possible. The only real concession he made was to have them kitted out with state-of-the-art in-car equipment by Mike Wells of Fulham. Although Mr Owen employs a father and

son team full-time to keep his cars in pristine condition, he is not kid-gloved in his approach. "My philosophy is quite simple," he told me, "I am not a collector of museum pieces; I like to drive my cars."

Although our feature is about the audio systems in these cars they are first and foremost a driver's animal. Comfort is adequate, but they keep you gloriously in touch with the road as you hurtle a few inches over its surface on springs that leave little to the imagination. In the 275 there is a gentlemanly bar in the passenger footwell allowing you to brace yourself against the seat as the car glues itself into a corner. The feeling is hard, and even in the passenger seat the gear change surges of G-force press you back into the striped leather with an exhilarating leap from the V-of-12 cylinders in front.

The best part is fourth gear, which (hush, hush) you don't put the car into before you're fit for the magistrates. Fourth in Daisy (the 4390cc Daytona's nickname), feels like... well, second in an MG. Whoosh! Off you hurtle into the clear space ahead. We never did get into fifth...

We were driving from the cars' West London mews home to Maranello Concessionaires in Egham, Surrey. The 275 was at the Ferrari garage for some minor checks and our picture shows one of the workshops there. Anything can be done at Maranello and the place looks like a slice of the car's history with models of varying ages and conditions (some down to the bare metal, some hopelessly twisted from when their drivers 'lost them').

Both cars have similar sound systems which have been installed "to look as if



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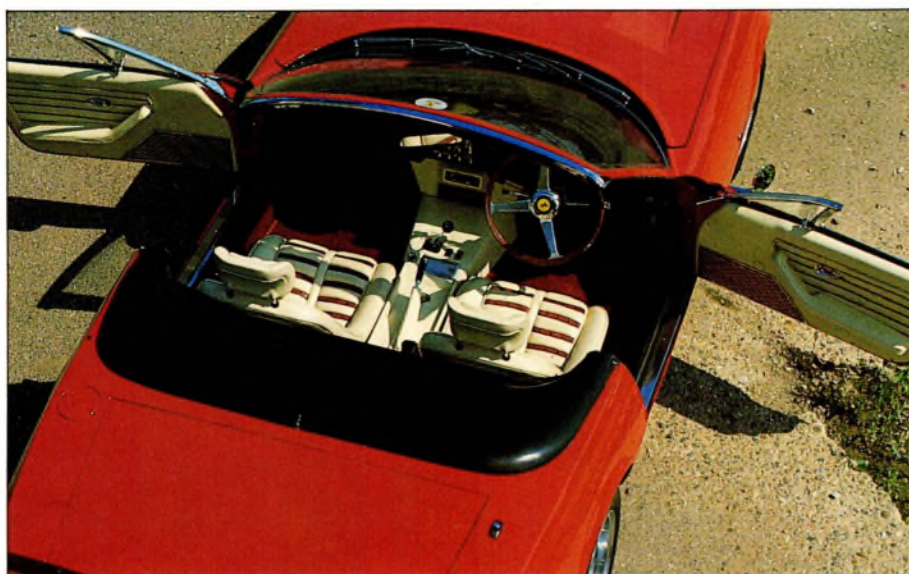
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"The ZD-880 should win a lot of friends both in terms of its ergonomics and, undoubtedly, its first-rate overall sound" Gramophone April 1988



V970X STEREO CASSETTE DECK

"The electronics are evidently of as high a standard as the transport and all these things come together to result in a machine with real class" Hi Fi Choice April 1988



The Car:

Ferrari Daytona Spyder 1973

The System:

- Sony *CDX 110* Control Unit and Autochanger \$1150
 - Alpine *9521* Two-Channel Amplifier \$170
 - Nakamichi *FA 400* bass amplifier \$329
 - Nakamichi *EC200* Crossover \$149
 - Nakamichi *FP80* Subwoofers \$165
 - Boston Acoustics *751* Mid/Treble Unit \$189
 - Total system cost (inc installation) \$3,500
- Both cars use Audiolinx interlink phono cable (\$6 per metre) and Phoenix *Gold* loudspeaker cable (\$1.50 per metre).



As recommended by Ricardo Tubbs and Hi-Fi Choice the Ferrari Daytona Spyder.

they should be there", according to Mike Wells. The set-up consists of a control unit, CD autochanger in the boot, two amplifiers, for the subwoofers and mid/treble loudspeakers, and crossover unit allowing individual fine tuning of frequency response to the characteristics of the car. Each installation took about two weeks and the cars were "entirely stripped" by Wells's engineers in Fulham for the laying of hefty phono cable along the floor to the speakers and front end.

Most of the system is in the boot where a few inches of space are lost to the amplifiers, but the art of concealment is practised - the massive eight-inch Nakamichi subwoofers being hidden behind an oval grille mounted on the back shelf. Even on opening the boot the only sight greeting you is the CD autochanger with its ten-disc removable magazine; the amplifiers are cased in, using the same material as the rest of the boot lining and are invisible. Rows of heat-dissipating fins along their length keep them cool in this situation. In the 275 the woofers' magnets are visible (if you bend down).

Inside the Daytona, Boston Acoustics' 751 mid and treble loudspeaker units are mounted in the provided position, behind a

chromium grille on the lower forward part of the door. The Sony *CDX 110* control unit is installed under the dashboard on the centre console which had to be retrimmed to accommodate it. Mike Wells employs a 'trimmer' whose business is matching materials and, if necessary, cutting out new dashboards to take this auto-audio exotica. In this case he had bought a piece of matching hide from Connolly Brothers of Wimbledon and fitted the unit so that it looks original.

Less guile was needed in the 275 where the detachable control unit hangs in a leather trimmed case under the dash. The KEF *KAR 110* midrange and *KAR 33F* tweeter units with their *KDN 20* crossover are mounted in the forward edge of the door skins in the (acoustically preferred) slightly higher position than in the Daytona. A natty black grille makes them all but sonically disappear.

The Daytona uses a conventional radio aerial but the 275's radio is wired into the rear window heating element, and is described as "not 100 per cent but adequate".

Listening to in-car 'hi-fi' is not like listening to your hi-fi at home. In acoustic terms it would be impossible to recreate

that hi-fi sound because the environment is necessarily over-reverberant and 'closed'. The problem facing engineers and consultants like Mike Wells is how to recreate a high-fidelity experience when you have such a small (and metallic) space, and the equivalent to a team of navvies out the front. You also have to have enough backup for the plaintive songster not to be drowned by waves of decibels, as petrol-sucking beasts like these crank over at six thousand RPM.

Taking into account the unavoidable differences between home and buggy, both these systems acquitted themselves well, providing the clean, clear cut CD sound. In fact, whereas CD is often considered an inferior source to vinyl for domestic audiophiles (who criticise its brashness) it may be the perfect medium on the move. With the Daytona's hood down (which consequently covers up the subwoofers) the degree of clarity and confidence in the system was impressive. Outside, just above our heads was the wind, and the curiously distant sound of the snarling engine. Inside, one is bathed in music - it's an odd feeling, but a feeling one can easily get used to.

There is ample power to drive the sys-



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tem really loud, which is usually the compensation for having the engine running, but there is no need to do this as the clarity of sound is maintained surprisingly well. Somehow the system makes you feel as though you are in a quieter space than you are, giving a good response through the musical spectrum. And it gives atmosphere as well; not that you need it when a glance at the clock tells you you can go to 180 miles an hour.

The control unit is easy and straightforward to use, with push buttons for the radio and CD player, volume, stereo balance, and tone (bass and treble). If you're listening to CD and want to listen to the news, one button takes you instantly to radio. Then another button touch takes you back to the exact spot you were at on the CD in about three seconds. Changing tracks on a CD is the same as with a domestic player and changing from one disc to another takes about 14 seconds. All ten compact discs will be played through if you leave the system alone. While the engine is off the almost silent whirring of the servo motor in the boot reminds the driver he is using up precious battery juice. These cars, they say, need 80 per cent of their full battery charge to fire-up.

Bruce Owen is delighted with his in-car entertainment. "In the Daytona with the top down it's terrific," he enthused. He is also complimentary of the stability and

*Bred for the track and disguised for the street,
the 275GTB.*



reliability of the systems and said they had never faltered. When one considers the suspension of the cars this is no mean feat.

The purist might not have wanted to alter anything about these now very classic cars, but the purist would probably not even want to drive them, except on a Sunday. For the hi-fi purist, a slightly different animal, they offer about the nearest thing on wheels to his home system. He won't find himself missing information from the music – or the musicality of the reproduced sound itself, and once one accepts the different parameters of sound imposed by the car itself, and the fact that you can't close your eyes (for too long), then they make music on the road pretty good fun.

The Car:

Ferrari 275GTB 1966

The System:

Sony <i>CDX A20</i> Auto Changer;	
<i>XR7300</i> Radio cassette	£1200
Nakamichi <i>FA400</i> bass amplifier	£329
Nakamichi <i>FA300</i> mid-treble amplifier	£299
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Total system cost (inc installation)	£3,880

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PERSPECTIVES

Richard Black states the case for tape recording, offering hints on how to get the best from your machine.



The Compact Cassette launched in 1962, combines convenience with low cost. No wonder the format caught on.

Customary hierarchy in hi-fi systems tends to place one end or the other of the system chain at the head; turntable (or CD) or loudspeaker. Below these come the amplifier, and then, at the bottom of the list, the two poor cousins, radio and tape recorder.

Given that amplifier and loudspeakers are essential whatever the source, the commercial LPs and CDs are generally superior in sound quality to commercial cassettes, there is doubtless some logic in

equipment, and to what use can this quality be put? I suggest that good recording quality is both attainable and desirable in a domestic system, and that a good recorder can be considered, not exactly as an equal to LP or CD, but as a different program source of perfect hi-fi respectability.

There are many reasons why one might use a tape recorder, apart from playing prerecorded tapes. 'Time shifting' radio programs, swapping recordings with friends, 'bootlegging' concerts, making ori-

by pointing to the fact that recording works otherwise unavailable is hardly doing the world of music a disservice. The same goes for performances of well known works by artists who have not recorded them. In fact, this country's paranoia about home taping is not universal. In Japan, some radio stations broadcast cassette recorder alignment tones immediately before live concert relays to aid home tapers!

BACK TRACKING

The fidelity of any recording medium is limited by two factors, bandwidth and resolution (dynamic range). On tape, roughly speaking, bandwidth is limited by tape speed, resolution by track width, and both by the packing density of the magnetic particles which hold the signal on the tape.

The tape in cassettes uses very small magnetic particles, while on open reel tape the particles are a little larger, but there is much more tape passing the heads (up to 128 times as much) on an open-reel machine so it is no surprise that achievable sound quality is better. Digital systems (and video) often use a rotating head assembly to obtain high effective tape speeds, but require only very low resolution albeit across a much wider bandwidth.

Professional formats in studios range downwards from 1-inch tape running at 30 ips (inches per second) to ¼ inch tape at 15 ips. 'Domestic' open reel usually implies ¼ inch tape at 7½ or 3¾ ips. Cassette tape is ½ inch wide and runs at 1¼ ips, and is usually used with a noise reduction system.

Noise reduction, in the form of the Dolby system, is an established feature of domestic recorders, which provides 10dB (Dolby B or professional Dolby A) or 20dB

Getting

IT

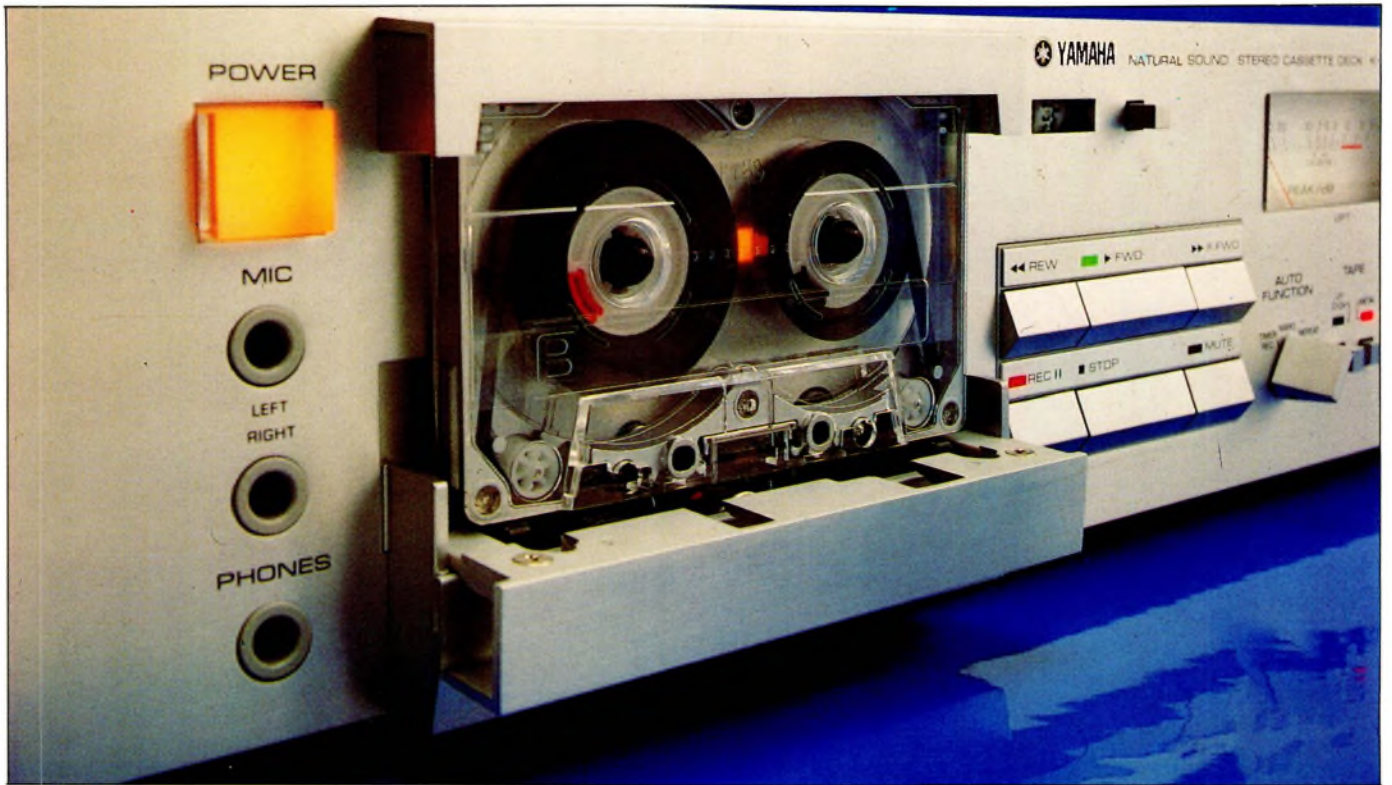
Taped

this. Yet for the lucky few who can justify the expense, open reel tape provides a source potentially superior to all other media – although for home use the applications of open reel recorders are limited, and prerecorded tapes are no longer available. The domestic days of open reel tape are effectively over far more so than in the case of LP versus CD, the potentially superior medium was simply too inconvenient – and expensive – for the mass market. The real breakthrough came in 1962 when Philips introduced the Compact Cassette. Within a few years the new standard had caught on and soon developed into a true hi-fi system.

But just how high a quality can one reasonably expect in home recording

ginal recordings, oral history, dictaphone – all common uses of home recording gear. The last two arguably require only rudimentary quality and need not concern us here. The rest, however, involve music and therefore demand true high fidelity; given that musicians devote years to perfecting their art, I feel the least one can do to avoid insulting them is to ensure that recordings represent their achievements as well as possible.

Before going any further, it seems in order to point out that in terms of legality some recording applications are distinctly shaky. In fact, recording from the radio and at concerts is illegal. I therefore cannot recommend these practices, although I justify my own (occasional) transgressions



(Dolby C) signal-to-noise ratio improvement by selective boosting and cutting of certain frequencies and levels. Other noise reduction systems include dbx, which compresses the level of the signal on record and expands it on replay, and various Dolby-like proprietary systems such as JVC's 'ANRS'

Unfortunately, the noise reduction systems tend to compromise clarity and attack slightly, the former by the modulation noise which accompanies any noise reduction system, and the latter by the finite response time of the system. To my ears, the most satisfactory compromise is Dolby B. This gives a worthwhile noise reduction with better clarity than Dolby C, and is less sensitive to alignment problems. All Dolby-type systems depend on accurate alignment of the tape recorder, and the more noise reduction one attempts, the greater the effect of misalignment. Compression/expansion systems often tend to 'breathe' rather, which I for one find distressing – and I don't think I'm the only one, as interest has always been a bit muted.

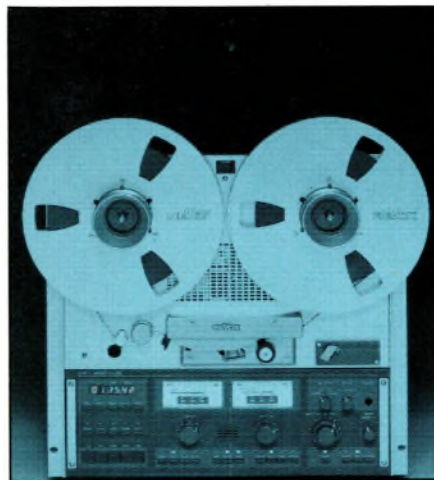
GETTING THE BEST

Of the three tape recording systems currently available to the consumer, cassette is by far the most popular. It combines convenience with low cost, and quality which is at least respectable and can be very good. So how does one use this system to its full potential? One answer is to buy a top-flight cassette recorder and take advantage of the auto alignment, full feature, bells-and-whistles philosophy. You will get excellent sound off almost any tape, whether recorded by you or anyone else, and you will pay about £1,500 for the privilege. However, short of commissioning a custom machine you can't easily do

better. But if you use a recording machine principally for off-air recording and playing prerecorded tapes and friends' recordings, it is possible to obtain very fine results from a cheaper machine if you look after it properly. And to be fair, even the high flyer would require some maintenance – though if you can afford the machine, you can probably afford to have it professionally serviced now and then.

It seems a little strange to me that people expect hi-fi equipment to work forever and a day with no care and attention given to it. No car will run well for long if it's not looked after, and hi-fi is the same, especially items with moving parts. Cassette recorders are particularly critical and have more variables than most other units. Nevertheless, apart from tape type selection and recording level, most machines are not adjusted once by their owner. I suggest that the following schedule is essential to maintain good running order:

Open reel provides a fabulous sound source – but these days the tape running costs are prohibitively high



- 1) Demagnetise and clean the heads regularly (say every 50 hours' use, for perfection).
- 2) Visually check the heads and pinch roller for wear from time to time and have worn parts replaced.
- 3) On a new machine, or whenever poor performance is suspected, check head alignment (azimuth) and Dolby level.
- 4) If possible, check bias level.

Demagnetising heads is often overlooked, but is vital to remove residual magnetism that gets built up in normal operation. If this is not done, tapes will sound dull (even duller if Dolby is used) and may be permanently damaged. If you find that prerecorded tapes sound particularly lacking in treble, demagnetising the heads could be the answer. By far the simplest way to do this is with the TDK demagnetiser, a neat device in a cassette shell which costs under £15 and works very well. Alternatively, use a prod-type demagnetiser, which will cost a little less – but keep cassettes well away! Heads should be cleaned with a cotton wool bud moistened with isopropyl alcohol (it costs pennies from your local chemist), but pinch rollers should be cleaned with water only.

Head wear is not necessarily worrying if it is even across the head, but uneven wear gives poor sound in many ways and is indicative of transport problems. Pinch roller life is unlikely to exceed 2,000 hours; the roller should be quite cylindrical, not beer barrel-shaped. A worn pinch roller can mangle tapes, so beware.

The remaining checks on most decks require a test tape, and adjustments will probably mean removing the cover of the deck and getting inside, armed with the owner's manual. If a proper manual was not supplied with the deck (and often it is not), one can generally order one for a

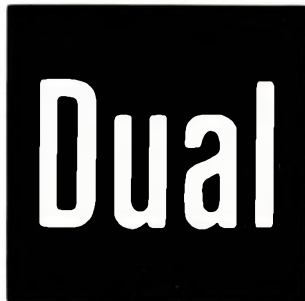
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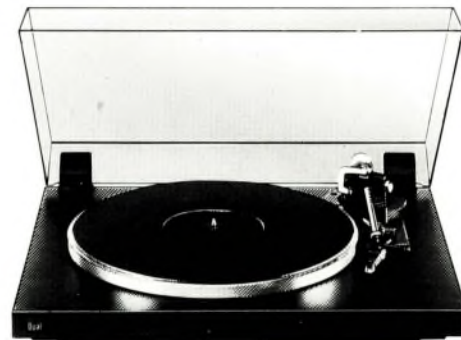


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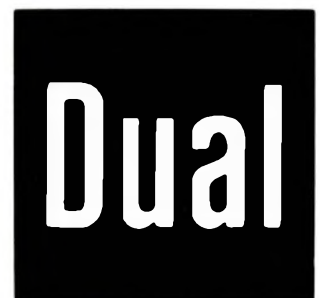


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small charge from the manufacturer or importer. The manual for my deck cost £2.50. It may be worth enquiring whether making adjustments inside a deck invalidates the guarantee. If it does, complain! After all, no professional machine is expected to go a week without adjustments, and as long as adjustments do not involve removal of parts I don't see why domestic decks should not be subject to performance tweaks.

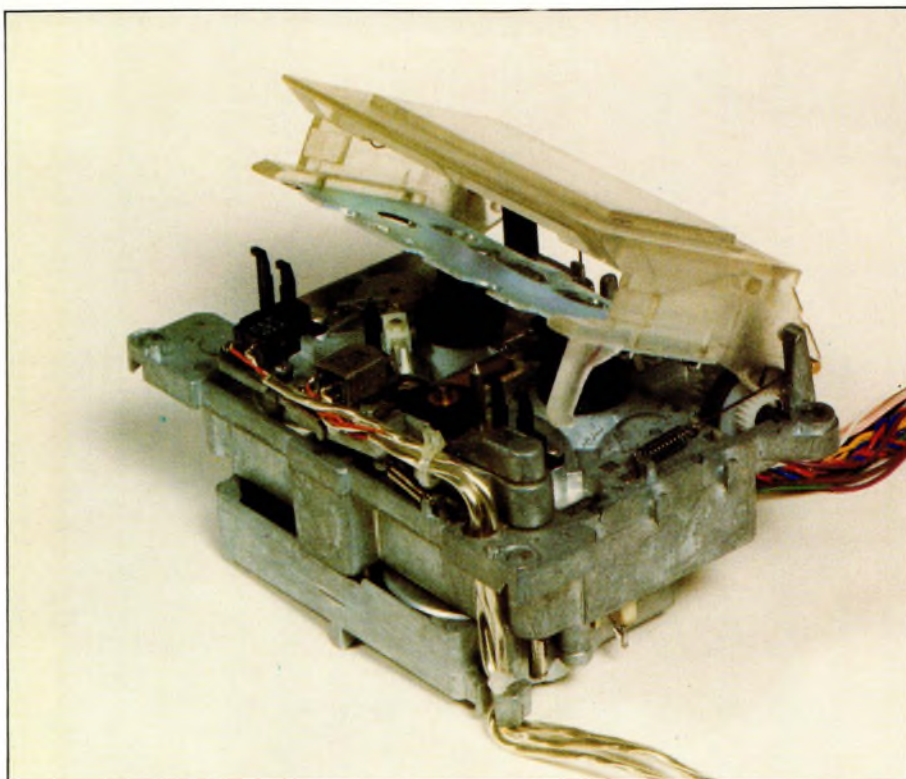
A test tape is not a common item in domestic tape collections, but I suggest it should be. Professional test cassettes cost up to £80, but I obtained a very good, comprehensive one from Ian Harrison, of 7 Mill Hill, Repton, Derby, for £18.50. Mr Harrison offers a range of cassettes from £3.50 to £18.50, depending on what you want to align. The top one contains test tones for azimuth, frequency response, speed accuracy, wow and flutter, Dolby processors and level meter calibration, and is available from Mr Harrison or Moth Marketing in Bedford (Tel: 0234 741152). It comes with comprehensive instructions, and requires no special test instruments for most of the tests on most cassette decks.

So you have cleaned and demagnetised your cassette deck, and perhaps checked Dolby level and head adjustment with a test tape. How good can the results be? As usual, there is an unfortunate correlation between what you spend and what you get, but the entry point for quality is not alarming.

FOR EXAMPLE

To see what the money buys, I recently examined two cassette decks, not so much in the manner of a review (read the reviews for that!) as in search of pointers to the range of performance available. In order not to appear partial, I will not name either machine, but I will say that 'A' costs £110 and is a basic budget machine, while 'B' is a recently discontinued but very high quality machine, last seen available for about £700. They are intended as examples

TDK's simple-to-use head demagnetiser is a good investment for keeping your cassette deck on top form. DAT recorders will need looking after too - pictured is a DAT head cleaning cassette.



of the pretty cheap and the pretty dear.

Machine A has two heads, manual selection of ferric, chrome or metal tape type, Dolby B, five-point bargraph metering, and a record level control which operates on both channels identically. Transport is driven by a single motor. Machine B has three heads, twin capstans and two motors, Dolby B, real meters (needles, not those vile bargraphs), a stereo record level control with an additional 'balance' control, and an output level control. It also has - and this for me is where it scores significantly - user switchable equalisation and bias (separately), switchable MPX (FM radio spurious signal) filter, and front panel fine adjustment of bias and record level with a built-in oscillator so that the machine can be accurately aligned for every tape that is inserted. I far prefer everything to be manually adjustable; even if the tape recorder has auto-alignment I would rather have the option of manual tweaking at least.

In terms of performance, 'A' does very creditably. It was not perfectly aligned when I bought it (recently), but even so it sounded quite acceptable. Properly set up, degradation is noticeable but not offensive. There is a distinct lack of absolute clarity and some distortion, but treble and bass come over fairly well even though measurements show them to be somewhat lacking. Measured performance is typical of the price range, with frequency response fairly flat from 50Hz to 10kHz at moderate record levels, extending to 25Hz without much attenuation but crashing pretty fast above 10kHz, although replay-only response is better at high frequencies. Signal-to-noise and maximum output levels are only marginally worse than expensive recorders. Tape transport stability is pretty good, although inspection of

A good cassette deck needs a rugged, well engineered transport. (Pic courtesy of Papst Motors Ltd, Andover)

the insides showed that the capstan flywheel is significantly off true. Altogether, quite satisfactory for off-air recording or playing back prerecorded tapes. However, better sound quality can certainly be had, and the machine has no fancy features at all.

Externally, 'A' shows evidence of cost savings in case and controls. It avoids feeling 'cheesy' by a narrow margin, and the case is made of very thin sheet steel. However, it is obviously reasonably rugged, and the internals are quite sound and well mounted. Circuit design makes efficient and economical use of the components, though inevitably with some compromise in performance.

Machine 'B' is some years old and has not been factory serviced. Despite this, it required only very modest tweaking to bring its performance to specification, and that did not require removal of the top cover. At moderate recording levels, frequency response is stunning, extending from about 14Hz to 22kHz, -3dB, and only 14dB down at 30kHz (on ferric tape, yet!). Subjectively, noise levels are much lower than with machine A, and maximum output levels, although measured at about the same level, sound louder without objectionable distortion. Ergonomically, the machine is superb; it feels right and sounds solid when it operates. Tape winding is very fast and provides a good, even pack.

Internal construction is similar to 'A', surprisingly so in many ways, and the capstan motor is of a similar type. However, there are more metal parts (instead of plastic), and the capstan flywheels are

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very well made and finished. The case is also much sturdier. The machine has various timer features, useful for recording radio programmes while you're out, and logic control of the transport, making for very kind tape handling. And the audio circuits are much more generous with components and therefore (presumably) performance.

Sound quality reflects these extra details. The three head system allows switching between source and tape monitoring whilst recording, and one can compare the sound off-tape with what went into the deck very easily. I can't say I've heard much better from cassette, and apart from some hiss the sound starts to compete with open reel recorders.

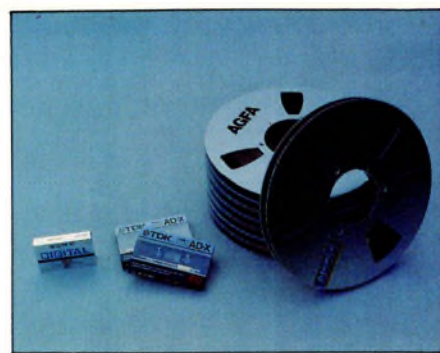
Source monitoring reveals that the machine's amplifier electronics are not perfect, but the problems are not great – principally a slight loss of transparency. Apart from the increase in hiss, switching out the noise reduction circuits gives a noticeable improvement in the recorded sound; this is a trade-off that will obviously be down to the user to decide. It cannot be too strongly emphasised to what extent the good performance of this deck is due to good alignment, though, and a recorder like this is largely wasted if advantage is not taken of the front panel alignment features. Then again, the ease of alignment means that it can give of its best with any tape, while machine A will often be under par due simply to tape variations which are not readily compensated for.

TAPED UP

The question of what tape to use can be a little vexed, as Alvin Gold found out when he tested several dozen of them for *Choice* last March. Not all tapes perform the same on different machines – and, if your machine is easily aligned from the front panel, you will find that even different batches of the same type of tape vary noticeably.

Unless you have such an alignment facility it is best to stick to one brand and type of tape, after a little experimentation to find what is best. If you can align for different tapes you will be more flexible, but even then you will probably find a favourite. It is always worth buying a good brand of tape for a good recorder; very cheap tapes tend to sound cheap.

As for prerecorded tapes, the conventional wisdom is that these tend to be poor. Certainly, they can sometimes be dull, hissy and lacking bass, but some are distinctly better than others. Anyone who has watched a high speed tape duplicator in action will be amazed that the process works at all, and it always looks as if the tape is about to snag and break. However, there is nothing intrinsically wrong with high speed duplicating, and the problems are often with the particular equipment used. 'Real time' duplicated cassettes can be better but are not always so. The very



DAT is eminently suitable for live location recording, for amateurs and professionals alike. Pictured is Sony's TCD-D10 portable DAT recorder – wonderfully compact, but presently on sale only to professional recording engineers. And putting things into perspective: two hours' worth of tape on open reel (1/2 inch running at 30ips for studio mastering quality), compact cassette and DAT.

You won't see them in many hi-fi shops: Pro and semi-pro machines from NEAL, Britain's only cassette deck manufacturer.

best I have heard come from InSync of New York. These are copied on selected TDK chrome cassettes at normal speed, using Nakamichi cassette decks individually aligned for each cassette. Prices are high, but so is quality, which certainly starts to compete with LP and CD.

ALTERNATIVES

What of other tape formats? I have worked extensively with professional open reel recorders, and they are in a different league from cassette in terms of bass and treble extension, dynamic range, pitch stability, transparency... But they are very expensive to buy and use. Domestic open reel recorders (the few that are still available) do certainly have the edge over cassette, but bear in mind that tape costs typically £6 per hour upwards, against £1 per hour for decent cassette tapes. Then again, if you want to record whole Wagner opera acts unbroken, you will find the ability to get up to three hours on a reel useful. If you are going to record from microphones, an open reel (or DAT) recorder is indispensable, but for domestic use it is of slightly limited application.

Digital Audio Tape (DAT) is a fascinating development. It offers up to two hours' continuous recording on a cassette smaller than a Philips cassette, in 'digital quality'. It is certainly very quiet and in many ways better than cassette, but I have reservations about current digital technology (the sampling rate, basically), and have compared a DAT recorder with various open reel recorders, to the detriment of the former. If you are prepared to spend £1,000 on a cassette recorder then DAT machines are certainly well worth considering. However, they do seem to me a little like a

solution looking for a problem.

The point is that cassette is capable of very good results and is also compatible with everything down to a ghetto blaster or car cassette player. DAT machines will not come down to the £100 mark for a very long time, and then I suspect only playback-only machines, so compatibility with cheap and cheerful decks is going to be limited.

The really exciting application for DAT is one which of course I wouldn't even consider (ahem), bootlegging concerts... It is also suitable for professional and amateur live or studio recording, and its size makes it particularly attractive for location use. We shall have to wait and see how the format catches on.

ADDING IT UP

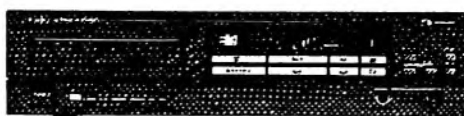
The use of cassette or other recording formats in hi-fi systems varies a lot from one user to another, and the importance you attach to it will obviously depend on what you want it for. If it is principally for replaying prerecorded tapes, you can dispense with metal tape compatibility and Dolby C – but then ever more decks, even at low prices, have those features. You will also probably not need three heads.

But if you do a fair amount of off-air recording from a good tuner, or wish to copy high quality source material, the improvements due to a high quality cassette deck will be very obvious. For anyone who uses cassettes extensively I strongly recommend that a small amount – £35 should be plenty – be set aside for accessories; at least a cleaning kit and demagnetiser, and preferably a manual and test tape too. That way you will still have the same quality machine in a year's time, and not only half of it.

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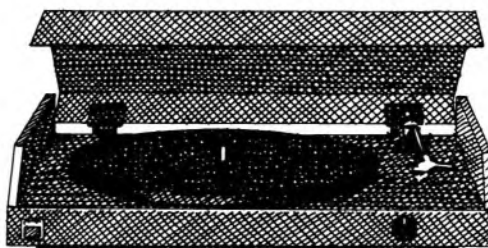
Nakamichi OMS-4E C.D. Player



NAIM NAC 32-5 Pre Amp



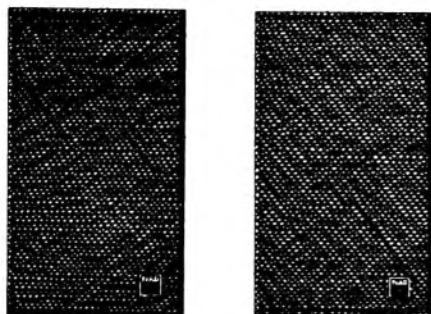
Arcam FM/LW/MW Tuner



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Audiolab 8000P Power Amp

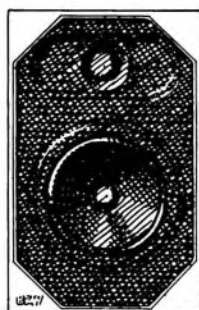


Marantz SD35 Cassette Deck

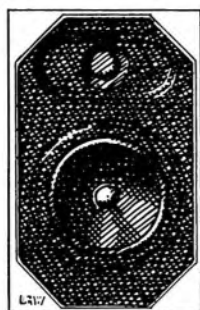


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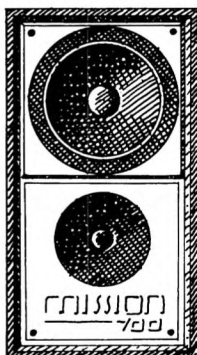
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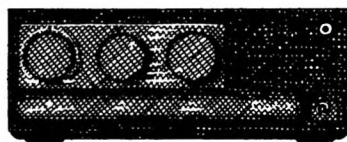
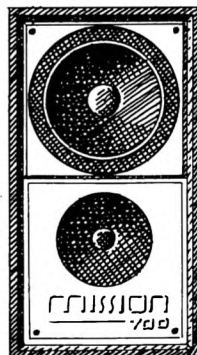
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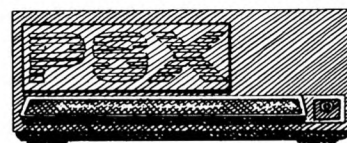
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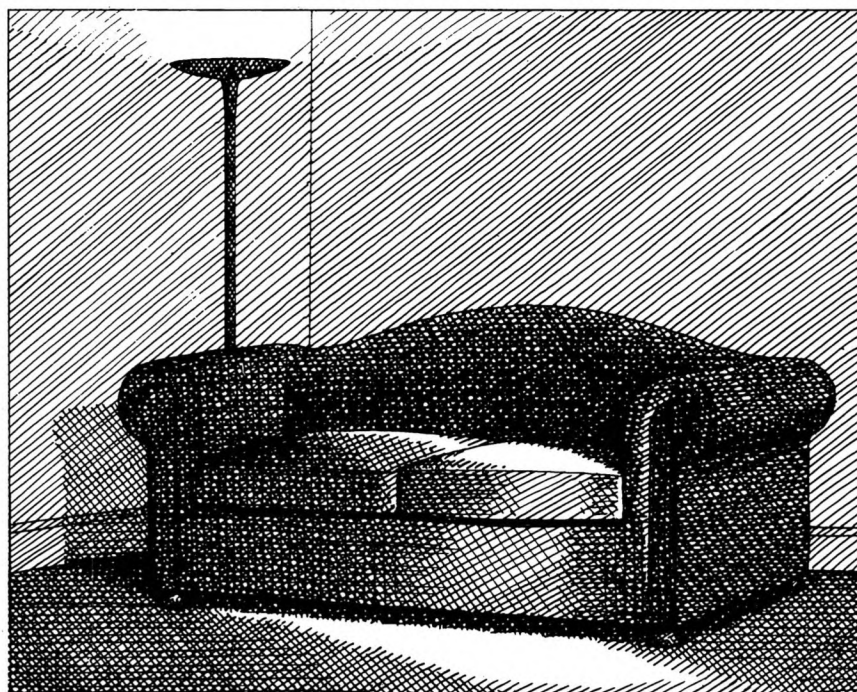
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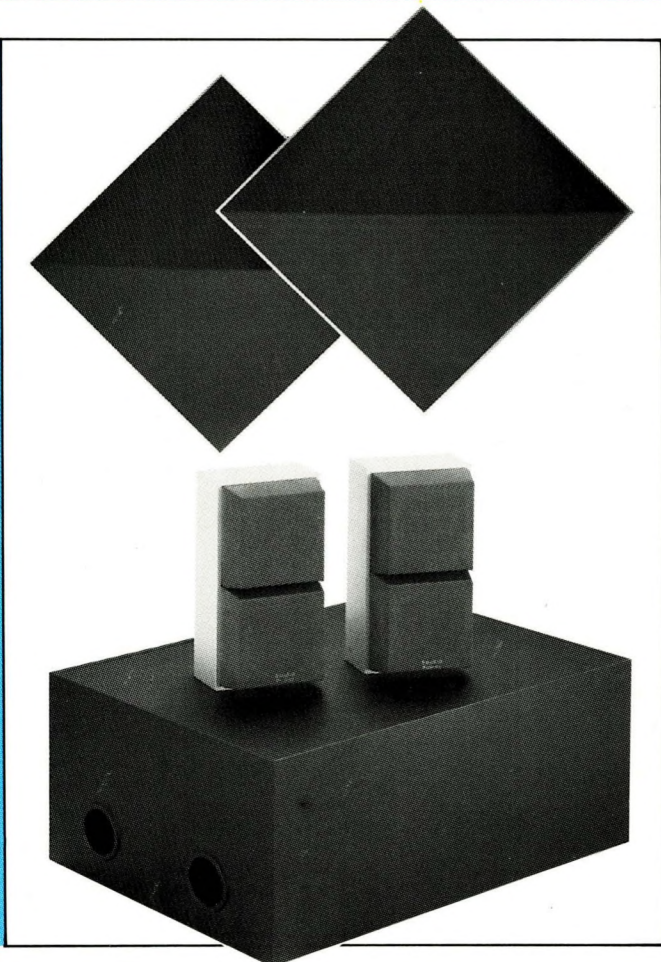
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PERSONAL MESSAGES

Beginning a new monthly column where Paul Messenger airs his views on all matters hi-fi.

For about eight years I wrote a regular monthly column for another hi-fi magazine – which perhaps provided some masculine insight into the PMT experience, but was rewarding nonetheless. *Subjective Sounds* finished some four years ago, so I've had a good break, but have also missed the opportunity to comment and express opinion that doesn't necessarily conform to an 'editorial' view.

Any regular column reflects the personality of the author (for good or ill), particularly when the brief is nice and loose, so there are bound to be similarities between this and its predecessor. But I hope *Personal Messages* will benefit from greater maturity (not to mention enhanced depth and stereoscopic perspectives!). The plan is to attempt to cover one or two hi-fi (and occasionally consumer electronics) products a month that particularly take my fancy, irrespective of whether *Choice* has or is reviewing them formally.

The first duty of any commentator on the hi-fi scene is to attempt to identify his/her own prejudices and tastes, so that the reader can add appropriate pinches or handfuls of salt whilst reading between the lines. My own system has remained remarkably stable over the years, combining Linn front end with *Isobarik* loudspeakers driven actively by Naim electronics. Though I've enjoyed the occasional update, there still seems to be plenty of music lurking within the wires, and I'm in no hurry to undertake any major changes.

As a system its strengths certainly don't lie in the ability to create a subtly layered, precisely defined and infinitely deep stereo soundstage. I like stereo better than mono, but not to the point where I regard it as much more than the window dressing that accompanies a musical performance. And I remain mildly suspicious of the fact that one tends to hear much more stereo imagery with exotic audiophile hi-fi systems than at any of the live concerts (acoustic or electric) that I have attended.

As an *Isobarik* user of very long standing, I am also obviously

rather more tolerant than many people of the tonal balance and coloration aberrations that particularly characterised early samples. During my personal hi-fi odyssey, *Isobariks* replaced the original Quad *Electrostatic* design (which I still keep close by as a vital source of reference). In almost every respect these two loudspeakers represent a dramatic contrast as far as the cosmetics of sound quality is concerned, yet I still regard them as two of the finest ever commercial designs for communicating the emotional content of a musical experience.

It is this emotional 'ingredient X' which lies at the root of my enjoyment of hi-fi, and justifies the expenditure of considerable sums of money. Others who enjoy music more as an intellectual stimulus may find that other criteria suit their purposes better. I offer no apology, merely note that my comments may be of limited relevance to their particular tastes.

Without the discipline of monthly column copy dates, I've only spent a limited amount of time listening to the latest equipment, but two quite recent arrivals have attracted attention. The first is Rega's new *Bias* cartridge, which finally solved a system matching difficulty that had plagued me for months. The problem lay in finding the right (high output) cartridge to sit at the end of an *RB300* tonearm mounted on a Linn *Sondek*, feeding a Naim *NA1T* driving the aforementioned old model Quad *Electrostatics*.

Goldilocks would have sympathised as I tried a range of alternatives that were either too dull (the earlier Rega model for example) – and hence lifeless with rock music and a bit treacherous with classical. Or were too bright (the cheap Audio Technicas and Linn's variations on that worthy theme, up to and including the *K9*, which definitely had sharp teeth when asked to reproduce classical music in this system).

Bias proved the answer to every porridge fancier's dream – just right; or rather more than just right in fact. Not only did the treble come under control and stop electrostatics from sounding

spiky and fatiguing (something the old Quads are always inclined to do anyway, given half a chance in an ill-matched system). But the cartridge also delivers midrange dynamics that can match many of the very best MC models around.

This midrange vividness leads me to draw parallels with the London (*née* Decca) and Clear Audio cartridges. *Bias* lacks the temperament of the former and extravagance of the latter, and as each has its own quite distinct flavour I wouldn't pretend it is a substitute for either. Instead it is an unusually good and relatively vice-free cartridge at a very affordable price. Take in some old Beatle records if you're going cartridge shopping – they haven't got much besides midrange in any case – and be prepared for a very pleasant surprise.



Speakers from Alexander – the £349 Aurora sounds promising.

There isn't quite the bottom end extension and power that top low output cartridges seem to provide as a matter of course, but that is a minor failing in a cartridge that costs only £34. Given a midrange as good as this, all other factors – including the bilious green bodywork – slide towards irrelevance. In many senses the performance of *Bias* calls into question popular misconceptions about 'moving magnet' sound, and shows what can be achieved by the sort of mechanical engineering attention usually reserved for MC models.

The other product for this month is a pair of loudspeakers called *Aurora*, from a Bristol based company called Alexander Acoustics. They're quite small,

quite expensive (£349/pair) but rather good too, if my memory serves me correct. (Unlike practically every other manufacturer/distributor, Presence Audio invariably want equipment back before you've quite finished with it – in this case a fortnight ago, such were the delays at my end occasioned by much minor trifles as moving house and setting up home on a building site. . .).

Consequently I never did get round to using the supplied stands (which are due to be modified anyway), or carrying out such basic tasks as checking dimensions and weight. But I did listen to them for a month or so, and would happily have continued to do so for a while longer had it been permitted. Though small and lacking real bass extension and weight, and a touch 'quacky' in the midband, *Aurora* is essentially an inherently highly informative design.

One of my working day pleasures is to have *Radio 4* burbling along in the background whilst tearing contributors' copy apart with a vicious multicolour ballpen. Many far more exotic speakers simply fail to burble satisfactorily at low levels. Seemingly struck down by severe sinusitis, they quickly irritate and grate on the half-listening, semi-subconscious ears. Yet the *Auroras* sounded clear and articulate even at the lowest levels – if they hadn't, I wouldn't have put up with them for a week, let alone a month. They don't work badly loud either, though with vinyl rock music the lack of oomph tends to become more apparent.

James Alexander Neal makes a number of mildly outrageous technoclaims couched in terminology sufficiently vague as to render certification impossible. But the loudspeakers do have metal cases, which is very unusual and probably a good thing. And they don't have the small, boxy and underwhelming character of most ultra compacts. There's maybe a bit too much 'character' in the strict sense of the word for some people, but I'd rather that than blandness any day.



MARKET RESPONSE

Dan Houston talks to hi-fi dealers across the country about cassette decks, bringing you their comments on matters ranging from reliability to DAT.

Cassette decks are known as hi-fi's bastard medium and so (in these days of volatile morality) remain a bane to the establishment, if we can call the music industry that, and a joy to those who like to extend their record collections cheaply. And however illegal it is to use the medium for copying, which some argue is the most common reason for owning a cassette deck, it is still one of, if not *the* most desired components in the hi-fi set up. CD players have increased the appeal of the cassette deck, which hopefully mirrors what it hears onto tape, and top quality recordings of live concerts from a decent FM stereo tuner can rival anything else as a musical source.

As we enter the digital age the only possible rival for the cassette deck may be DAT which, as yet, is unavailable on any organised scale. DAT (Digital Audio Tape) machines can be bought in London's West End, but there is not yet the service back-up infrastructure to support a mass market. Only Japan and West Germany have domestic Sony machines according to Nick Hopewell-Smith, spokesperson for the electronics giant. Two domestic machines are available through the pukka pro audio sales HHB outlet, but these are restricted to professional users and all invoices go back to Sony to prove that status, he claimed.

DAT is still perceived by the recording industry as an imposter that will do to CD what the compact cassette did to the LP, and Sony seems to be respecting the music industry's xenophobia until the reasons for domestic DAT are better understood. Even when DAT is brought into the UK Sony see it as purely a high-end alternative to cassette decks and the compact cassette's longevity looks assured for at least a decade or more. Sony's domestic machines are also built to record at 48kHz sampling frequency, preventing direct digital copying of CDs.

Nick Hopewell-Smith also pointed out that DAT will never threaten CD in the same way that compact cassette hit vinyl sales because CD is already several

things that vinyl is not. CD is not only portable, non-scratchable (!) and multi-functional – with in-car systems and the like – but it also offers the cachet of owning the artist's album; with artwork, lyrics and credits making it infinitely more appealing than the blank tape medium. Domestic DAT will therefore only appeal to the audiophile market where quality of recording makes it viable against the cassette deck. DAT software, at around £9 a blank tape, also makes the medium prohibitive until the manufacturers decide to push it.

Of the dealers we spoke to in this survey many were getting questions from customers who often felt that DAT would take over from CD as the "next best thing to come on to the market". Customers may therefore be procrastinating about buying a CD player because of the misinformation and poor press that DAT has had so far. Dealers said customers were not associating DAT with the tape medium but regarding it as a new medium in itself. While pointing out that the time scale and cost would keep DAT out of the ordinary home for many years dealers did say that the medium was a stimulus – creating new interest in hi-fi.

Peter Russell of the Hi Fi Attic, Plymouth, felt that Tandy's recordable CD system (due here late '89) would put the kibosh on all tape everywhere. Tandy claim that a record- and-erasable CD is viable with initial hardware costs of \$500, but the UK office could not confirm software costs and weren't even 100 per cent sure Britain would get it. But back to cassette decks...

For this market survey we sent out around 100 questionnaires to dealers up and down the UK. Our approach is random but if a dealer wants to be consulted regularly then we do so. We also telephone dealers to put flesh on the bones of the results, and to get some comment on the market situation at the moment. *Market Response* is based on the main review topic of the magazine and complements the reviews as a buying guide looking at matters such as reliability and giving a

best sellers' table.

Several dealers told us cassette decks were better now than ever before with improved components providing enhanced sound quality and better reliability. And some agreed that the cassette deck was chosen by their customers as the secondary source although sales of cassette decks have actually been falling steadily over the past three years.

Stephen Duncan of BREMA, the British Radio and Electronic Equipment Manufacturers' Association told us that whereas in 1985 590,000 cassette decks had been delivered to retailers, in 1987 the number was only 430,000. The current figures for the first five months of this year showed a drop in sales by 69 per cent on the same period last year, while CD players are 28 per cent up on last year's sales. According to BREMA 1987 saw 737,000 CD players into the shops. This seems to confirm CD's popularity over other media.

One cause for concern from many dealers was that there was no domestic British cassette deck on the market at present. In previous surveys dealers told us they even lost sales on British systems because they couldn't offer a British cassette deck to go with the rest of the system.

TWIN SPIN

A couple of dealers informed us that twin cassette decks were on the way out and that customers "realised they were not getting the same reliability and performance" for their money. However, in spite of this trend we have twin cassette decks as best sellers from two or three dealers.

Harking back to April's survey, when we asked dealers about twin cassette decks, we found agreement that two for the price of one meant you got a half of each. Manufacturers had to cut down on the component costs and consequently quality suffered; our advice (through dealers) then was that you should pay around twice the money for a reasonable twin cassette deck (ie: £250) in order to get reasonable quality and reliability. Dealers also told us that double cassette decks were

often a fad for customers who hadn't thought out properly why they might want one. If you're not going to use it much it seems you're better off putting your money into a good single deck.

RELIABILITY

Cassette decks as a whole don't seem to suffer from reliability problems. We got a few juicy comments on the subject, but overall it seems things are going well and if you look after your deck you can expect years of life from it (an average six years for the heads). We calculated that only 2.96 per cent of cassette decks arrive from the manufacturer as faulty which is about the same as our calculations in the spring. The results of our table must therefore be held against this light; reliability is not a great problem and you are more likely to get a machine that does work than one which does not whatever the brand.

Notoriously unreliable brands sink very quickly anyway because handling them is expensive and time consuming to the retailer. However, we did ask dealers to comment on reliability and have calculated the findings on a points system. Of course, the more of a brand the dealer handles the more likely he is to find unreliable samples but in the past we have found dealers aware of this.

The most reliable brand is Nakamichi with 83 points followed by Denon with 70 points, Yamaha with 58 points, Technics with 30 points and Marantz with 26 points. Where unreliability was concerned only two brands stood out: Aiwa and Denon, both with 35 points. This creates a precedent with the survey highlighting just how individual it is. Denon had done extraordinarily well in the past on reliability but were criticised in our *One Name Systems* issue (61) where several dealers felt the firm was overstretching itself.

Rob Follis of Hayden Laboratories, who import the Denon range from Japan said that the company had just set up a special service department to

deal solely with domestic hi-fi. (Previously their service dept. was dealing also with professional gear which necessarily has to be repaired very quickly, domestic equipment being pushed to the back of the queue.) Reported problems over reliability may be due to dealers having to wait for faulty goods to be returned, he told *Choice*. This is partly borne out by our "fast and slow repair chart" where ten dealers complained of slowness from Denon. We calculated a mean equipment turnaround time of five weeks for the firm as opposed to the 3.3 week average repair period for cassette decks. Two dealers said Denon were fast at dealing with repairs.

The fastest repair time brand was calculated as Nakamichi with eight mentions for being fast and two for slow. Yamaha and Harman Kardon were also mentioned as speedy at dealing with problems, while Pioneer were said to be slow by three dealers. If the problem is not severe dealers will often repair the cassette deck themselves and varying times from 48 hours to two weeks were given for this. On average we found dealers take 1.16 weeks on repairs. It is interesting to note that the average repair times given above are almost the same as those calculated in our April issue.

CLEAN HANDS

"Many people think a cassette deck will run forever without cleaning . . . and they are stupid . . . and if their guarantee has run out then the dealers make a few bob out of them!" One dealer told us he was delighted to take the "not-working" cassette deck into the back of his shop, swab the heads, pinch rollers etc with isopropyl alcohol and give it back to his beaming customer in exchange for a fiver.

However, if you read *Choice* you probably know all this so we asked dealers to name their best selling cassette deck cleaner. It is the *Allsop 3*, marketed by the Path Group at £3.95 and recommended by 90 per cent of the dealers we spoke to. But over half of those dealers said that the better (and cheaper) method was to actually get into the cassette deck and do the job oneself with isopropyl alcohol (available from chemists) and cotton wool buds. Of course the operation does take time and is not as easy as bunging in the cleaning cassette, but use of alcohol puts you firmly in the audiophile (or would-be audiophile) class and you'll amaze friends with technical

wizardry and knowhow! Take care to use isopropyl though, as it is the purest alcohol. While something like meths looks pretty in a little glass vial, dealers told us it could leave a residue on the tape heads. As to how often you should clean your cassette deck the consensus varied from "once a fortnight" to "every two months"; here cotton wool buds are useful as they will show the dirt as you clean the heads and roller. Most important is to clean the heads before recording.

TAPED UP

We also asked dealers for their best selling tape. Over half the dealers questioned quoted That's tape as the best seller, a quarter told us TDK was tops and Maxell was also mentioned a few times, followed by Sony. This is not necessarily a complete picture for the planet right now as many dealers only sell the one brand of tape. What is important, according to a couple of dealers, is to stick to one or two brands of tape and correctly set up the tape deck's bias and equalisation for them.

Norman Perriam of Norman Audio pointed out that although there was "supposed to be standardisation for tape types, in practise they vary". Many machines are set up for TDK tape in Japan and if you are using another brand then it's advisable to get your dealer to look at the setting. Norman Audio said they also would look at azimuth to get optimum frequency response when setting up a deck, complaining that many manufacturers were lax on azimuth setting and many cassette decks arrived with wide tolerance levels.

CONSISTENCY

The above point brings us to sound quality consistency; Norman Audio said the variations in frequency response from cassette decks lead to machines sounding hugely different. We asked dealers to name the most consistent and inconsistent brands and again calculated the results on a points system. The most consistent decks are by Nakamichi (62 points) followed by Denon (53), Yamaha (48) and Marantz (25). On inconsistency Aiwa fared worst with 18 points followed by Denon (16) and Teac (14). Again Denon gets into the best and worst camps and Aiwa was also rated by five dealers as being consistent which shows personal preference on the part of the dealers.

THE BEST SELLERS

This list is compiled from the

dealers' three top selling cassette decks in each price category. With hindsight the budget area could probably have been up to £150 but nevertheless there were nearly 20 decks mentioned in the sub-£120 bracket.

'Budget', below £120

- | | |
|----------------------------|----|
| 1) Aiwa <i>ADF-360</i> | 59 |
| 2) Aiwa <i>ADF-260</i> | 51 |
| 3) Technics <i>RSB205K</i> | 28 |
| 4) Kenwood <i>KX 47</i> | 24 |

Aiwa, Technics and Kenwood have maintained these positions from our survey in the spring

Mid price, £121-£300

- | | |
|---------------------------|-----|
| 1) Denon <i>DRM07</i> | 123 |
| 2) Denon <i>DRM12HX</i> | 75 |
| 3) Denon <i>DRM24HX</i> | 36 |
| 4) Yamaha <i>KX200</i> | 36 |
| 5) Kenwood <i>KX550HX</i> | 35 |

This picture is much the same as the one printed in our April issue.

Top Price, £300 +

- | | |
|---------------------------|----|
| 1) Nakamichi <i>CR1E</i> | 65 |
| 2) Nakamichi <i>CR2E</i> | 60 |
| 3) Denon <i>DRM 44 HX</i> | 37 |
| 4) Denon <i>DRM 30HX</i> | 31 |
| 5) Nakamichi <i>CR3E</i> | 28 |

Dealers' predictions that the CR range from Nakamichi would be a best seller has proved correct; Nakamichi appear to be doing better than in April.

The results of this survey are only as representative as the comments from 39 dealers can be. We draw on the dealers' experience to compile it and as such it is more a poll than the complete picture of the market at the moment.

PARTICIPATING DEALERS

Our thanks to the following dealers for taking part in this survey:

Acoustic Arts, Watford, Herts.
A. Fanthorpe Ltd, Hull, Humberside.
Analog Audio, Finchley, London N12.
Andrew Thomson, Kirkcaldy, Fife.
Aston Audio Ltd., Alderley Edge, Cheshire.

Audio Insight, Milton Keynes, Bucks.
Audio T, London NW6.
Brentwood Music Centre, Brentwood, Essex.
Cambridge Hi-Fi, Cambridge.
Chew and Osborne Ltd., Saffron Walden, Essex.
Chichester Hi-Fi, Chichester, West Sussex.
Cleartone, six shops in Bolton and the North.
Cloney Audio, Blackrock, Co Dublin, Eire.
Doug Brady Hi-Fi, London, Liverpool and Warrington.
Eastwood TV Ltd., Leicester.
ENL, Nottingham, Notts.
Eric Wiley, Castleford, W. Yorks.
Gilson Audio, Middlesbrough, Cleveland.
Horns of Oxford Ltd, Oxford.
Lafayette Hi-Fi, Dublin, Eire.
Lyon Audio, Colchester, Essex.
Nick Dakin Ltd., Nottingham.
Norman Audio Ltd., Preston, Lancs.
Now That's Hi-Fi, Portsmouth, Hants.
Paul Green Hi-Fi, Bath, Avon.
Peter Russell's Hi-Fi Attic, Plymouth, Devon.
Pinewood Music Centre, Andover, Hants.
Radlett Audio Consultants, Radlett, Herts.
Richer Sounds, 12 shops in London and UK.
Rogers Hi-Fi, Guildford, Surrey.
RPM, Clapham, London.
Standens (Tonbridge) Ltd., Kent.
Subjective Audio Ltd., Palmers Green, London.
The Audio File, Bishops Stortford, Herts.
The Cornflake Shop, Windmill Street, London W1.
University Audio, Cambridge.
Uxbridge Audio, Uxbridge, Middx.
Zeus Audio, Belfast and Donaghmore, N. Ireland.

NB Any dealer who feels aggrieved that he is not on this list, and would like to be consulted in future, either regularly or intermittently, please write to us at 14 Rathbone Place, London W1P 1DE, or telephone 01 631 1433.





£29

FISHER MT870 turntable
 ●Fully auto ●Belt drive ●Linear tracking ●Black finish ●Cart £5 extra ●440 x 90 x 360



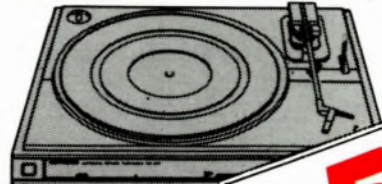
£49

FISHER CR-58 cassette deck
 ●Dolby* B&C NR ●Soft touch controls ●LED peak meters ●Metal facility ●Champagne finish ●400 x 110 x 220



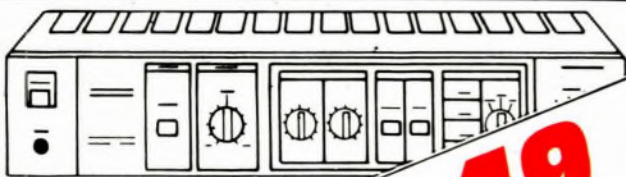
£39

GOODMANS GSP308 turntable ●Belt drive ●DC motor ●static balance tonearm ●W&F 0.1% ●Black finish ●345 x 92 x 324 ●Cart £5 extra.



£54

KENWOOD KD37R turntable
 ●Belt drive ●DC servo motor ●Straight tonearm ●Auto return ●Black finish ●420 x 100 x 331 ●Cart £5 extra.



£49

SANYO JA220 amplifier ●20 watts per channel ●Great budget or starter amp ●Plenty of inputs ●Tone controls ●Silver finish ●420 x 80 x 220



£54

JVC TDX102 cassette deck
 ●Dolby* B NR ●LED peak meters ●Metal tape facility ●Excellent finish ●Black finish ●435 x 115 x 237



£49 Pt.

GOODMANS Q35 speakers
 Smartly finished, high quality budget speakers with an impressive sound ideal for amps up to 35 wpc ●Walnut finish ●380 x 200 x 170



£59

QED MIDIMATE Power Amp
 ●40 wpc ●Add-on power & sound quality booster for midi or rack systems ●Boosts by up to 4 times normal power ●Black finish ●265 x 62 x 132



£49

TEAC EQA3 ●10 bands per channel ●Black finish ●Source/tape, line 1 & 2 selectors ●435 x 120 x 265. (Also EQA5 £59.95, EQ1011 £69.95, EQ20 £99.95)



£59

TEAC V200 cassette deck
 ●Dolby* B NR ●Hard heads for improved performance ●Top brand name ●Black finish ●435 x 120 x 215



CHOOSING AND USING . . . CASSETTE DECKS

The unique feature of Compact Cassette is, of course, the ability to record. But it should also be stressed that musicassettes are a major source of prerecorded music, outselling LP and CD combined. The cassette has done for the music industry what the transistor did for radio, providing 'go anywhere' flexibility in portables, personals and in-car variations.

The most obvious recent trend in domestic mains machines has been towards the double 'dubbing' deck, fitted with two transport mechanisms. *Choice* has tended to steer clear of these, less for moral reasons concerned with copyright theft than because there is no way such a machine can out-perform a single transport machine at a similar price.

REPLAY

Nowadays the best musicassettes can give very respectable quality, so the ability to get the best from musicassettes is a valid assessment for a cassette deck.

The task requires a good quality tape transport mechanism and replay head, plus careful alignment of heads and electronics. Although international tape equalisation and noise reduction standards do exist, not all manufacturers are equally good at adhering to them. The result is that many decks perform less well on replay only than they do within the 'closed loop' of record/replay, and our reviews pay attention to this.

RECORD/REPLAY

In some ways record/replay is easier than replay only, insofar as head alignment, Dolby tracking and equalisation errors can cancel out and compensate for each other. However, any inherent transport problems are likely to be exaggerated, and there is now a still greater premium on the quality of the record head, particularly if metal tape is likely to be used. To get a decent quality recording, a deck needs to be accurately aligned electronically for a sensible range of different tape types; some machines offer variable bias for 'fine tuning' to specific tapes – a useful facility for those

prepared to take the trouble.

Good quality metering set to the right sensitivity level can be a boon, though in time and with practice a cassette deck owner will probably gradually come to learn the 'right' meter level for getting most signal without compression onto a specific type of tape.

TAPE TYPES

Though there are three formal groups of tapes, Types I, II and IV, there are variations within each group which further confuse. In brief, the best advice is to find a tape in each group which suits the set-up of the recorder, and then stick to it. (But note that the tape manufacturers have an annoying habit of re-mixing formulations regularly without changing the brand identity.)

The very cheap ferric tapes are not hi-fi quality, so it is better to go for premium Type I ferric from a reputable brand for general purpose use. A Type II chrome or pseudochrome will give a step-up in quality, while Type IV metals can turn out to be the cat's whiskers on some decks – but may not work too convincingly on others. Perversely, the very best decks can produce stunning results on the better quality Type I ferrics.

FEATURES

No other component fulfills a button pusher's dream like a cassette deck. The bare essentials boil down to tape selection (which can be automatic), and Dolby B noise reduction (necessary for musicassette replay but optional for record/replay).

A host of imaginative inessentials will either enhance the enjoyment or baffle the user, depending upon temperament. Microphone inputs are fast disappearing, but headphone sockets remain. Extra noise reduction may be Dolby C and dbx, with headroom extension from Dolby HX Pro.

Electronic logic control may supervise an almost silent transport system, giving the potential for microprocessor-controlled track search and programming systems; for auto-

reverse to extend play or record times; and for automatic or semi automatic tape tuning in the more expensive machinery. Bias 'tweaking' enhances tape matching, while replay EQ may be trimmed for optimum replay response on some machines.

R-DAT RECORDERS

R-DAT – more often known by its generic title, DAT – is an acronym for Rotary-head Digital Audio Tape, and was developed by a large number of mainly Japanese companies headed by Sony.

Two existing technologies came together to make DAT possible. One is the helical scan method of recording signals on to tape. A fast rotating drum with heads embedded in its periphery records diagonal stripes across the width of the tape. The result is a high head writing speed to cope with the necessary 2.5MHz bandwidth combined with a slow linear tape speed (along the length of the tape) to give up to two hours recording time from a relatively short length of tape. This in turn facilitates a physically small tape and allows fast shuttling from one end of the tape to the other. To further increase practicality, the tape is wholly enclosed – it's only exposed when within the maws of the recorder itself – and it has a neat record disable switch rather than a cassette style break off tab.

The other technology is of course compact disc style digital signal processing. More than one standard of digital encoding is available. For prerecorded material, the system is identical to CD – 44.1kHz sampling and 16 bits (there are necessary differences in error correction which don't concern us here). However domestic DAT recorders are inhibited from recording at 44.1kHz to avoid the temptation of making 'perfect' recordings digitally from compact discs. Instead, recordings are allowed at a 48kHz sampling frequency which means a slightly greater bandwidth but an unnecessary digital to analogue conversion stage followed by conversion back to digital, with the

inevitable loss of sound quality when recording from compact disc.

DAT machines can also be driven in a long play, lower quality mode, but this isn't fully supported by the industry and is not available for recording purposes. They will play such tapes, which have a 32kHz sampling frequency, but I know of no source of 32kHz tapes either here or abroad.

In common with video practice, recordings are made on one side of the tape only – there's no turning sides in the middle – but with the addition of a control track which automatically records data such as running time from the start of the recording and track numbers which are recorded automatically when the deck detects a gap between tracks or songs. The codes can be changed later if required, renumbered (important when recordings overlap so the recorder can tell where it is when the tape is inserted without having to rewind) or to add skip IDs which instruct the tape to fast wind to the next start ID and resume play from there. A few minutes recording time can be skipped in a second, which is almost imperceptible, whilst a complete two-hour tape can be rewound in about 40 seconds with most recorders. When handling, the format is incredibly slick and polished by cassette standards. Only CD makes DAT's track access times look pedestrian.

CHOOSING

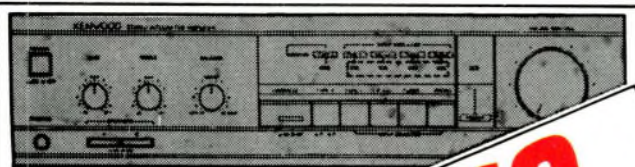
Having weighed up the pros and cons of your own priorities and requirements, and having studied our reviews, it's not a bad idea to audition one or two likely contenders. A comparison with something really good is almost essential to establish a quality yardstick when trying to assess how much you will need to spend to achieve the desired level of performance.

The hi-fi enthusiast may not take the purchase of a tape deck as seriously as he would the selection of, say, turntable, arm and cartridge, but audible differences between machines are no less obvious.

RICHER
Sounds

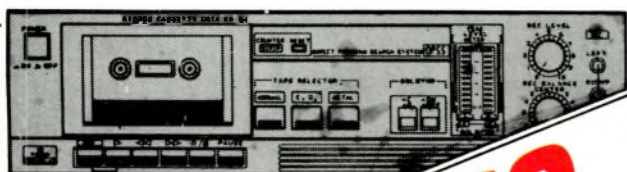
SALE...

Please phone 061 480 1700 (24hrs) for FREE 24 page price list and hi-fi guide.



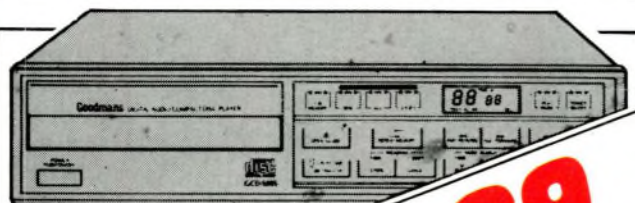
£69

KENWOOD KA56 amplifier
 •Powerful 50 wpc output •A&B speaker switching •Cassette dub switching •Power muting
 •Black •420 x 110 x 277.



£69

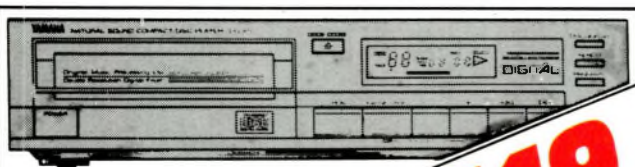
KENWOOD KX54 cassette deck
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 •420 x 123 x 269



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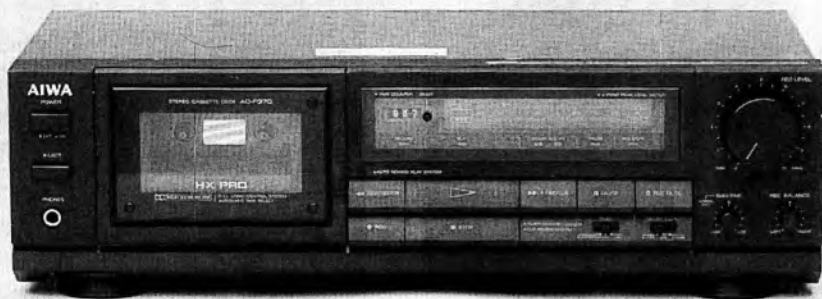
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AIWA AD-F370

AIWA (UK) LTD., UNIT 2, DUKES ESTATE, WESTERN AVENUE, LONDON W3 0SY. TEL: (01) 993 1672.



Aiwa claims that the *AD-F370* is unusual because it includes Dolby HX Pro at £129.95. It is, but not that unusual, and the recorder may be better remembered by posterity simply as a smart deck with mainstream appeal and an affordable price tag.

The Aiwa is also notable for one other reason. It marks a break with the company's longstanding styling convention of a piano keyboard control layout on an upwards facing bottom ledge. Styling now is entirely traditional – the *AD-F370* looks somewhat like a cross between an Onkyo and a Denon. That may well please both the other companies, but I think the change is worthwhile; the old models somehow looked cheap and contrived. They were also dust-traps.

The *370* makes an unseemly clatter when selecting play or fast wind, but the full logic transport works well otherwise. The controls are large and sensibly disposed ('play' between 'wind' and 'rewind', and 'stop' beneath for example), whilst a small switch selects Dolby B, C and off. Overall record level is set with a large rotary gain control, backed by a small balance knob and a set of 7-segment, 30dB record level meters.

Tape types are switched automatically, and a fine bias feature is fitted for Type I and II tapes only. 'Punch-in' recording is possible, as is cue and review, the speeded up sound remaining audible at low level. It's surprising that this once popular feature is now so seldom used, considering the equivalent is part of the basic roll call of features with all CD players, and even DAT.

Remaining features include a record mute key, a headphone socket and a standby switch for triggering record and playback operations from an external timer. It's even possible to preselect 'play' during 'rewind'. The review sample had single insulated figure-8 mains cable, which does not meet prevailing safety standards, but presumably this will be changed for machines sold to the public.

LAB REPORT

Types I and II (normal and chrome bias) test

tapes are handled accurately at the normal, central position of the fine bias adjustment. Unfortunately this doesn't hold for the Type IV metal test tape, and the bias adjustment facility doesn't help either, since Aiwa subscribes to the all too common but demonstrably false belief that all metals have the same bias requirements.

Dolby B record/replay integrity is satisfactory, but the C circuit response is all over the place. Head contour effects are rather obvious, and a degree of transport roughness leads to unexpectedly high levels of flutter – see the noise modulation spectrogram. The deck is electrically quiet but the amplifier sections are audibly less than clean, the intermodulation test indicating that headroom is limited.

SOUND QUALITY

The *370* is at its best with prerecorded material. It sounds crisp and clean, and despite head contour effects the bass is firm and deep with good pitch specificity.

As a recorder, however, the Aiwa simply fails to shine. On the surface the deck sounds fine – at least it did so with Dolby B and also without Dolby. But examined more closely it fails to differentiate clearly between subtly different but related sounds – the individual string sections in one orchestral recording for example. The Aiwa also produced a vague, woolly soundstage far removed from the well-defined imagery of the source material used for testing.

Last but not least, this Aiwa sounds vaguely untidy and incoherent. It simply doesn't hang together properly, and ringing the changes with tape types does little to change things.

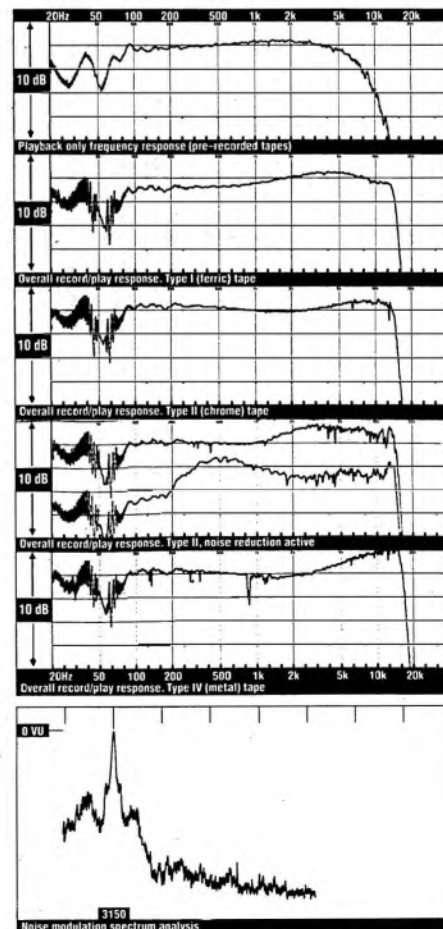
CONCLUSIONS

Although somewhat derivative, Aiwa's aesthetic design skills have been well employed in this new series. There still isn't quite enough emphasis on under the skin engineering, however, the Dolby C circuit and flutter levels both need attention. Good with prerecorded tapes, the *AD-F370* is just

average as an actual recorder.

TEST RESULTS

Rec/replay response – 3dB ref 1kHz	
IEC Type I	<20Hz – 15kHz
IEC Type II	<20Hz – 15kHz
IEC Type IV	<20Hz – 17kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.13%/0.34%
Wow/Flutter Peak DIN wtd	0.06%/0.38%
Speed error	+ 0.25%
Type I signal/noise CCIR/ARM 400Hz distortion 0dB	49dB
Type II signal/noise CCIR/ARM 400Hz distortion 0dB	0.75%
Type II signal/noise CCIR/ARM 400Hz distortion 0dB	54dB
Type IV signal/noise CCIR/ARM 400Hz distortion 0dB	1.5%
Type IV signal/noise CCIR/ARM 400Hz distortion 0dB	52dB
Channel separation 0VU/1kHz	48dB
Line input sensitivity/overload	88.5mV/>7V
Line output for 0dB/maximum	610mV/2.5V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	20%
Azimuth check R-L phase at 8kHz	30 degrees
VU indication at IEC 0dB	+ 3dB
Dimensions (w x h x d)	43 x 13 x 23.5cms
Typical Retail Price	£130



AIWA XK-007

AIWA (UK) LTD., UNIT 2, DUKES ESTATE, WESTERN AVENUE, LONDON W3 0SY. TEL: (01) 993 1672.



Excelia is the name that Aiwa intends to promote as a premium, cost (mostly) no object brand, the £400 *XK-007* covered here being a simplified version of the *XK-009* (reviewed separately).

Aiming to please all comers, the deck has Dolby B, C and dbx noise reduction, plus Dolby HX Pro headroom expansion circuitry.

Like its bigger brother, the '007 is a 3-head deck equipped for real-time off-tape monitoring using siamesed record and playback heads. These permalloy heads use PC-OCC wiring, and a new head shield design said to greatly reduce bias leakage; they're secured to a diecast head block which is coupled to a sophisticated dual capstan transport that includes a cassette shell damper clamp. The latter engaged with a loud 'crack' every time a tape is inserted. That apart the deck works with the hushed decorum befitting its price.

The cassette well is back lit, and the ideally laid out transport section includes facilities for 'punch-in' recording and audible cue and review. The meters are superb 52dB high resolution types, with clear additional indication of the appropriate maximum recording level for the tape group being used.

Further facilities include auto tape type sensing, a real-time memory counter, independent MPX switching and a second 'straight line' input. Record bias and sensitivity may be varied using a pair of front panel pots, adjustment by ear being facilitated by the tape source/monitor switch.

LAB REPORT

Noise and distortion figures are very similar to the *XK-009*, and the record/replay responses likewise. The Type I and II traces show a rise in the top octave, however (using the standard tapes at the nominal settings), and although this can be corrected, it leaves a shallow response dip around 5kHz – a cure which in some respects is worse than the disease. Note how the noise reduction systems progressively boost this error, the dbx plot rising by a massive 6dB at 14kHz. The playback response curve is good, and the measured azimuth was correct.

The transport proved mildly disappointing, especially given Aiwa's reputation in this area. Although good by normal standards, some quite severe discrete sidebands are seen in the spectrogram, and these are responsible for the highish flutter test figure. Intriguingly, this problem was not found with the supposedly similar '009.

SOUND QUALITY

Inevitably, the *XK-007* was compared to the '009, and generally fell short, though results are somewhat equivocal. First, this deck is clearly preferable without noise reduction, especially dbx. Balance differences are attributable simply to the response shape variations – the way the two decks drive tapes if you like – but even taking this into account, the *XK-007* is subtly less involving and engaging to listen to. The reverberant 'glow' around one well recorded performance was stripped away by this deck in a manner which the senior model avoided.

The *XK-007* still sounds refined and manages the '009-like trick of driving tapes very hard – those that are capable of taking it that is. But there's less information on the admittedly very quiet recordings that result. They sound lazier, less taut and precise.

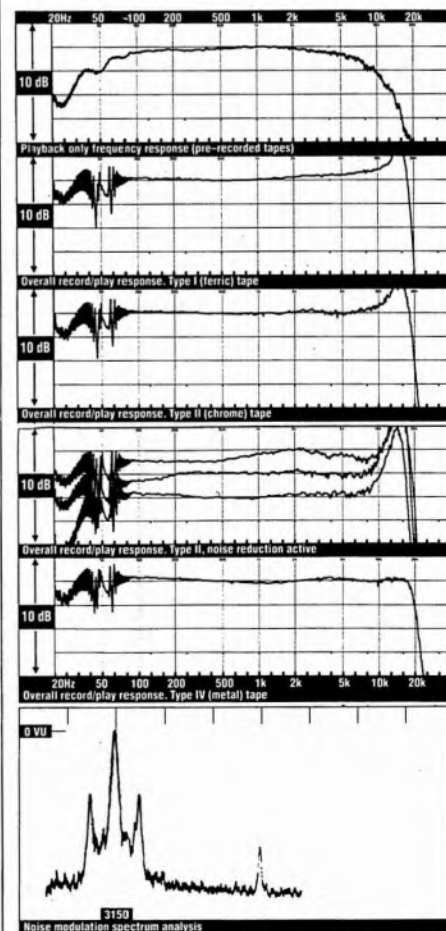
Whatever is affecting the '007's recording ability – and in fairness it isn't severe – may be having a similar effect on prerecorded material, but paradoxically the end result here tends to favour the cheaper model. Certainly '009's occasionally splashy top end was less evident with '007, and if there is slightly less detail, the sound still remains lively and potent.

CONCLUSIONS

This cut price version of the *XK-009* sacrifices little of the flagship's facilities – the most important omission being the user-friendly thermometer scale aid for adjusting bias and equalisation. In musical terms there's a small but vital difference, however; *XK-007* is clearly good, but not in the '009 class.

TEST RESULTS

Rec/replay response – 3dB ref 1kHz	
IEC Type I	<20Hz – 18kHz
IEC Type II	<20Hz – 19kHz
IEC Type IV	<20Hz – 20kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.12%/0.20%
Wow/Flutter Peak DIN wtd	0.066%/0.18%
Speed error	–0.25%
Type I signal/noise CCIR/ARM 400Hz	51dB
distortion 0dB	0.65%
Type II signal/noise CCIR/ARM 400Hz	54.5dB
distortion 0dB	0.85%
Type IV signal/noise CCIR/ARM 400Hz	52dB
distortion 0dB	0.8%
Channel separation OVU/1kHz	50dB
Line input sensitivity/overload	72mV/>>7V
Line output for 0dB/maximum	84.5mV/5.9V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	2.8%
Azimuth check R-L phase at 8kHz	0 degrees
VU indication at IEC 0dB	+4dB
Dimensions (w x h x d)	43 x 13.5 x 42cms
Typical Retail Price	£400



AIWA XK-009

AIWA (UK) LTD., UNIT 2, DUKES ESTATE, WESTERN AVENUE, LONDON W3 0SY. TEL: (01) 993 1672.

RECOMMENDED



This new £550 3-head model is Aiwa's long-awaited flagship. Built on a lavish scale with excellent build quality, this *Excelsia* has wood end cheeks and 'power bulges' at the back for the two dedicated transport and audio transformers. Dolby B, C and dbx noise reduction are all fitted – the latter a 'catch-all' provision aimed mainly at the US market where this system still (unaccountably) has a strong following. MPX filtering is independently switchable, and Dolby HX processing works continuously in the background. The display is superb, the meters covering a massive 54dB range with peak hold LEDs which are automatically or manually released – your choice.

The 009 has tape bias and sensitivity adjustment using a 'match scale and pointer' scheme with an alternative meter display mode and built-in 400Hz and 10kHz oscillators. This simple, two-stage process takes about ten seconds, but is limited by the ability to store settings for only one tape type.

The features list includes the (amazingly noisy when engaging) anti-modulation tape stabiliser also fitted to the cheaper *XK-007*, a real time tape counter (with memory stop or play), and an extra line input labelled 'CD/DAT Direct' which bypasses the deck's early amplifier stages. Headphone monitoring level is adjustable. The transport itself engages quietly and incorporates some extras like audible cue and review.

The heads are amorphous alloy types with PC-OCC wiring that claims one crystal boundary/meter. Aiwa claim a low 0.018% WRMS wow and flutter figure, partly because the tape stabiliser reduces intermodulation caused by vibration or resonance in the cassette shell (mounting the well screened heads on a heavy cast headblock also helps).

LAB REPORT

Choice doesn't use the unrealistically optimistic WRMS weighting curve, but even so Aiwa's claims seem short of reality on this occasion. Wow and flutter is low, and the spectrum analysis looks impressively clean, but there is a significant (unrepresenta-

tive?) wow component – confirmed with several different test tapes.

Elsewhere 009 does well. The frequency response shapes are very well tailored and well extended at LF and HF alike. Likewise the playback response, and the various noise and distortion figures. On overall evidence then, this is an impressive recorder.

SOUND QUALITY

Replay sound quality from commercially recorded tapes tended towards brightness. Musically 009 works well here, but there's no escaping a degree of high frequency splashiness. This produces something of an 'edge of the seat' experience with some types of material – close-miked percussion for example.

There were other occasions too when I had cause to doubt high frequency performance which often seemed semi-detached. I formed a distinct preference for the minimum necessary noise reduction, dbx recordings suffering the problems of noise, pumping behind low frequency transients (you can always catch it out with piano) and loss of image scale and clarity.

Non-Dolby and dbx recordings were extremely impressive. I made some remarkably fine tapes at hair-raisingly high levels, using Sony *Metal-ES* which would have been unusable without the tape calibration system. There was scarcely any sign of compression or noise, even with wide dynamic range chamber music – a tribute to both tape and machine.

The rest of the picture remains entirely positive. The 009 is quick and light on its feet, with minimal overhang and an excellent sense of pitch at low frequencies. The mid-band sounds impressively sharp and open, and although the off-tape sound is always distinguishable from the direct sound (monitored at the amplifier during playback, not the cassette deck while recording), value judgements were often surprisingly close.

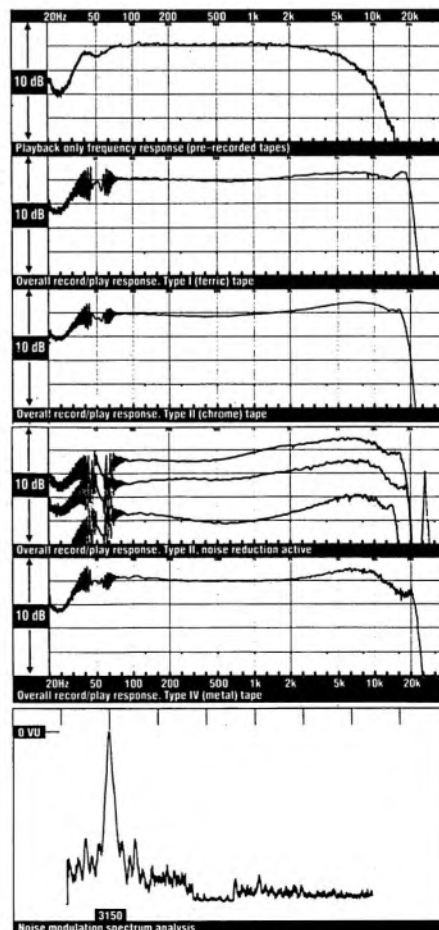
CONCLUSIONS

This is a first rate recorder even at £550. Ignore the noise reduction circuits which sap

much vigour from the sound; use good tapes and enjoy. First though, buy the recorder.

TEST RESULTS

Rec/replay response – 3dB ref 1kHz	
IEC Type I	<20Hz – 21kHz
IEC Type II	<20Hz – 19kHz
IEC Type IV	<20Hz – 22kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.15%/0.16%
Wow/Flutter Peak DIN wtd	0.11%/0.13%
Speed error	+0.75%
Type I signal/noise CCIR/ARM 400Hz	52.5dB
distortion 0dB	0.8%
Type II signal/noise CCIR/ARM 400Hz	54dB
distortion 0dB	0.85%
Type IV signal/noise CCIR/ARM 400Hz	51dB
distortion 0dB	0.6%
Channel separation 0VU/1kHz	46dB
Line input sensitivity/overload	113mV/>7V
Line output for 0dB/maximum	1038mV/5.9V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	0.56%
Azimuth check R-L phase at 8kHz	10 degrees
VU indication at IEC 0dB	60dB
Dimensions (w x h x d)	47 x 13.5 x 43.5cms
Typical Retail Price	£550



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RECOMMENDED



Excelia is the name given to the cream of Aiwa's hi-fi separates, and is used here for the company's (and the world's) first DAT recorder in Japan's shops, the *XD-001*. Functionally and internally it's almost identical to the Sony *DTC-1000ES* – Aiwa of course is a largely autonomous part of the Sony empire.

Similar as they are, Aiwa has given its recorder a completely different appearance, which unfortunately comes off worse. Aesthetics are stylised and many of the key controls are tiny and ill-differentiated.

Happily the remote control is much better – or at least it appears to be so from the information provided, as it was omitted from my much travelled review sample. And the Aiwa does benefit from one minor feature not included on the Sony; it has a second analogue input, switch selectable on the front panel.

Built around the clear and comprehensive display, key constituents are 50dB record level meters and a real time counter giving various elapsed or (arbitrary) time to go readouts. Start and skip IDs are normally laid down automatically as recordings are made, but can be post-edited or recorded manually at will; the absolute track numbers can also be changed.

As well as the usual analogue in and outputs, electrical digital socketry is fitted for direct digital dubbing (at 48kHz only – copying at the 44.1kHz sampling rate is inhibited as usual), and to feed an external digital converter.

LAB REPORT

The digital circuits are neatly housed in a screened box adjacent to the transport, and the power supply sits above one digital board. There is an abundance of high grade components, including Nichicon *Great Supply* and Duorex caps and polystyrene/copper foil caps. Two transformers are housed in a box that overhangs the rear. Casework is built from braced but undamped copper-plated steel.

The analogue replay boards are based on a Philips 4x oversampling digital filter and

DAC chip set (*SA17220/TDA1541*), followed by *LF353* FET op-amps. The record circuits use one Sony *20018* non-oversampling ADC per channel with analogue filters. Twin converters eliminate interchannel phase errors. The circuit boards are compact, and the design is well rationalised.

Channel balance was out by 0.4dB in the midband, whilst high frequency separation is poor and asymmetric to boot. Distortion figures are adequate at high levels but with a low level asymmetry that is not uncharacteristic of the Philips DAC/digital filter combination.

The downband intermodulation products of the 19/20kHz twin tone test are higher than normal, betraying the simple output filtering. The frequency response shape is flat apart from some ADC ripple, whilst noise measured lowest of all models in our ad hoc grouping. The –90dB sinewave is a little triangulated on the left channel and almost disappears into noise on the right, overall resolution being around 15 bits – typical of hardware using the *TDA1541* DAC.

SOUND QUALITY

The Aiwa sounded similar to its Sony cousin, but certainly not the same. It's far from clear whether statistical variations are to blame, but perhaps it doesn't matter. For much of the time, the Aiwa was marginally preferred. It sounded slightly more lucid and less dry than the Sony, gave a bigger though certainly not a better differentiated sound picture, and also seemed perceptibly sweeter and more immediate. The differences are consistent with those often ascribed to different capacitor types, but there are enough alternative explanations to make such an analysis risky.

For all its good features, the Stork vs butter test doesn't really help this one. Despite high standards of resolution and a string sound that was vibrant and alive, complex passages found the Aiwa sounding cluttered – more so seemingly than the Sony, though again the differences were small in absolute terms.

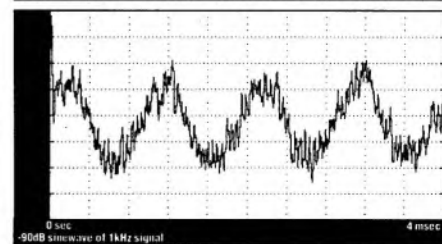
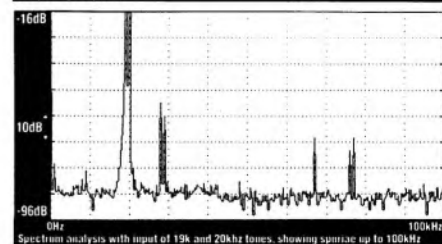
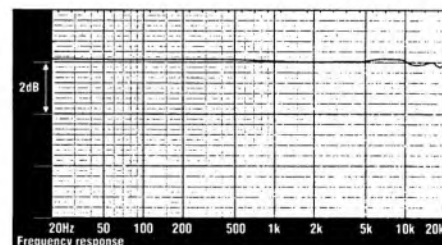
CONCLUSIONS

A direct alternative to the Sony *1000*, the Aiwa trades points with that model. The key subjective differences are that the Aiwa sounds sweeter in normal use, but a little more synthetic in character when the music is very complex. But these differences are never large, and often negligible.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel balance	0.40dB	0.39dB	0.34dB
Channel separation	85dB	87dB	60/75dB
Channel phase difference	0°	0°	0°
Total harmonic distortion inc noise, 20kHz bandwidth			
0dB	–85dB	–82dB	–75dB
–10dB		79dB	
–60dB		41/37dB	
–80dB		22/18dB	
Intermodulation distortion			
L + R (0dB, 19kHz/20kHz)			75dB
L + R (–10dB, 19kHz/20kHz)			85dB
Frequency response			
L	0.02dB	0dB	–0.09dB
R	0.01dB	0dB	–0.07dB
Output level 0dB			2.04V
Output impedance			365ohms
Mechanical noise			low
Signal/noise ratio (no emphasis unwt'd)			94dB
CCIR/ARM wtd (ref 1kHz)			88dB
Spuriae to 100kHz			85dB
Resolution (linearity) at –90dB L/R		–91.4dB/–100.0dB	
Headphone socket/output impedance			variable 149ohms
Line in impedance (kohm)			69kohms
Line sensitivity/overload			400mV/>7V
Dimensions (w x h x d)			43.0 x 11.5 x 41.0cms
Typical Retail Price*			£1300

*This machine is not officially available from Aiwa UK, though models from overseas sources may well be found in some UK shops.



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RECOMMENDED



Denon's latest cassette deck is the £180 *DR-M10HX*. For that you are offered few special features – unless you call Dolby HX Pro a special feature – but you do get some decent, no-nonsense engineering in a package reminiscent of the *DR-M12HX* reviewed last year (now replaced by the *DR-M12HR* by the way).

In common with others in the range, the *10HX* has Denon's slick cam-operated transport (an idea first used in domestic decks by Nakamichi I believe) which has the benefit of changing and entering transport modes with an almost deathly hush. This one seems quieter than previous models, and more than once I found myself peering closely at the tape reels to see if they were really running.

Combined with a clean, uncluttered front panel layout, automatic tape type sensing (with confirming LEDs on the front panel) and good quality 26dB meters, the *10HX* is one of the nicest of this year's cassette deck crop to sit down and use. Operating features apart from Dolbys B and C include a fine bias adjustment knob (active with all three tape groups), a memory counter and a simple next or last track search facility. Headphones are accommodated (without the benefit of a volume control), but not microphones.

As so often with Denon (and other good marques), the really newsworthy elements of the design are not wholly reflected in the outside. In this case, amongst other more minor points, the manufacturer has fitted heads with a hyperbolic profile which effectively reduces low frequency contour effects (the 'ringing' at the left hand side of the response curves).

Dual power supplies are fitted, a number of coupling capacitors have been eliminated and/or upgraded, and there also appears to be a novel constant current record amplifier circuit.

Finally, riding high on the back of a good reliability rating in the *Market Response* feature, Denon has increased the guarantee to two years. Whereupon the review deck promptly suffered a fault with its tape sensing feelers!

LAB REPORT

Aside from a modest 15 degree phase error between channels at 8kHz, the *DR-M10HX* sailed through the test programme. All the various frequency responses are within a 2dB envelope up to about 15kHz. Varying the bias setting tends to hinge the response shapes at around 1kHz, and can be used to flatten any residual balance errors quite effectively. Using the standard test tapes and normal bias settings, the Type II response shape is mildly exaggerated by Dolby processing, which is as it should be.

Speed stability ranks as satisfactory rather than good. The 0.09% wow figure is low, but flutter isn't quite so well restrained. The spectrogram shows some well distributed broad-band flutter, but few distinct energy peaks, which promises well. The various signal/noise and distortion results should be good enough to allow recording without Dolby, using an ultra-quiet tape like TDK SA-X.

SOUND QUALITY

I was mildly disappointed by the replay standards of prerecorded material. Although superficially clean and precise, the sound was really rather pedestrian. Dynamics are suppressed and stereo imaging was flat and dimensionless.

Clearly tape compatibility is part of the problem because this Denon is considerably more successful as a recorder. Here it paralleled the performance of the *DR-M12*. Although not wholly natural – there's a pervading graininess and tightness that's reminiscent of certain amplifiers – the Denon is generally clean and concise, with good stereo focus in the context of a narrow and not very deep soundstage. There is little obvious smearing, and the deck proved capable of powerful, involving music making with all tape types – the bass light and tune-ful rather than deep or weighty.

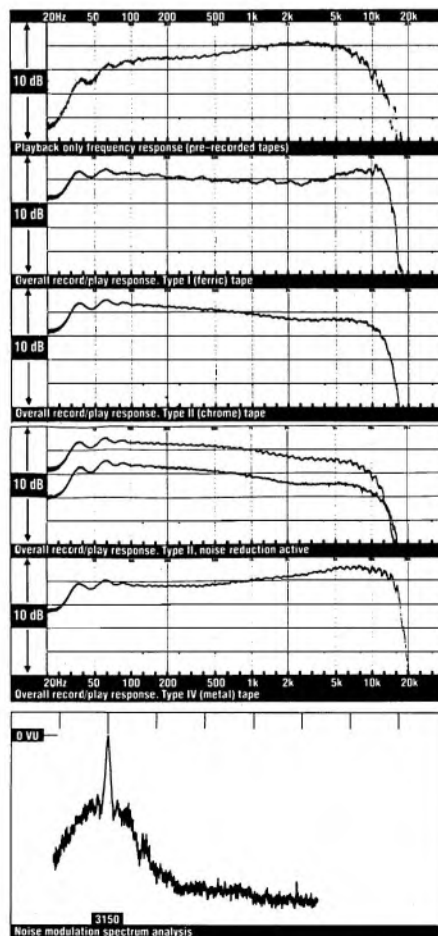
CONCLUSIONS

The sound treads the line between good and very good, whilst the user interface (disgust-

ing phrase, but you know what I mean) is absolutely superb: Recommended.

TEST RESULTS

Rec/replay response – 3dB ref 1kHz	
IEC Type I	<20Hz – 15.5kHz
IEC Type II	<20Hz – 13.5kHz
IEC Type IV	<20Hz – 17.5kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.15%/0.42%
Wow/Flutter Peak DIN wtd	0.09%/0.42%
Speed error	+0.25%
Type I signal/noise CCIR/ARM 400Hz	54dB
distortion 0dB	1.0%
Type II signal/noise CCIR/ARM 400Hz	57dB
distortion 0dB	0.85%
Type IV signal/noise CCIR/ARM 400Hz	55dB
distortion 0dB	1.8%
Channel separation 0VU/1kHz	52dB
Line input sensitivity/overload	100mV/>7V
Line output for 0dB/maximum	710mV/3.7V
TH distortion 1kHz, ref 10kHz/11kHz 0dB	3.1%
Azimuth check R-L phase at 8kHz	15 degrees
VU indication at IEC 0dB	0dB
Dimensions (w x h x d)	43.5 x 11.5 x 28.5cms
Typical Retail Price	£180



DENON DR-M34HR

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



For reasons that are as obscure as next week's weather, remote controlled cassette decks remain rarer than hen's teeth. Only a handful have been produced over the years, and this is one of the few.

The £319.95 pricetag will restrict interest a bit, but this is a high spec machine. Based on the *DR-M24HX*, the *34HR* is made from the cream of the 3-motor dual-capstan transports used in the cheaper model, the main sorting criterion being speed stability.

It's also a 3-head deck, with manually switched off-tape monitoring (incidentally, tape/source switching is not remote controllable; the handset restricts itself to the standard transport functions plus 'record'). There are no special functions like cueing or 'punch-in' recording, but the cam operation and logic control makes the transport a pleasure to use, and the two colour 28dB meters are equally good. Tape recognition is automatic with confirming indicators, and the memory tape counter is electronic.

Aside from Dolby B/C switching, the MPX filters are separately switched and Dolby HX headroom expansion is always active. Fine control of record sensitivity and bias for all three tape types is available, and easy to adjust by ear using the off-tape monitoring facility. A headphone socket with volume control completes the hardware description.

LAB REPORT

Frequency responses are all extremely well extended, with a worst-case 21.5kHz for -3dB - ironically in this case for Type IV metal tape (MPX filter out of course). The Type IV test tape was significantly underbiased by this machine, but that was only at the centre bias setting.

The Dolby plot looks oddly ragged, with a shallow 1-2kHz output peak, but the total range of variation was little more than 1dB. Chrome and metal test tapes gave adequately low noise levels, though the ferric tape result is a little marginal. A modest azimuth error was measured, amounting to 10 degrees at 8kHz, and the playback only response test had something of the camel's hump appear-

ance with a loss of output at both frequency extremes.

Speed stability is excellent, the test results standing in mute tribute to the fine quality of Denon's dual capstan transport. Wow and flutter figures are low and the spectrum analysis merely shows how little there was to measure.

SOUND QUALITY

This Denon is consistent with the *DR-M24* when making and playing back recordings, and turns out to be a first rate performer, exactly as promised. It has a light, natural quality with sharp, well pointed dynamics and good focusing without overhang - even at low frequencies where cassettes tend to waffle. There's no shortage of bass either, which makes the *34's* achievement all the greater. Pitch stability is first class.

This pleasing mixture of qualities is achieved with a wide range of tapes of all kinds. In fact the combination of variable bias and equalisation on one hand and Dolby HX Pro on the other confers a good deal of independence from the type of tape used, and in this sense helped rob Type IV metals of their usual high frequency advantage. The Denon was very successful indeed with some of the lower noise Type IIs, and was very effective both with Dolby B and without any noise reduction, the latter removing a further faint veil from the sound at the cost of some added noise.

All was not sweetness and light, however. This Denon is little less than a disaster with prerecorded material, suffering a severe lack of high frequencies, a problem that had not been fully anticipated from the measurements alone. Approximately the right balance was restored with most tapes by switching Dolby *off* - a sure indication that something is awry in the total package alignment.

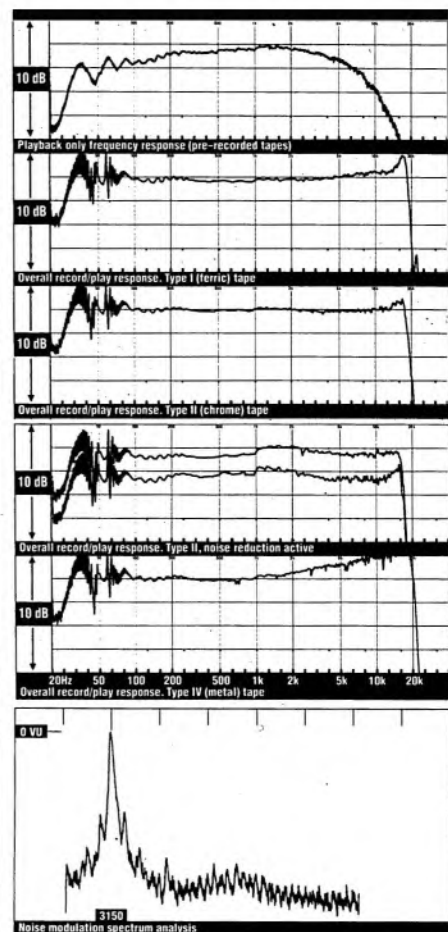
CONCLUSIONS

Unfortunately the prerecorded replay problem was discovered too late in the day to request a replacement recorder, and all that

can be said is that it's hopefully nothing more than a sample fault. The performance of the deck in other areas indicates that what happened was probably not meant to happen, so have your machines checked prior to purchase if you use musicassettes extensively. If not, don't worry about it; sit back and enjoy the armchair control instead.

TEST RESULTS

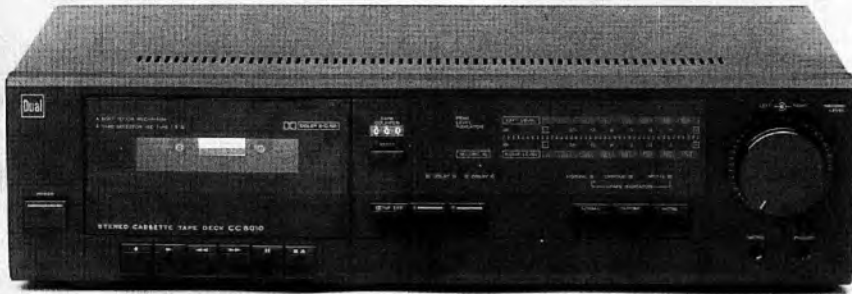
Rec/replay response - 3dB ref 1kHz	
IEC Type I	25Hz - 19kHz
IEC Type II	25Hz - 19kHz
IEC Type IV	25Hz - 21kHz
Wow & Flutter - Peak DIN wtd/unwtd	0.05%/0.10%
Wow/Flutter Peak DIN wtd	0.055%/0.9%
Speed error	+0.5%
Type I signal/noise CCIR/ARM 400Hz	50.5dB
distortion 0dB	1.0%
Type II signal/noise CCIR/ARM 400Hz	55dB
distortion 0dB	1.0%
Type IV signal/noise CCIR/ARM 400Hz	54dB
distortion 0dB	1.3%
Channel separation 0VU/1kHz	62dB
Line input sensitivity/overload	96.5mV/>7V
Line output for 0dB/maximum	864mV/4.4V
IM distortion 1kHz, ref 10kHz/1kHz 0dB	4.2%
Azimuth check R-L phase at 8kHz	10 degrees
VU indication at IEC 0dB	1dB
Dimensions (w x h x d)	43.5 x 13.5 x 28.5cms
Typical Retail Price	£320



DUAL CC8010

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

BEST BUY



The secret of this machine lies in the very small letters on the back panel which spell 'Made in Korea'. The *CC8010* is a far cry from the long ago days when Dual electronics were German made, Teutonically built, slightly offbeat and invariably rather expensive. The *CC8010* is very obviously built down to a price: it costs £109; it doesn't altogether behave like a £109 machine though...

But it is built like one. The aesthetics are very simple and rather tacky, giving something of the impression of the equivalent section of a £200 one piece midi system or similar. But there's nothing opaque about the way it's laid out or the way it works.

Somehow the press release manages to stretch the feature list over a nine point list, but in reality it could hardly be simpler. Three switches select Dolby B, C and off, another three select normal, chrome or metal tape type. Two sockets enable microphones and headphones to be connected and a large friction locked control sets record level and channel balance.

The meters run from -13 to +3dB, the latter insufficient to register peaks that are still within the useful operating ceiling of the recorder. A simple tape counter completes the tally, apart that is for the transport controls. The latter facilitate one touch record starts and free interchange between transport modes, though the system is power assisted rather than true logic-operated. Auto-stop works in all modes, in contrast to some low cost recorders. The unit is functional and uncomplicated, spoiled only by impossibly indistinct control and record level meter calibrations.

LAB REPORT

The Dual is a surprisingly competent recorder. LF head contour effects are almost absent, and high frequency performance is well extended into the treble. Frequency response linearity is excellent, especially in the case of the Type II and IV settings, where Dolby tracking integrity is good. The replay response tends to rise through the midrange, leading to a slightly bright, thin sound from

prerecorded material. Head azimuth is accurately set.

High level intermodulation distortion is low, implying decent overload margins, but IEC 0dB corresponds to the meter 0VU point, so shouldn't be exceeded too freely.

The transport performance was good enough for models rather more expensive than this one. The noise modulation (3150Hz) spectrum analysis is fairly clean, the various speed instability components being well distributed rather than bunched together at discrete points. The deck offers respectable signal/noise performance too.

SOUND QUALITY

Making its own recordings, the '8010 sounds smooth and well controlled. Particularly impressive is the way in which the frequency extremes are reproduced. The bass is tight and tuneful with all tape types - a legacy perhaps of the near-elimination of head contour effects. The treble sounds consistently neat and unobtrusive.

At the same time, there is a touch of opaqueness which detracts from the ability to resolve fine detail or to reproduce sound-stage information in a coherent manner. This aspect wasn't substantially improved by using metal (Type IV) tapes, so a good Type II is probably the best all round compromise.

The noise reduction circuits - often culpable in situations like this - in fact perform very well. Besides being accurately set up, they seem to be of decent quality too. There is some sonic advantage in using the less manipulative Dolby B, though there isn't really sufficient dynamic range to cope with a wide range of music without noise reduction.

I was gratified to discover that speed stability is excellent. There's little hint of pitch variations or erratic tape-to-head contact (which is often perceived in much the same way), though the overall mild loss of clarity is probably partly attributable to flutter.

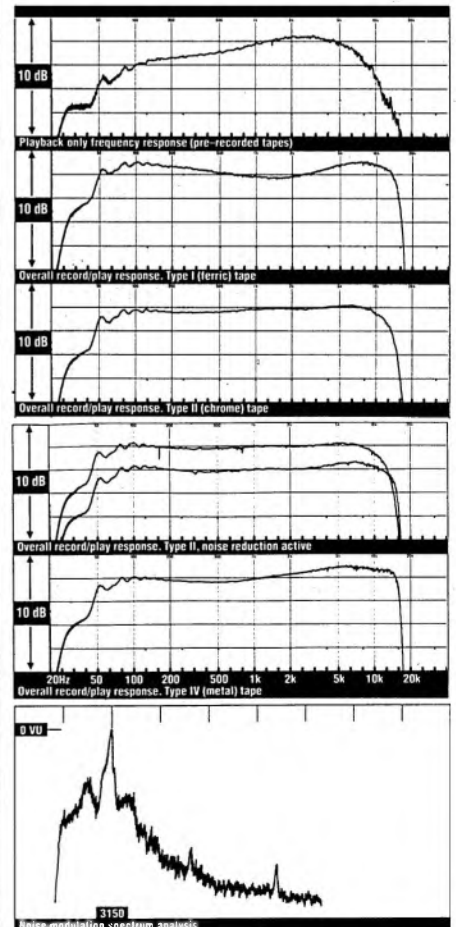
CONCLUSIONS

The criticisms are mild indeed in relation to price. The deck is simple but beautifully laid

out and has good (if rather slippery) manual transport controls. It is stable, mostly clean sounding, and therefore a clear Best Buy.

TEST RESULTS

Rec/replay response - 3dB ref 1kHz	
IEC Type I	32Hz - 16kHz
IEC Type II	44Hz - 14kHz
IEC Type IV	42Hz - 16.5kHz
Wow & Flutter - Peak DIN wtd/unwtd	0.11%/0.28%
Wow/Flutter Peak DIN wtd	0.12%/0.27%
Speed error	0%
Type I signal/noise CCIR/ARM 400Hz	50dB
distortion 0dB	1.2%
Type II signal/noise CCIR/ARM 400Hz	55.5dB
distortion 0dB	2.4%
Type IV signal/noise CCIR/ARM 400Hz	51dB
distortion 0dB	1.9%
Channel separation 0VU/1kHz	47.5dB
Line input sensitivity/overload	79mV/>7V
Mic input sensitivity/overload	0.43mV/39mV
Line output for 0dB/maximum	566mV/2.0V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	2.2%
Azimuth check R-L phase at 8kHz	0 degrees
VU indication at IEC 0dB	0dB
Dimensions (w x h x d)	44 x 11.5 x 24.5cms
Typical Retail Price	£109





NEWSLETTER

Vol. 4, No. 4 October 1988.

The Music Room is proud of its leadership in ultimate and high-end musical systems. But our goal is specific but wider than the expensive exotica. We advise and deal in all specialist and purist Hi-Fi products and systems. Our customers are people who seek value and service rather than the bogus products and incentives.

Our position of respect means that we are continuously approached by many new manufacturers or old ones with new products. We keep an open mind. For example, we could sell lots of CD changers; why people want them is not our concern, but we sacrificed these sales because the only one we knew about was based on a mechanism which produced hard sound, not music. Now TEAC and Philips plan changers, and we will keep an open mind, and ear.

TEAC have a neat product called an AD-4; looks like a double cassette deck, but one side is a CD player. The advantage is a reduction in the boxes for which you need to find houseroom, and a crafty on-board computer by which you insert a CD, a blank cassette, key in the cassette size (eg. C-90) and the AD-4 calculates the CD track sequence which will best fill side one of the cassette with the least end gap. The machine makes the transcription, automatically using the cassette deck's auto-reverse to continue on side two to complete the CD. Of course you can edit (delete certain tracks, insist on a sequence etc.). Perhaps this isn't *purist* Hi-Fi, but it is very good quality, value and ideal for those who make tapes for use in in-car.

Don't forget our in-car Hi-Fi shop, Mobile Fidelity who recommend Alpine, Clarion, Nakamichi and Soundstream frontends and amps. plus speaker systems from Infinity, KEF, JBL etc. and the sound compares to the average car

Hi-Fi as a Music Room domestic compares to a rack system. Call in at 98 Bath Street, Glasgow if you want to hear it all!

AFFORDABLE EXCELLENCE

As always, we have a constantly changing list of second-hand and ex-dem equipment, fully checked and guaranteed for six months. Our special offer this month will be of interest to the growing number of those who greatly admire the new **AUDIO TECHNICA** generation of Moving Coil Cartridges. By arrangement with AT you can have an AT-F3 for £52.95, AT-F5 for £74.95, OC-7 for £187.95 or OC-9 for £299.95 under stylus replacement service. You must send us your existing AT-moving coil cartridge, any one without a removable stylus, and we will send you post-free your new cartridge. Beware, incidentally, of a crop of imported imposter AT cartridges whose origins are being investigated.

For those considering an upgrade on **DUAL** we commend the **ARISTON Q-Deck** (£139) and the **ICON** (£219), not necessarily because of our Scottish origin – these products have won prizes and acclaim worldwide for breaking new ground in terms of performance and overall excellence! Phone for an audition. Another step up, to £299, buys the **MICHELL Syncrodek** with **Rega RB-250** tonearm: can you beat this combination for ease of use, looks and overall excellence? It is easy to believe that such a Designer work of art cannot be state of the art in sound, but your ears will delight you immediately you hear one. If you have to keep changing LP's until it comes right, then something is wrong. With this combination you know immediately that here is magic.

Our reference turntable is the **ROKSAN Xerxes** and with the new arm and cartridge, the **Artemiz** and the **Shiraz**, we look

forward to amazing more customers and friends! We have always admired the excellent turntables from **SYSTEMDEK** but our only reservations are based on slow deliveries. The model II and IIXE are outstanding value, however, and we have just received the revised IV, which features external Power Supply box and acrylic platter a la Goldmund/PT philosophy. The **Four** is a solid top-class turntable whose outstanding feature is its very fine price of £495.

AMPLIFIERS

The **Sugden A-25** is a bargain at £159. Now in its MK. II form it can be identified by its superior speaker posts and headphone jack. An extra £20.95 buys the legendary **Cyrus One Mk. II** if you can get your hands on one. **Musical Fidelity** prices are now substantially increased but these amplifiers are still well-worth considering.

Cambridge Audio received a Best Buy rating in last month's Hi-Fi Choice for the amazing **P55** at £289 which was described as "subjectively one of the best integrated amplifiers around". This elite dealer network and product is still in short supply. For £90 less, the **P40** follows on from its famous predecessor's slimline looks and superb sound. Its elite leader is Stan Curtis, so you need never worry about its electronic design being less than slightly ahead of the state of the art.

COMPACT DISC PLAYERS

Permit us to revert to the exotic products if we mention the forthcoming **Cambridge CD-1 MK. II** which is expected to sell for around £2,000 but its three-boxes of no-compromise electronics promise to retrieve the music from silver discs as never before. A less costly approach is the £599 **CD-2** which converts not only D/A but

even some CD skeptics! And more important, keeps them very satisfied even with DDD Discs long-term. Finally, less costly Curtis can be achieved with the Cambridge black boxes by which other CD Players can achieve up to 16-bit × 16 times sampling resolution.

Major CD News this month is the international launch by Philips of CD with Video! Opera buffs will be able to buy CD sound with picture quality far in excess of the best VCR, and rock fans can play the 5" discs with the feature song including its video and 20 minutes music only. Software is promised immediately and with substantial back catalogue. Prices are promised not to include the normal initial premium, and compatibility is total: all "Combi" players play all discs, including CD's and the old laservision discs. However, for £299 you can buy a **Philips CDV 285** which plays standard CD's through your Hi-Fi and the 5" Video Discs through your Hi-Fi and TV. The future is with us today!

LOUDSPEAKERS

The last components: for less than £300 you can buy remarkably fine loudspeakers. **Musical Fidelity MC2** and **Rogers LS6** are worthy contenders but have been joined by a new design from **Monitor Audio** which is always good news. The R300 MD is a £200 sealed box design and will thus perform well in small rooms. Reflex or ported design can work well, especially in the hands of competent designers (notably **Celef** and **Pro-Ac** loudspeakers and you should ask to hear their **SuperTowers** costing £1,001 and the **ProAc Studio Ones** at £505).

The budget loudspeaker for the high-end customer is still the **Magneplanar SMGa** at £675 per pair; pure genius: and we must end on this happy note before we drift up-market. More next month.

The Music Room
50 Bridge Street
Manchester M3 3BN

061-835 1366

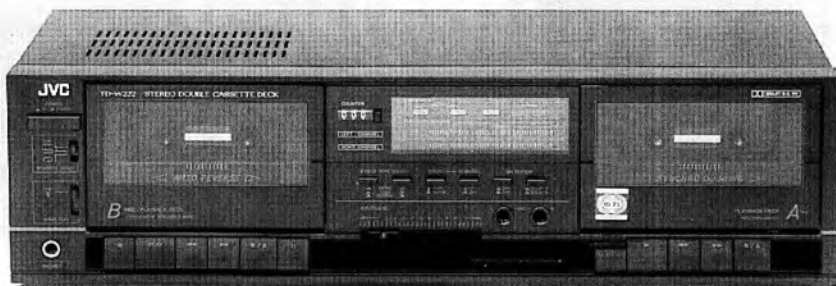
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The Music Room
221 St. Vincent Street
Glasgow G2 5QY

041-248 7221

JVC TD-W222

JVC (UK) LTD., ELDONWALL TRADING ESTATE, 12 PRIESTLEY WAY, STAPLES CORNER, LONDON NW2. TEL: (01) 450 3282.



This is JVC's latest twin mechanism deck, designed as all such are primarily for dubbing tapes. As usual this can be performed at two speeds: normal, otherwise known as real time; or double speed, otherwise known as don't.

There are few surprises, but in a general sense you could describe the *TD-W222* as well equipped but messy – surprisingly so given the quality of the company whose name it bears. There are a number of examples I could give, but none better illustrates the point than the bank of six pushbuttons amidships which control dubbing speed, tape type selection (on one of the two transports only) and noise reduction switching. Singly or collectively, they are an ideal example of how it shouldn't be done.

One of the two transports is capable of recording; it also has auto-reverse, manual tape type selection, record level setting using a single input level slider, rough and ready 5-step 16dB meters and microphone inputs. (This was the only dual deck submitted capable of accepting microphones.)

The playback only deck has auto tape type replay equalisation (the instructions say it adjusts bias and equalisation, which of course is wrong) and a simple unidirectional transport. A mechanical tape counter is fitted, but there's no memory or track search feature of any kind.

Noise reduction is by Dolbys B or C. The tape type controls are mechanical and are described as 'logic' by JVC. This normally means that you can switch (for example) straight from play to fast wind or rewind, which proved impossible with either transport; the claims seem a little short of reality. One plus feature for JVC system owners, however, is that Compu-link facilities are provided. If you don't know what this means, you don't need to...

LAB REPORT

This JVC gave badly dished frequency responses with the usual test tapes in all three tape groups. Judging by the way the responses are preserved through Dolby pro-

cessing, however, it's clear that what was measured was at least partly intentional, probably to give the sound a little artificial sparkle.

Noise and distortion results at 0VU are indicative of a mildly constrained operating dynamic range. Transport integrity of the record capable transport is mediocre, but measurably and audibly better in the forward direction than reverse. The spectrum analysis shows some thickening of the central 3150Hz line which suggests rather high wow levels.

SOUND QUALITY

In audio terms, this model is superior to the only directly competitive new model tested in this issue – the (much prettier) Sony *TC-W300* – but that isn't saying a lot.

Predictably the JVC sounds bright and edgy with almost any of the modern high energy tape formulations, and more nearly neutral with tapes similar to the old IEC II and current IEC I and IV standards – which tends to mean the lower grade and older formulations. In a way it's fitting that cheap tapes like TDK *D* or *SF* (to give two examples) should work so well in an inexpensive deck like this.

On the whole there is no practical advantage in using metals. They tend to sound rather noisy and all too readily clip the player's electronics without themselves running out of headroom. It's doubly important to choose a suitable tape when dubbing, as frequency response errors are inevitably additive.

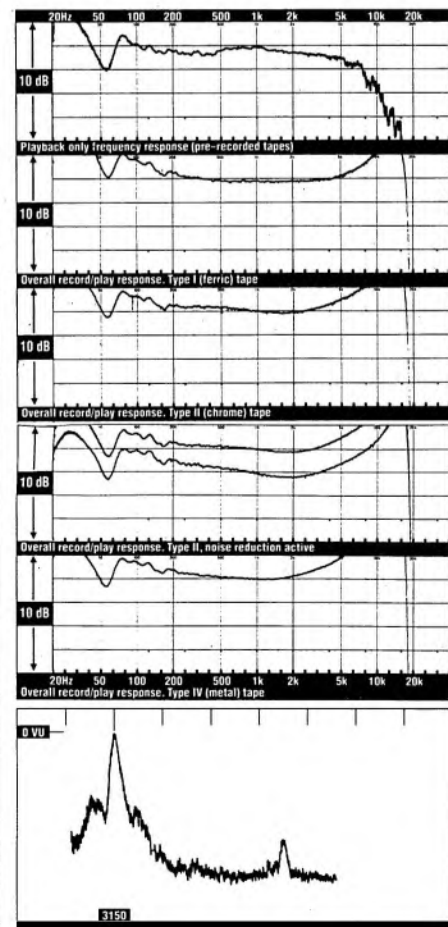
Wow and flutter was subjectively tolerable, except when dubbing where the cumulative nature of the transport irregularities began to take their toll. But even at its best, losses of definition and stereo focus are severe. The deck is perhaps at its best with prerecorded material, but (despite the evidence of the response plots) the bass and to a lesser extent the treble sound curiously restrained. However, in happy contrast to all too many decks, treble quality is clean and attractive.

CONCLUSIONS

There are worse twin transport cassette decks around, but there are better ones too. The *TD-W222* puts neither operating convenience nor sound quality first, though with auto-reverse operation it is certainly well equipped for £150.

TEST RESULTS

Rec/replay response – 3dB ref 1kHz	
IEC Type I	<20Hz – 18kHz
IEC Type II	<20Hz – 18kHz
IEC Type IV	<20Hz – 18kHz
Wow & Flutter –	
Peak DIN wtd/unwtd	0.22 (0.22)%/0.34 (0.46)%*
Wow/Flutter	
Peak DIN wtd	0.19 (0.19)%/0.34 (0.40)%*
Speed error	+1.0%
Type I signal/noise CCIR/ARM 400Hz	51dB
distortion 0dB	0.8%
Type II signal/noise CCIR/ARM 400Hz	55dB
distortion 0dB	2.2%
Type IV signal/noise CCIR/ARM 400Hz	53dB
distortion 0dB	1.2%
Channel separation 0VU/1kHz	46.5dB
Line input sensitivity/overload	14.5mV/>7V
Mic input sensitivity/overload	0.51mV/2.6mV
Line output for 0dB/maximum	518mV/2.6V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	3.1%
Azimuth check R-L phase at 8kHz	20 degrees
VU indication at IEC 0dB	3dB
Dimensions (w x h x d)	43.5 x 12 x 22cm
Typical Retail Price	£150
*(reverse direction figures)	





Nigel Kennedy listens to Nigel Kennedy on Stax headphones

STAX

THE BEST HEADPHONES IN THE WORLD

Path Group PLC, Desborough Industrial Park, High Wycombe, Bucks HP12 3BG. Tel: 0494 459981. Telex: 837134 PATH G. FAX: 0494 461209



JVC TD-V711

JVC (UK) LTD., ELDONWALL TRADING ESTATE, 12 PRIESTLEY WAY, STAPLES CORNER, LONDON NW2. TEL: (01) 450 3282.

RECOMMENDED



Only one word adequately describes this machine: wow! In a marketplace of clones, the £380 TD-V711 benefits from some highly original thinking. One example is the total removal of the Dolby circuits from the signal path when they're not in use – usually the major part of the circuit continues to conduct the audio signal regardless. Even Dolby HX Pro can be defeated and removed in this way.

The TD-V711 has separate dedicated record and playback heads and automatically switched tape/source monitoring. The transport has dual capstans, driven by a direct drive motor. Instead of solenoids, motor driven cams control the transport, in a near silent arrangement modelled on Nakamichi and Denon practice. Auto tape type recognition is supplemented by a fine bias adjustment facility. The range of up-market gadgets fitted include a headphone socket with volume control, 43dB meters with peak hold, a counter with remaining time readout and various memory and track search functions.

There are other points of at least equal interest to the audiophile. They include extensive remote control switching to minimise signal runs inside, the separation of control and audio signal areas, OFC circuit track and PC-OCC head windings, and a number of steps to reduce microphony and structural resonance. The deck also has no less than three line inputs so that various system components can be connected directly without passing through a system amplifier.

LAB REPORT

The high-tech transport endows the JVC with very fine wow and flutter test results bettered elsewhere only at much higher prices. Both wow and flutter are low individually and the spectrum analysis shows almost negligible modulation noise.

The record/replay frequency response plots were run with the bias control set to normal and using the standard test tapes. Note the way the responses hinge around 1-2kHz; this is almost completely correctable

using the bias adjust feature. Not so Dolby tracking, however. The nature of the curves shows quite strong mistracking evidently due to inappropriate Dolby level settings; this of course can't be corrected without access to the internals; the solutions are appropriate choice of tapes (see below), or re-alignment by a competent dealer.

Incidentally I ran some frequency response tests with HX Pro switched in and out, at 0VU and -15VU; both showed similar 1dB increases in output at the top end of the passband with the circuit active, which is curious since there should be little effect with simple sinewave signals at -15dB. It appears that the HX Pro circuit is in effect operating a little like a mild dynamic expansion circuit, which isn't quite the idea.

SOUND QUALITY

I made some wonderful recordings with this deck using some of the recent high grade tapes such as TDK MA-X and Sony Metal ES Type IVs, and Sony UX-Pro Type II, using Dolby B or without Dolby altogether. These tapes are especially suitable for non-Dolby recording because they can take a lot of signal without compression, leaving hiss far behind. Generally I felt the deck sounded best without noise reduction but with HX Pro. However, non Dolby recordings were often better with the more sensitive tapes simply because they side-stepped the sensitivity mismatch problem. Adjustable record sensitivity would avoid this.

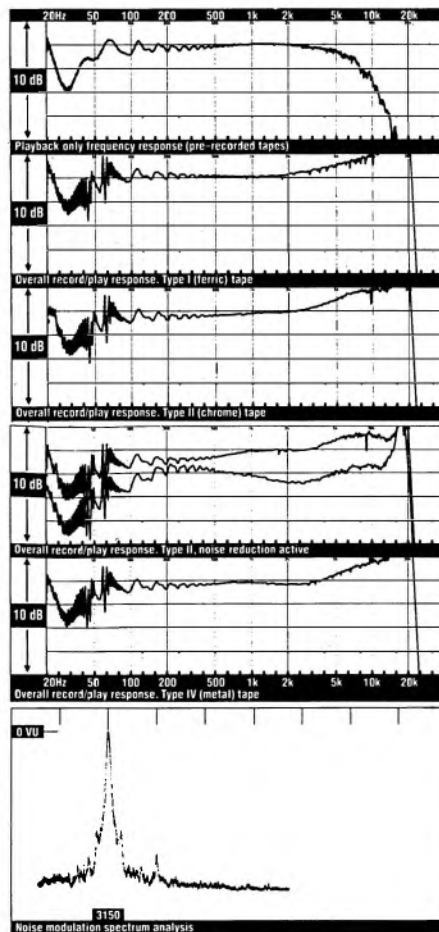
Prerecorded material replays well. There's a small loss of air and detail but nothing that isn't explicable by the parallel (and mild) loss of HF output. The deck is predictably best at playing its own recordings, however, and the overriding impression after the auditioning was that this is a remarkably stable and assured performer, with pin sharp precision, a solid bass, and complete accuracy of pitch. But there is also a slight trace of 'wispieness', a kind of emphasis on transients to the detriment of the body and weight of the sound, even though the tonal balance is to all intents and purposes flat.

CONCLUSIONS

It is possible to criticise the JVC V711, which doesn't have quite the fullness and weight of the real thing. But it does have remarkable resolving power and stability, and fundamentally doesn't sound like a tape recorder. I know of few decks so utterly free of dropout either – Recommended enthusiastically.

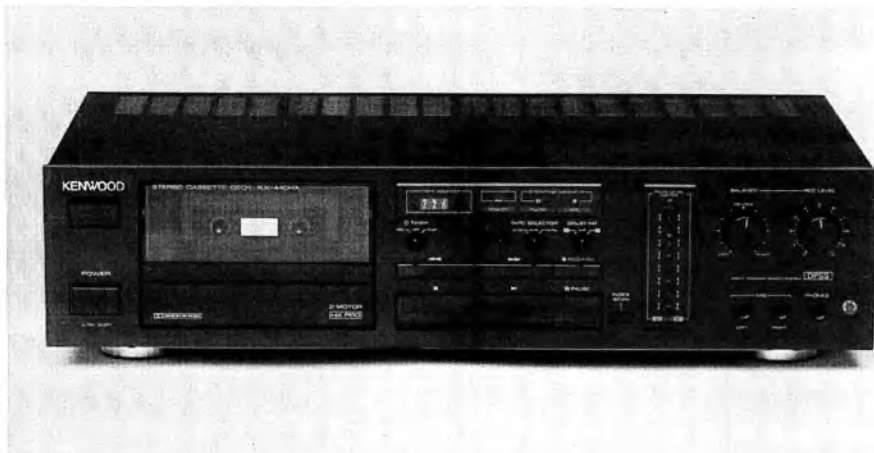
TEST RESULTS

Rec/replay response – 3dB ref 1kHz	
IEC Type I	30Hz – 21kHz
IEC Type II	30Hz – 21kHz
IEC Type IV	30Hz – 21kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.06%/0.10%
Wow/Flutter Peak DIN wtd	0.05%/0.09%
Speed error	+0.5%
Type I signal/noise CCIR/ARM 400Hz	48dB
distortion 0dB	0.48%
Type II signal/noise CCIR/ARM 400Hz	53dB
distortion 0dB	0.65%
Type IV signal/noise CCIR/ARM 400Hz	49dB
distortion 0dB	0.5%
Channel separation 0VU/1kHz	49.5dB
Line input sensitivity/overload	147mV/>7V
Line output for 0dB/maximum	510mV/4.2V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	2.5%
Azimuth check R-L phase at 8kHz	0 degrees
VU indication at IEC 0dB	4dB
Dimensions (w x h x d)	47.5 x 13.5 x 33.5cms
Typical Retail Price	£380



KENWOOD KX-440HX

TRIO KENWOOD, 17 BRISTOL ROAD, THE METROPOLITAN CENTRE, GREENFORD, MIDDX. UB6 8UP. TEL: (01) 575 6030.



This model sits at the bottom of a five strong range and in a sense represents the lowest common denominator of the others, drawing heavily on them for inspiration. The styling is just different enough from the norm to look fresh and original, but not to cause problems at point of sale. For the most part the £140 *KX-440* is simply if adequately built, but the standard of finish is really quite good – perhaps even a little better than usual.

The key selling features are intro-scan – which is not always found on decks at this price – and Dolby HX Pro, in addition to the usual Dolby B and C noise reduction. Microphones can be used with this deck, headphones likewise at fixed level only.

Intro-scan mode searches for and plays the first quarter minute of each 'track' – that is each recorded section on tape preceded by about four seconds silence. Unless action is taken within that fifteen seconds, the circuit searches out the next track, and so on *ad infinitum*. It's a useful search aid, especially in the absence of a memory counter or audible cueing, and is an excellent supplement for the track search feature which can locate tracks numbered up to 16 away from the current position.

The vertically oriented meters are very basic, covering a restricted 16dB range. The transport section is fully logic controlled and includes one touch record start. Separate record level and balance controls are fitted plus a standby switch for play/record via an external timer. Tape type recognition is manual, using a three position switch.

Presumably the Kenwood meets all relevant British safety standards, but I wasn't altogether impressed by live, unshrouded mains connections a couple of centimetres below a slotted ventilation grille which would certainly allow a knife blade to pass. I noted also that the PC board mounted line level sockets are supported by the back panel which is extremely flexible in this region.

LAB REPORT

Technically the *KX-440* is on quite strong ground. The basic prerecorded response is

flat through the midband but with some losses at high frequencies, even though head azimuth checks show no discernible error. The full record/playback cycle responses are very flat over most of the frequency range of interest; the very tiny rises at the very high frequency end seems partly due to downband ringing from the MPX filters, which have quite a sharp action just prior to the 19kHz null. There is also a suggestion that the bass end has been tailored by sympathetic tuning of the head contour effect, the result here being a quite sharp rolloff below a certain threshold frequency near 65Hz, in reality a higher cutoff frequency than many others.

Dolby B alignment is good, but less so Dolby C which gives a rather dull, distant sound (see later). The transport has quite low wow and flutter and a benign noise modulation spectrum. The various noise and distortion figures are fully satisfactory, though the +6dB meter reading for IEC 0dB level is set high.

SOUND QUALITY

I was unhappy with the sound of both prerecorded musicassettes and new recordings alike. Both are unacceptably coloured and compressed to the author's ears. Transients are badly crushed and there was little space or energy in the sound. And this from the company that has shown such a turnaround with their amplifiers in the last year . . .

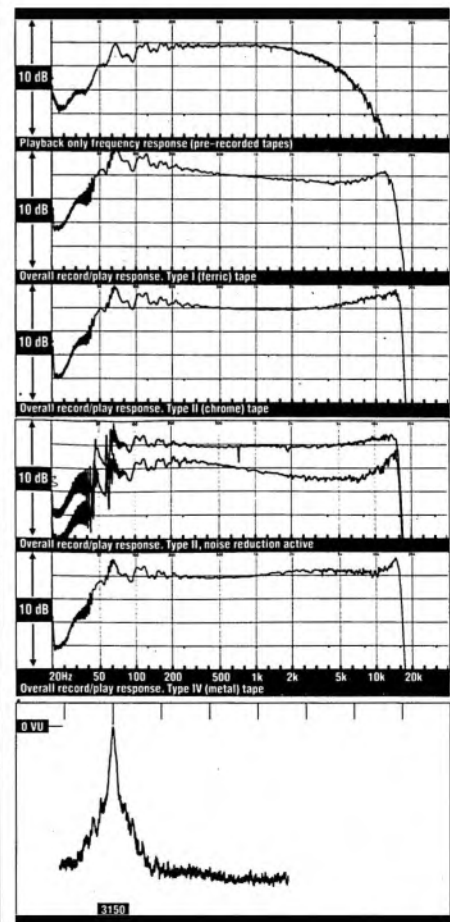
The problems certainly lie in part with the crude design of the record and replay amplifiers, but some of the blame lies elsewhere. The bass has a one-note, almost thuddy quality off tape, the sound being uneven and scrappy with significant loss of detail. In addition, there is an uncertain meandering of pitch, an effect with a quite long time constant and doubly disturbing for that reason.

CONCLUSIONS

The *KX-440HX* is not Kenwood's most successful product, even in relation to price. Neatly presented and adequately equipped, our sample at least sounded crude and lacking in stability.

TEST RESULTS

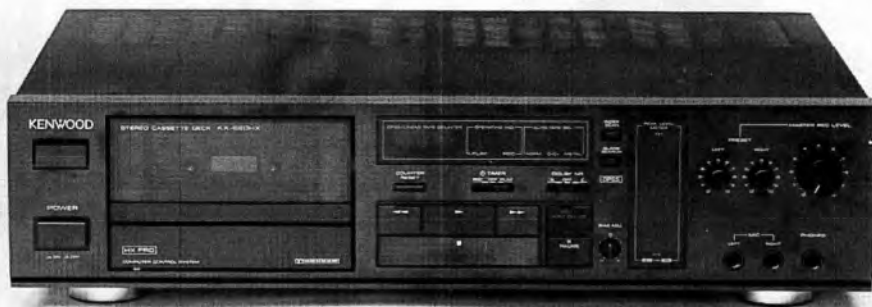
Rec/replay response – 3dB ref 1kHz	
IEC Type I	32Hz – 17.5kHz
IEC Type II	31Hz – 17kHz
IEC Type IV	39Hz – 16.5kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.13%/0.23%
Wow/Flutter Peak DIN wtd	0.09%/0.23%
Speed error	+0.5%
Type I signal/noise CCIR/ARM 400Hz distortion 0dB	50dB 1.3%
Type II signal/noise CCIR/ARM 400Hz distortion 0dB	54dB 1.7%
Type IV signal/noise CCIR/ARM 400Hz distortion 0dB	52dB 1.0%
Channel separation 0VU/1kHz	47dB
Line input sensitivity/overload	115mV/>7V
Mic input sensitivity/overload	0.66mV/16.3mV
Line output for 0dB/maximum	558mV/3.4V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	5.6%
Azimuth check R-L phase at 8kHz	0 degrees
VU indication at IEC 0dB	6dB
Dimensions (w x h x d)	44 x 11.5 x 27cms
Typical Retail Price	£140



KENWOOD KX-660

TRIO KENWOOD, 17 BRISTOL ROAD, THE METROPOLITAN CENTRE, GREENFORD, MIDDX UB6 8UP. TEL: (01) 575 6030.

RECOMMENDED



The *KX-550* reviewed in *Issue 52* has not been directly replaced; instead its place is taken by two models that flank the position the old one occupied. This £170 *KX-660HX* is the more expensive of these two new models; the other is the *KX-440* reviewed separately.

There's no shortage of choice around this price point, and Kenwood have decided to take a fairly purist view of what is desired. Some modest measures have been taken to 'rigify' (Kenwood's term) the structure against resonance and vibration, and the businesslike control system is also notable.

Like other Kenwood decks, the '660 is equipped with Dolby HX Pro which to a first approximation has the effect of linearising (my term) the high level, high frequency performance of lower bias tapes. Noise reduction is courtesy of the ubiquitous Dolby B and C.

Twin 6.3mm microphone sockets are fitted alongside the fixed level headphone socket. Tape type recognition is automatic, and bias levels may be adjusted on all three tapes. The electronic tape counter reads in minutes and seconds, which makes searching a tape a more than usually intuitive task. There is no memory stop feature, but a number of alternative tape search facilities include track search (up to 16 tracks in either direction), blank search and index scan (which plays a few seconds from the start of each track in turn). These combine to form a powerful set of tools for this often tedious task.

The main user interface is unusually well designed. The transport controls are disposed in a block with the fast wind controls flanking 'play' and surmounting an oversize 'stop' key. One-key record starts are possible. Input level controls consist of two variable controls for each channel described as 'presets', and a third large master gain control which enables fades to be easily made. The meters are excellent, high resolution, two-colour vertical columns, scaled clearly from -20dB to +12dB.

LAB REPORT

The transport is plainly a good one. It produced some excellent figures for a sub-£200 model on test, though some fairly low level capstan wow artefacts are visible on the plot, and some high frequency components too.

The metal and ferric (Type IV and I) record/replay frequency responses are all perfectly smooth and flat up to 5kHz, but the Type II curve is on the rise from below 2kHz. A little extra bias from the front panel control is enough to more or less correct matters, and this should be adjusted for similar perceived source and off-tape tonal balance - using FM interstation noise, for example. The Dolby plots look acceptable enough, but more detailed examination suggests mild misalignment.

Head azimuth is correct, and prerecorded tapes are accurately reproduced. IM distortion is low. Note that the IEC OVU level is set high, at +4dB on the meters, which means that recording levels can be set a little higher than usual.

SOUND QUALITY

Prerecorded cassettes sound coloured, with a strangely thin, hollow bass and a slightly metallic 'enclosed' mid and top - clear and detailed enough, but plainly invented and obviously synthetic.

The *KX-660* rates rather better as a recorder. Adjectives culled from the listening notes include 'good', 'tight', 'dynamic', 'forceful' and 'fairly detailed'. The precision and stability suggests that modulation noise is low, and there's little waffle or muddiness.

I found the deck varied and interesting to listen to, predictably more so with Dolby B than with C which tended to sound slightly coloured. Noise levels are generally too intrusive to allow use without noise reduction, not just because of the absolute level of hiss but also due to its character which was a little sharper than usual.

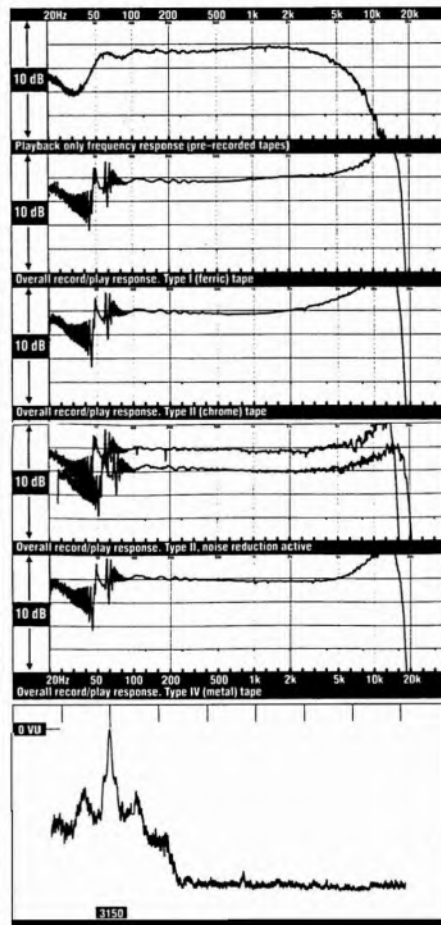
CONCLUSIONS

The *KX-660HX* is one of the better decks in its

market sector. It is stable and well focused and works consistently well with a wide variety of blank tapes. Recommended, except for those with a large collection of music cassettes.

TEST RESULTS

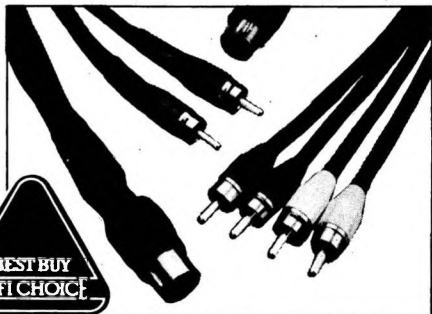
Rec/replay response - 3dB ref 1kHz	
IEC Type I	30Hz - 17kHz
IEC Type II	30Hz - 17kHz
IEC Type IV	30Hz - 17kHz
Wow & Flutter - Peak DIN wtd/unwtd	0.08%/0.23%
Wow/Flutter Peak DIN wtd	0.06%/0.20%
Speed error	+1.0%
Type I signal/noise CCIR/ARM 400Hz	46.5dB
distortion 0dB	1.1%
Type II signal/noise CCIR/ARM 400Hz	51.5dB
distortion 0dB	0.7%
Type IV signal/noise CCIR/ARM 400Hz	50dB
distortion 0dB	0.7%
Channel separation 0VU/1kHz	49.5dB
Line input sensitivity/overload	121mV/>7V
Mic input sensitivity/overload	0.62mV/32mV
Line output for 0dB/maximum	560mV/2.6V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	1.3%
Azimuth check R-L phase at 8kHz	0 degrees
VU indication at IEC 0dB	4dB
Dimensions (w x h x d)	44 x 11.5 x 32.5cms
Typical Retail Price	£170



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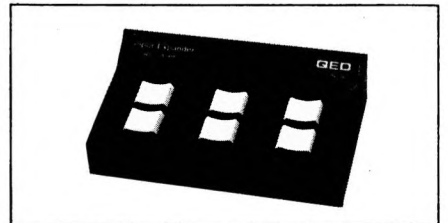
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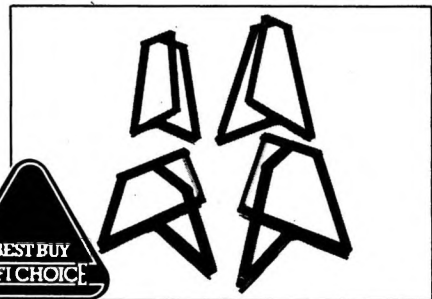
Input Expander



As the name suggests, the IX 4 is designed to expand both the 'tape' and 'line' inputs of a 'minimum facilities' pre-amplifier or integrated amplifier. Provision is made for the connection and control of two tape decks, with full record, playback and tape to tape functions, plus two line inputs. The line inputs are marked 'video' and 'aux/C.D.'.

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LUXMAN KD-117

HW INTERNATIONAL, 3-5 EDEN GROVE, LONDON N7 8EQ. TEL: (01) 607 2717.



It's nothing short of uncanny the way half a dozen companies have taken a revolutionary product like DAT and independently come up with almost identical visions of how it should be packaged for sale. Happily, this ultra-slimline Luxman unit, which looks even more like a CD player than most other DAT recorders, is very much an individual in what is fast becoming a field of clones.

Inevitably, there's nothing unusual about the basics. The machine supports playback at 32, 44.1 and 48kHz, and will record from a digital datastream at 32kHz (largely academic until we have digital satellite radio) and 48kHz but not, of course, CD's 44.1kHz. There are more rear panel sockets than usual, with two line level inputs (one labelled CD with its own preset input gain), a switchable low pass filter (at 22kHz), and two digital inputs (one optical and one electrical). The output side is almost identically equipped, with extra output sockets so a CD player channelled through the recorder can be fed to a system amplifier.

Selections can have start and skip IDs assigned manually or automatically, or dubbed from a digital master tape for that matter. Search facilities include direct track access, repeat play, a 24-track programme memory and index scan. A full feature remote control is included, and slightly less usual features include a switch which allows two recorders to be addressed independently from the one handset. There is also a thermometer style remaining time indicator, and an adjustable threshold level for the track search feature which controls automatic track ID and numbering.

There were minor problems and shortcomings. Fast winding is about 20 per cent slower than the other decks on average, especially when running past unrecorded tape, and the main transport controls engaged erratically and sometimes not at all. When it did work, it was often without any explicit sign from the machine to suggest what it was doing. Also the track numbering circuitry placed start IDs in places other decks ignored, which could prove annoying.

LAB REPORT

The Luxman has messy looking internals partly due to a complex wiring harness' which seemingly join every corner of every PC board to every other. A multi-board design, the main boards are for analogue (screened) and power supply components which are sited below the digital board. Sony chips are much in evidence, but the converters are Burr Brown *PCM56P* 16-bit types, one for each channel. Good quality capacitors include Cerafin electrolytics in the audio section. The power section has no fewer than eight 10,000µF caps, all fed from a single transformer to form a multiplicity of supplies to feed the various circuit blocks.

The inter-channel phase difference at high frequencies suggests a time-shared DAC or ADC system, in this case apparently the latter. THD figures are good at all levels but intermodulation distortion is higher than average. The overall frequency response shows a little ripple and significant bass and treble shaping. Noise measures about average but ultrasonic spurious are exceptionally well suppressed, indicating a heavily filtered output. Low level resolution is good, the -90dB sinewave reproducing well, giving 15.8-bit resolution. The emphasis applied when recording gives about 10dB boost at 20kHz ref 1kHz.

SOUND QUALITY

Assessed with the low pass filter disabled, which gave the best results, the higher than normal subjective noise levels are audible behind quiet passages, partly because the hiss had a sharp, almost aggressive quality. The inky black silences that characterise digital audio at its best were not always present here.

The Luxman was initially impressive, mostly because it had good control and projection. But it was also clear that there was considerable smothering of fine detail. It was responsible for some smearing effects and tended to sound rather bland and unsubtle. The *KD-117* produced a big soundstage but

one that lacked specificity and focus.

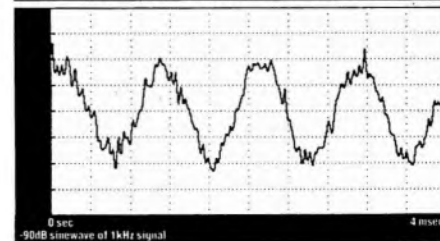
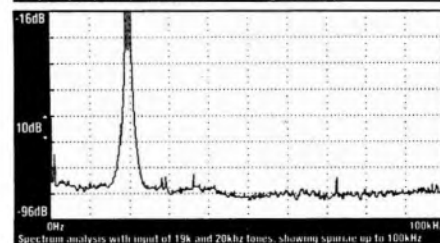
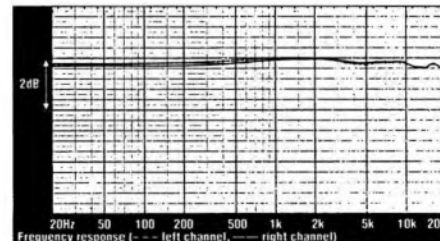
CONCLUSIONS

The Luxman is physically unobtrusive and has some novel minor features which will be useful in certain situations. I cite its unusual interfacing potential and the ability (useful in logging set-ups perhaps) to address two recorders from one remote handset. Musically, however, it tends to waffle, and the sound is a little coloured and glutinous.

TEST RESULTS

Channel balance	20Hz	1kHz	20kHz
	0.21dB	0.12dB	0.04dB
Channel separation	82/106dB	85/97dB	80/86dB
Channel phase difference	0°	4°	75°
Total harmonic distortion inc noise, 20kHz bandwidth			
0dB	86dB	87dB	83dB
-10dB		78dB	
-60dB		41dB	
-80dB		20dB	
Intermodulation distortion			
L + R (0dB, 19kHz/20kHz)			70dB
L + R (-10dB, 19kHz/20kHz)			73dB
Frequency response			
L	-0.25dB	0dB	-0.84dB
R	-0.26dB	0dB	-0.77dB
Output level 0dB			2.02V
Output impedance			370ohms
Mechanical noise			low
Signal/noise ratio (no emphasis unwt'd)			89dB
CCIR/ARM wtd (ref 1kHz)			84dB
Spurious to 100kHz			-110dB
Resolution (linearity) at -90dB L/R			89.2dB/89.2dB
Headphone socket/output impedance			yes, variable 133ohms
Line in impedance (kohm)			46kohms
Line sensitivity/overload			100mV/>7V
Dimensions (w x h x d)			43.8 x 8.3 x 34.5cms
Typical Retail Price*			£1500

*This machine is not yet officially available from Sony UK; the price quoted is an estimate from DAT specialist Playback, of Percy Street, London W1, on the likely European price.



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RECOMMENDED



NAD tell me that they suffer from a 'perceived value' problem with this 3-head Dolby B/C remote control deck – there are too few controls and displays to justify the price in many people's eyes. Perhaps many people have problems with their eyesight...

General reaction to the appearance is positive: the NAD has a discreet charm and a splash of originality unique amongst the decks submitted this year (originality often is unique, I have found). It also has some surprises. Dolby HX Pro is combined with *Dyneq* processing to improve working dynamic range. And something called *Play Trim* can adjust the replay equalisation applied to old or incorrectly processed tapes, but does so *inside* the Dolby replay loop which reduces the processing required by a half.

Dyneq is a recording limiter which operates on high level HF signals to prevent them causing LF intermodulation. It does so in conjunction with Dolby HX Pro, and is designed to work only when the system would otherwise be in clip.

The NAD is a superb ergonomic design, my only criticisms being that the power switch should be further away from the cassette door open button, and that the (28dB high resolution) record level meters are too bright. Elsewhere NAD has managed to keep the control count as low as practical – the MPX switch is on the back panel for example. Sensible grouping and the imaginative use of colour and control style makes the deck as near intuitively obvious to use as possible.

Elsewhere, the electronic counter has a real time option, and tape and Dolby switching use sensible lever switches. But I do miss a memory counter and automatic tape recognition, not to mention the almost inevitable headphone socket. The transport accommodates 'punch-in' recording, and the cassette well is illuminated. The remote control addresses the main transport features including 'record', and a full NAD system remote handset will be available soon (it says here).

For car cassette users in particular, the deck features a switchable compressor to

reduce recorded dynamic range, and so make quiet passages more audible in an environment with inherently high background noise.

LAB REPORT

The '6300 aims to offer low scrape flutter and good speed stability, and achieves these ends in some style. The transport is a dual capstan diffused resonance design (shades of Nakamichi) of a quality level that doesn't grow on trees. The wow and flutter figures are remarkably fine (0.05% DIN Wtd), and the noise modulation spectrum is sharp and clean, albeit with some discrete sidebands at very low level.

Remarkably well extended at both ends of the passband, the response curves all show a sharp, high Q lift at high frequencies which is not completely correctable by bias adjustment. The playback response shape is good at the normal setting of the play trim control, and the effect of minimum and maximum settings have also been included for information.

SOUND QUALITY

Dyneq works rather well. It can be treated almost like an auto-level control circuit, and is very nearly undetectable unless you know what you're listening for. It can be cracked if the deck is really abused, but with common sense one is free to use very high record levels without compression, tape noise virtually disappearing at the other end of the volume spectrum. This facilitates purist non-Dolby recordings which in turn help retain that much more of the life of the original.

The sound of this deck is quite distinctive. Not wholly neutral, it has a rounded kind of feel. The HF end isn't as open or as airy as the best, and the '6300 never sounds as detailed as some. But the sound picture is remarkably homogenous, with excellent dynamics and a truly 3-D quality rare from cassettes. Image stability and separation are remarkable.

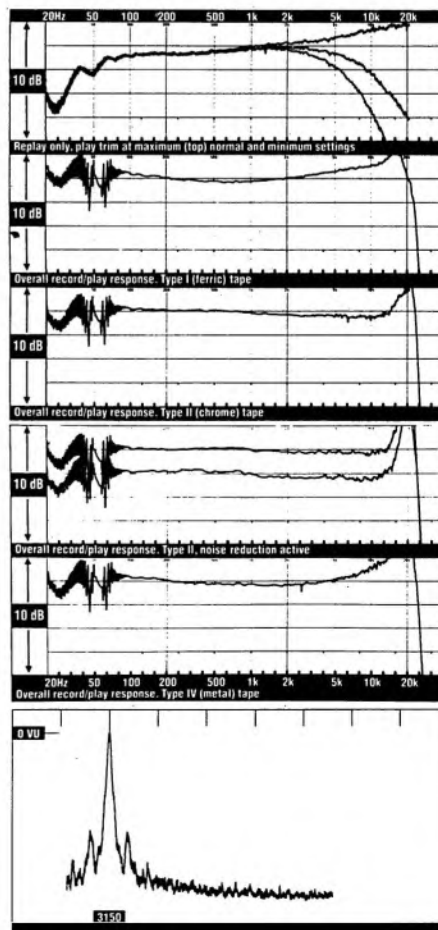
CONCLUSIONS

This is the nearest thing to a minimalist audiophile low-spec recorder this side of

some of the best Nakamichis. The hefty price can only be justified by the sound; Recommended, but I feel bound to suggest it's a bit overpriced.

TEST RESULTS

Rec/replay response – 3dB ref 1kHz	
IEC Type I	<20Hz – 22kHz
IEC Type II	<20Hz – 22kHz
IEC Type IV	<20Hz – 22.5kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.05%/0.09%
Wow/Flutter Peak DIN wtd	0.04%/0.08%
Speed error	+0.75%
Type I signal/noise CCIR/ARM 400Hz	52dB
distortion 0dB	0.6%
Type II signal/noise CCIR/ARM 400Hz	56dB
distortion 0dB	1.2%
Type IV signal/noise CCIR/ARM 400Hz	53dB
distortion 0dB	0.8%
Channel separation 0VU/1kHz	47.5dB
Line input sensitivity/overload	52mV/>7V
Line output for 0dB/maximum	562mV/2.3V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	0.8%
Azimuth check R-L phase at 8kHz	20 degrees
VU indication at IEC 0dB	1dB
Dimensions (w x h x d)	43.5 x 12 x 28cms
Typical Retail Price	£649



NAKAMICHI RX-202E

NAKAMICHI B&W (UK) LTD., MARLBOROUGH RD., CHURCHILL INDUSTRIAL ESTATE, LANCING, WEST SUSSEX. TEL: (0903) 750750.



Nakamichi has taken two bites at the twin problems posed by auto-reverse operation – lack of stability of the head block and azimuth integrity (errors here tend to be additive, with Side B worst affected). The most exotic solution is found in the *Dragon* which combines elaborate construction with variable azimuth, adjusted by a servo system to maximise HF response. The *RX-202E*, by contrast, is a classic application of lateral thinking: the whole cassette rotates! The reversing mechanism is extremely rapid, leaving a gap of around half a second at the end of side, though Nakamichi throw this advantage away by omitting infra-red sensing of the tape/leader join.

The remaining facilities are very much on a par with other, older Nakamichis – this is not amongst their most recent designs. The roll call consists of Dolby B and C (with independent MPX switching), an electronic memory counter, and niceties like automatic two speed fades and blank skip. Headphones may be connected with volume adjustment using a level control wired into the main output. The only inputs are at line level, and the record levels meters cover about 37dB. One neat touch is a single key record start feature for the current or opposite other side of the tape, operative from any part of the tape.

But no such simple list of features can do the deck justice. Apart from the oddball auto-reverse mechanism, what sets this deck apart are the incredibly smooth controls and the almost eerie silence with which the cam operated transport goes about its business. Unfortunately it doesn't take long to find the snags either. The design of the control system is typically idiosyncratic. I cite the tape and Dolby switches which are particularly obscure – this deck is for fans only!

LAB REPORT

Lab performance is excellent in parts. The Type I and II record/replay plots, for example, are remarkably accurate and well extended, whilst the Type IV curve only shows a small (2dB) boost at 20kHz because the deck is set up for older style metal tapes

closer to the original (and now outdated) IEC Type IV standard.

Dolby calibration is for tapes a couple of dB less sensitive than the new IEC standard tapes used for the tests, so the deck should be readjusted to take current tape technology into account, preferably at the factory. However, any competent Nakamichi dealer ought also to be able to make these adjustments since the deck is liberally endowed inside with the various presets for all parameters affecting tape matching.

The replay only result shows a slightly bright overall balance but an early treble rolloff (the two are not contradictory). The various signal/noise and distortion readings are fine: high level intermodulation is especially low, which is a tribute to the quality of the record and replay amplifiers. Speed stability on the other hand is plain OK, with a suggestion of capstan wow and other resonant effects somewhat reflecting the age of this design.

SOUND QUALITY

This Nakamichi was a remarkably effective tool for reproducing prerecorded cassettes. As a foretaste of how it was to behave as a recorder, the deck displayed remarkable focus and dynamics. Transients seemed to rise from a base of absolute silence rather than the kind of murky greyness more usual with cassettes, and tonal colours were just that for once – vivid, varied and above all colourful.

The lack of proper Dolby C compatibility afflicted all the tape types tried to a greater or lesser extent. But type B noise reduction was less influenced, and indeed left the deck sounding vital and lively, with little loss of resolution or transient attack – it's the transients that often seem most seriously affected by noise reduction circuits.

Findings parallel those for prerecorded material. The deck is remarkably lifelike and rewarding by cassette standards, and tends to be free of that indefinable cloying 'something' that so often marks down the compact cassette medium. Bass depth and power are

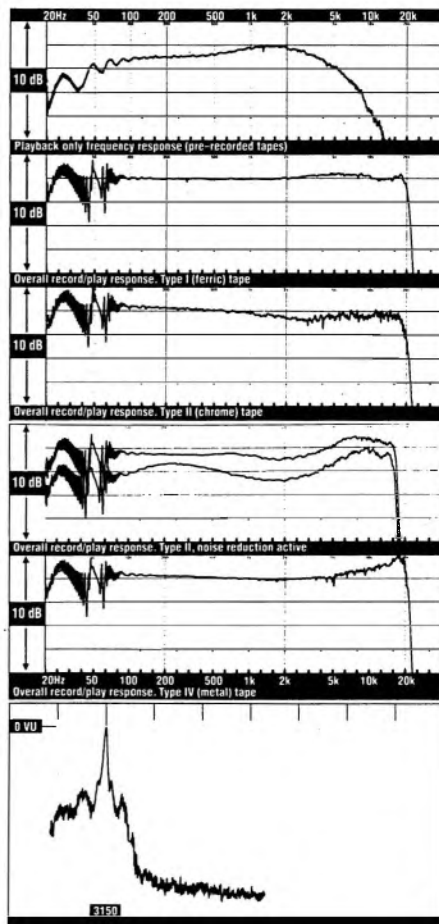
particularly un-cassette like and undoubtedly help a lot.

CONCLUSIONS

Allowing for some necessary setting up, the very high standard of audio performance outweighs the many idiosyncrasies. This deck has real personality – Recommended.

TEST RESULTS

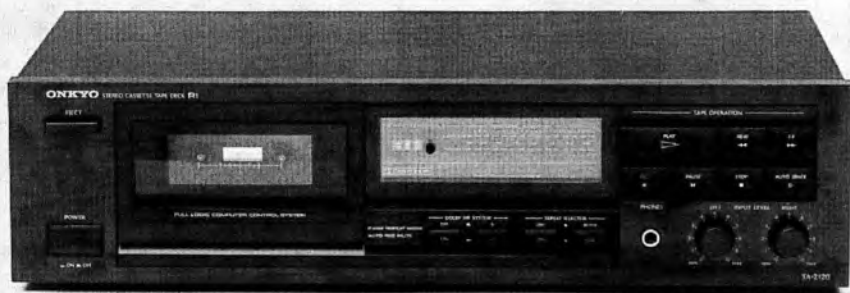
Rec/replay response – 3dB ref 1kHz	
IEC Type I	<20Hz – 21kHz
IEC Type II	<20Hz – 20kHz
IEC Type IV	<20Hz – 21kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.12%/0.23%
Wow/Flutter Peak DIN wtd	0.09%/0.24%
Speed error	+1.5%
Type I signal/noise CCIR/ARM 400Hz distortion 0dB	50dB
Type II signal/noise CCIR/ARM 400Hz distortion 0dB	1.2%
Type IV signal/noise CCIR/ARM 400Hz distortion 0dB	56dB
Channel separation 0VU/1kHz	1.7%
Line input sensitivity/overload	53dB
Line output for 0dB/maximum	0.95%
IM distortion 1kHz, ref 10kHz/11kHz 0dB	47dB
Azimuth check R-L phase at 8kHz	76.5mV/>7V
VU indication at IEC 0dB	660mV/3.0V
Dimensions (w x h x d)	0.7%
Typical Retail Price	0 degrees
	3dB
	45 x 13.5 x 25.5cms
	£545



ONKYO TA 2120

NATURAL SOUND SYSTEMS, AXIS 4, RHODES WAY, WATFORD, HERTS WD2 4YW. TEL: (0923) 226499.

RECOMMENDED



The TA-2120 is a neatly engineered deck, realistically priced at around £120.

This Onkyo has automatic tape type recognition and Dolby B and C noise reduction. The record level meters have only seven steps covering a limited 21dB dynamic range, and the deck has a standard mechanical (non-memory) tape counter. Nothing unusual here.

What is vaguely unusual is the two way repeat feature, which either repeats whole sides or specific music blocks whose end points can be randomly assigned. There is also an auto-space feature which inserts five second blank passages onto tapes at the press of a single button - but it's rather stranded without the automatic track search feature for which auto-space was originally designed.

The rest is standard stuff. Input level is controlled by adjacent twin rotaries which doesn't make ganged stereo fades too easy. The only input is at normal line level; microphone users will have to use an outboard preamplifier or look elsewhere.

If plumbed into certain Onkyo systems, the 2120 can be remotely controlled using a serial data link. The rest of us will have to spoon feed it in the time honoured fashion. Not that that's much hardship; the transport controls are very clearly laid out and fully logic interfaced to avoid tape scatter or tangling when changing modes without passing through 'stop'. The control solenoids engage noisily, but the transport itself is as sweet as a nut.

LAB REPORT

Measurements give relatively few clues to the qualities of this deck. They suggest a competent machine but certainly not an outstanding one. Low and middle frequencies are accurately handled, with the small deficiencies on the Type II and IV plots of little real consequence and largely determined by the brand of tape employed. Dolby processing leads to only very tiny undesirable response modifications.

Wow and flutter is perfectly satisfactory

for a deck in this price range, the flutter analysis showing few discrete components that are likely to be audible. High level intermodulation distortion is very low and signal/noise ratios usefully large; consequently this deck is capable of a usefully wide operating dynamic range. Head azimuth is accurately set.

SOUND QUALITY

Within certain limits the TA-2120 turns out to be a first rate performer, easily on a par with some of the better models up to, say, £150. The limits are defined partly by tape suitability: the Onkyo isn't particularly well suited to metal (Type IV) tapes; even correctly biased types such as TDK MA sound a little hard and lacking in hear-through clarity. It could be that such tapes demand more than this deck can give, since the problem is simply not evident with lower bias tapes.

Another point that soon became obvious was that Dolby noise reduction did few favours to this Onkyo. Both species of noise reduction had the similar effect of sapping the sound of vitality and dynamics.

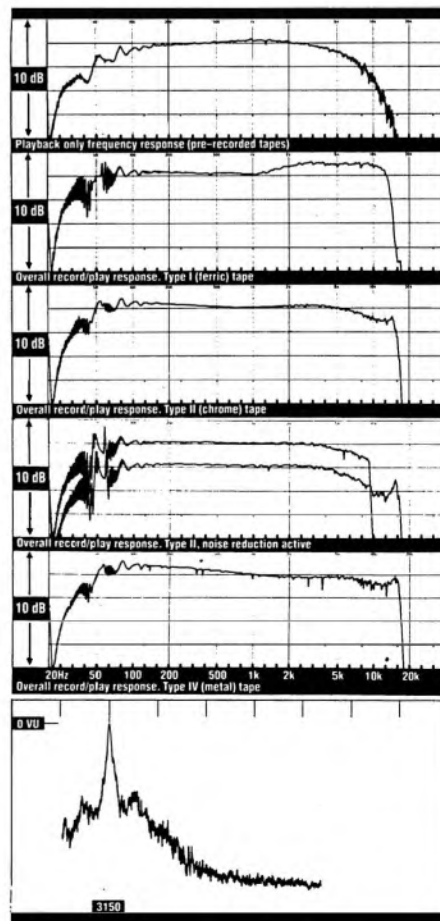
Without Dolby processing and used with a good Type II tape, the 2120 is capable of surprisingly vivid and lifelike music making. Dynamics are strong and stereo imagery is surprisingly specific and stable. Pre-recorded tapes are also handled with some subtlety and aplomb, putting the seal on a low cost deck with a touch of distinction.

CONCLUSIONS

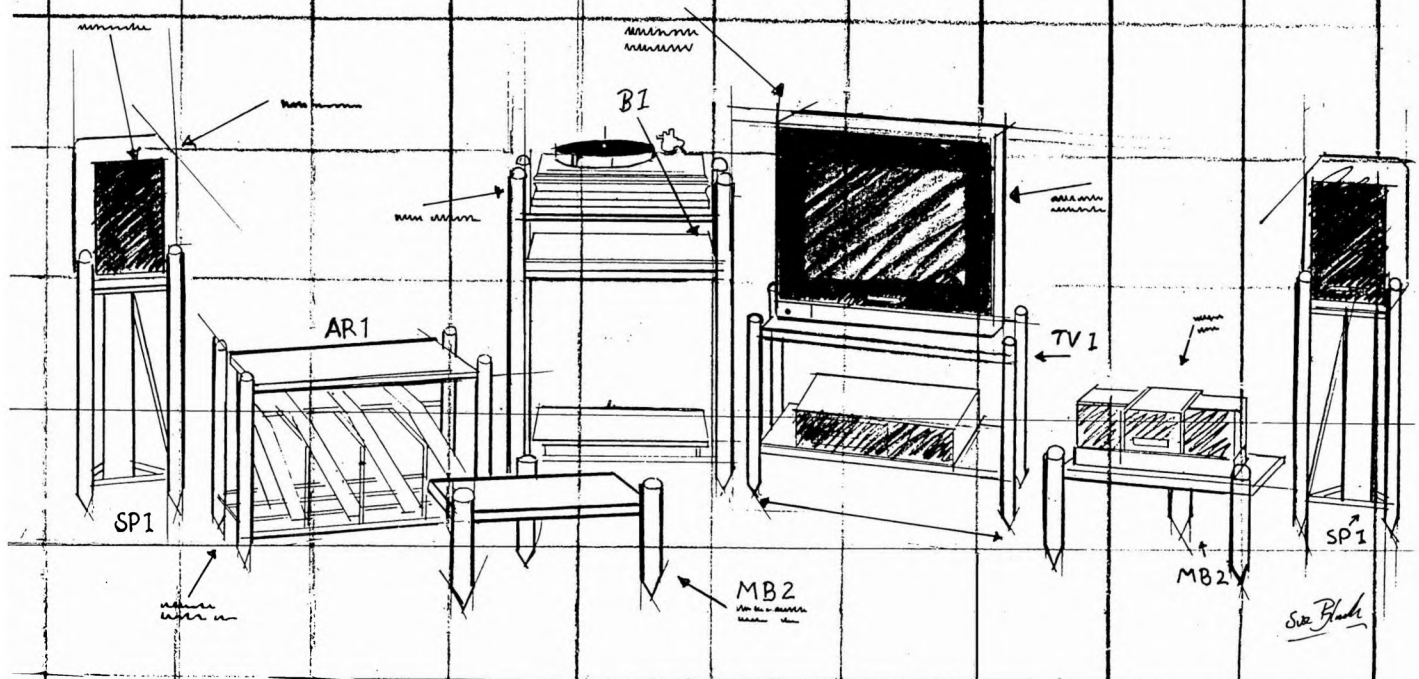
Scarcely an elegant recorder and with only very average facilities, the Onkyo is nevertheless surprisingly satisfying on audition. Not at its best with metal tapes, the noise reduction circuits also proved something of a liability. Underlying these limitations, however, is a fine, articulate sounding recorder and a clear candidate for Recommendation.

TEST RESULTS

Rec/replay response - 3dB ref 1kHz	
IEC Type I	25Hz - 14kHz
IEC Type II	25Hz - 16kHz
IEC Type IV	25Hz - 17kHz
Wow & Flutter - Peak DIN wtd/unwtd	0.16%/0.31%
Wow/Flutter Peak DIN wtd	0.12%/0.25%
Speed error	+0.75%
Type I signal/noise CCIR/ARM 400Hz	53dB
distortion 0dB	1.0%
Type II signal/noise CCIR/ARM 400Hz	58dB
distortion 0dB	1.2%
Type IV signal/noise CCIR/ARM 400Hz	55dB
distortion 0dB	2.1%
Channel separation 0VU/1kHz	47dB
Line input sensitivity/overload	70mV/>7V
Line output for 0dB/maximum	630mV/2.8V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	2.2%
Azimuth check R-L phase at 8kHz	0 degrees
VU indication at IEC 0dB	0dB
Dimensions (w x h x d)	43.5 x 11.5 x 26.5cms
Typical Retail Price	£120



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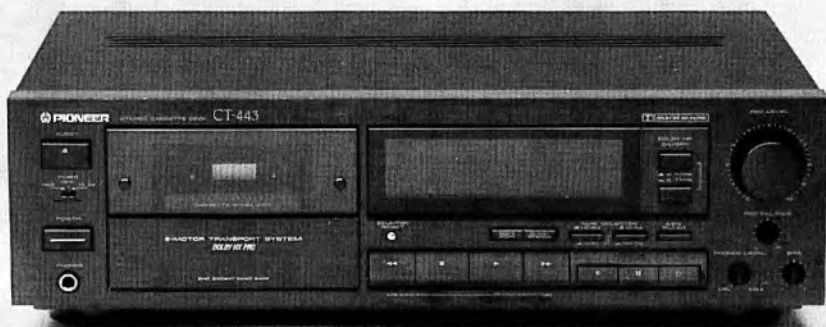
Tel: 041-954 5585 or 041-959 6351 Tlx: 776563

Daniel Lamb & Co. Ltd.
157, Curle Street, Glasgow

PIONEER CT-443

PIONEER HIGH FIDELITY GB LTD., FIELD WAY, GREENFORD, MIDDX UB6 8UZ. TEL: (01) 575 5757.

RECOMMENDED



Lower down the pecking order than the CT-737 comes this expensive looking £180 three-head Pioneer deck known as the CT-443. Like its larger sibling, it includes rudimentary (cf. Aiwa XK-009) cassette shell damping and other anti-resonance measures designed to reduce microphony in the player itself.

The deck is Dolby B and C equipped and has non-switchable Dolby HX Pro headroom extension circuitry. Like other recent Pioneer designs, the 443 has an attractive display with a range of simple function tell-tales, an electronic tape counter (but no memory!), and two colour 28dB meters which are both clear and offer good resolution.

The display also shows what kind of tape has been selected and Dolby status (including Dolby HX Pro for some inscrutable reason). But there are some useful gadgets, to wit 'index scan', which looks for and plays the first 12 seconds of each track until over-riden; 'blank search', which finds the end of a recording so that a new one can be made; and a track search feature. For recording itself the deck permits fine control over bias, and defeatable MPX filtering.

There are some nice features here then, but also some unfortunate shortcuts, probably thought necessary in the designers' (marketing departments?) desire to include some extra facilities to fill out the 'perceived value' side of the equation. Examples include unfriendly Dolby B/C switching based on dual dependent switches and badly designed manual tape type switching in place of auto tape sensing. Though logic controlled, the transport is rather noisy, but it's arguably unfair to expect much more at this price level.

LAB REPORT

The playback test tape was reproduced adequately enough, and with the fine bias control centred, the three main record/replay frequency responses were all contained within a ± 1 dB envelope from under 50Hz to above 15kHz. In each case there's a tendency towards a slightly 'dished' shape which is

probably responsible for the mild 'loudness' effect noted when listening. The two higher bias positions are most affected, and the application of Dolby - quite well aligned in this recorder - naturally exaggerated the effect. Of course the fine bias adjustment is tailor made to ameliorate this kind of situation.

Wow and flutter is quite good, though the highish unweighted figure shows the presence of quite a bit of energy towards the outside of the weighting curve - note the 'shoulders' in the spectrum analysis. The 443's noise figures are between 1 and 3dB below average, and the speed error is surprisingly large.

SOUND QUALITY

This Pioneer runs perceptibly fast, and the pitch change may well be unacceptable in certain cases. Some people are naturally sensitive to pitch, and others may want to be able to play a properly tuned live instrument alongside a commercial tape (never mind why).

Prerecorded tapes lack top end 'bite', but the underlying quality is good - bass definition is fine and there is little obvious smothering of detail.

The record/playback cycle sounds dynamically rather neutered. The Pioneer never really sounds as potent and meaningful as the source, but it does have something ultimately more important perhaps - subtlety. In comparison with similarly priced decks, the 443 has a natural expressiveness, good resolving power and a good if mildly imprecise stereo soundstage width and depth.

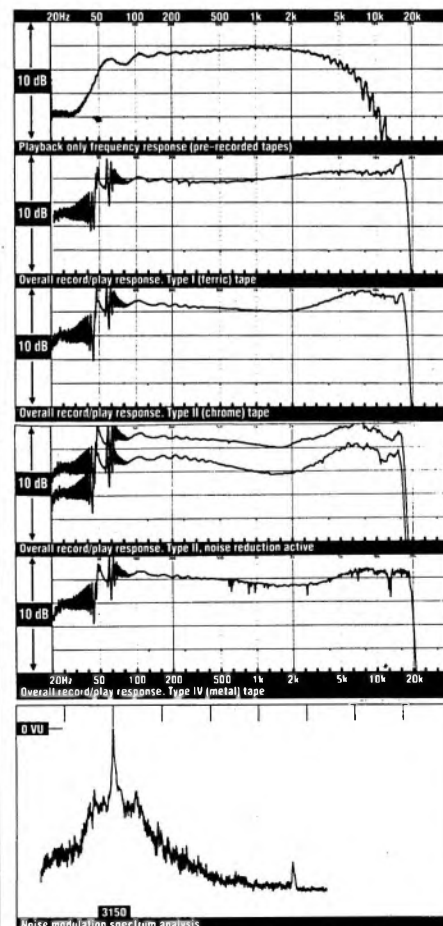
There was never anything obvious or pointed about a sound which instead offered a taste of quality more frequently found with considerably more expensive decks than this one. The 443 also made good use of lower bias tapes, and created the impression that the HX Pro circuitry really meant something in this case. The two noise reduction circuits are reasonably transparent, but the C circuit was predictably responsible for some added sonic damping.

CONCLUSIONS

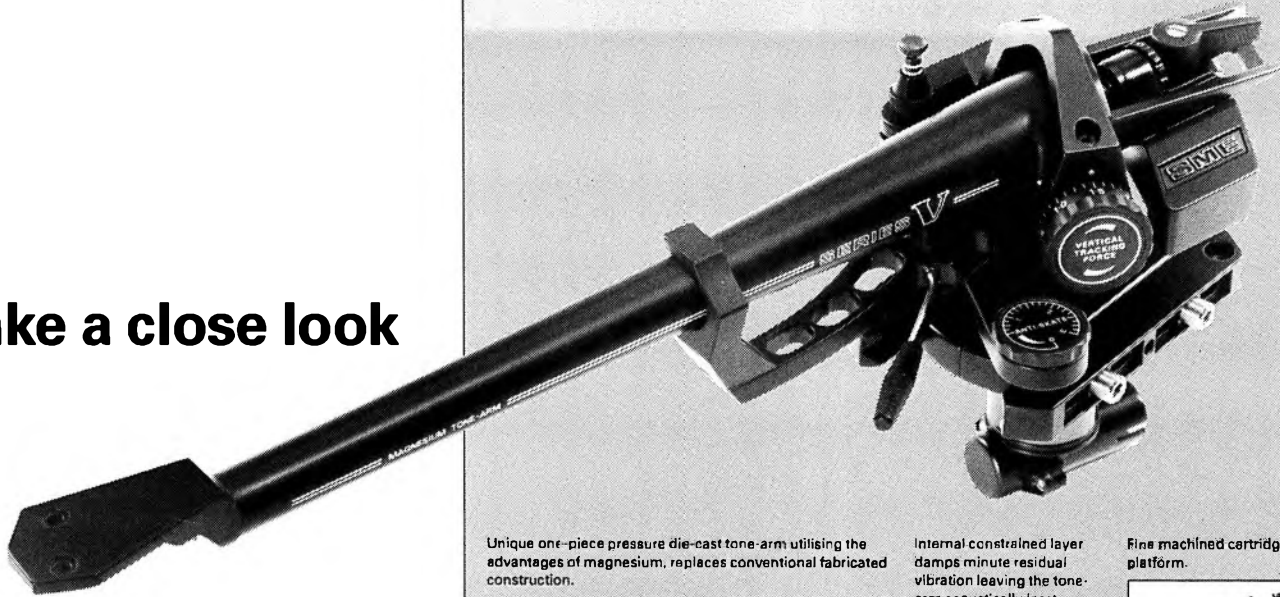
Prerecorded cassette enthusiasts should beware the speed error, but in most other respects the Pioneer CT-443 is rather more than you'd expect at the price. It offers a real touch of class, and readily justifies recommendation.

TEST RESULTS

Rec/replay response -3dB ref 1kHz	
IEC Type I	30Hz - 18kHz
IEC Type II	20Hz - 18kHz
IEC Type IV	20Hz - 20kHz
Wow & Flutter - Peak DIN wtd/unwtd	0.10%/0.25%
Wow/Flutter Peak DIN wtd	0.07%/0.23%
Speed error	+1.75%
Type I signal/noise CCIR/ARM 400Hz	48.5dB
distortion 0dB	1.1%
Type II signal/noise CCIR/ARM 400Hz	53dB
distortion 0dB	0.55%
Type IV signal/noise CCIR/ARM 400Hz	50.5dB
distortion 0dB	1.0%
Channel separation 0VU/1kHz	52dB
Line input sensitivity/overload	91mV/>7V
Line output for 0dB/maximum	500mV/1.9V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	1.4%
Azimuth check R-L phase at 8kHz	10 degrees
VU indication at IEC 0dB	3dB
Dimensions (w x h x d)	42 x 13 x 32cms
Typical Retail Price	£180



Take a close look

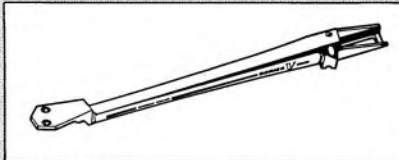


A close look at the unique Series V precision pick-up arm will reveal a wealth of design and engineering features of which only twenty are illustrated on this page. Some of these are concerned with ease and accuracy of adjustments essential for optimum cartridge performance; from others stem outstanding sonic qualities enabling the full detail and dynamics of the music to be heard, often for the first time.

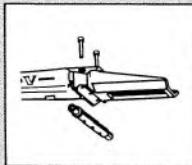
It is said that the best reproduction of LPs ranks next to the original performance for the critical home listener and the Series V used in concert with a comparable cartridge and deck will do much to reinforce this opinion.

The arm is described in greater detail in a four-page colour brochure which we shall be happy to send you on request.

Unique one-piece pressure die-cast tone-arm utilising the advantages of magnesium, replaces conventional fabricated construction.



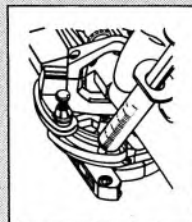
Unique assembly gives high rigidity and allows bearings to be critically adjusted before tone-arm is fitted.



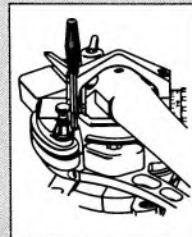
23mm diameter steel pillar, heat treated, ground and honed, carries two 17mm ABEC 7 ball races, widely spaced to resist tilt.



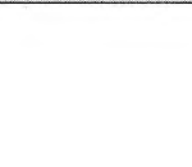
Subsonic lateral mode fluid damper can be instantly adjusted or cancelled.



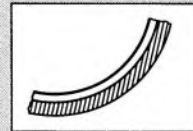
Fine adjustment of arm height (VTA).



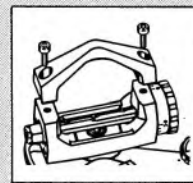
New design alignment protractor sets HTA with great accuracy.



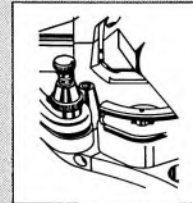
Internal constrained layer damps minute residual vibration leaving the tone-arm acoustically inert.



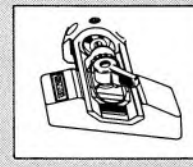
Stainless steel cross shaft, ground and thread ground. Carried in massive yoke on 10mm ABEC 7 ball races. Axis at record mean level to minimise warp-wow.



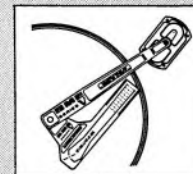
Lowering/raising control gives smooth positive action. Height of lift can be adjusted.



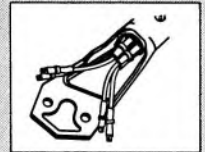
Underslung weight housing corrects centre of gravity and provides non-reflective tone-arm termination. Adjustment leadscrew journaled in twin ball races with lever clamping.



Advanced jig/template system guarantees correct positioning.



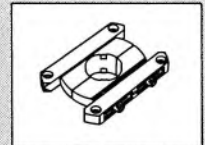
Fine machined cartridge platform.



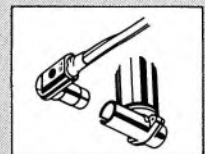
Dynamic balance - graduated vertical tracking force (VTF) control applies 0-3 grams x 0.125 gram through resonance controlled spring.



Dual-lock base provides movement control with high rigidity.



Swivelling damped output-socket minimises vibration transmission in sub-chassis use.



Reference lines on tone-arm facilitate VTA setting.



Fine adjustment of horizontal tracking angle (HTA).



PIONEER CT-737

PIONEER HIGH FIDELITY GB LTD., FIELD WAY, GREENFORD, MIDDX UB6 8UZ. TEL: (01) 575 5757.



The £300 737 is a full 3-head deck, with automatically selected off-tape/source monitoring but with manual override. Dolby B and C noise reductions have a separately switchable MPX filter, and the logic transport is unusually quiet at take up as well as when running. The search systems can find tracks up to 15 away from the current position, and include a memory equipped elapsed time counter and (most praiseworthy) a 'return' button which takes the tape back to counter zero, in whichever direction it lies. Variable bias, Dolby HX Pro and a headphone socket with volume control are also fitted.

This model incorporates some of the special construction techniques that Pioneer have been advocating for some time such as audio grade capacitors, low resonance body components (eg the stamped 'honeycomb' base), and non-magnetic minor components like copper screws. All of which adds up to much more than most cassette deck manufacturers bother with. Welcome signs of the seriousness of the Pioneer approach are that none of the solutions are unduly extreme or expensive.

I can't quite work out what to make of the dual range record level meters. In their usual operation mode these peak hold, two colour displays are calibrated from -35 to +12dB with fair resolution and the suggested maximum record level for the selected tape type clearly marked. Press a switch, however, and the range changes to -4dB to +16dB with slightly increased resolution. Nice, but why not use an extended range display from the outset? But as the meters are superb, the fact that they might have been even better is probably academic.

LAB REPORT

Most of the response plots have a peculiarly ragged 'noisy' appearance at high frequencies, as though the tapes were suffering from severe dropout. In fact they were suffering from a case of poor tape to head contact. The heads and guides were carefully cleaned but to little effect, and the problem appears to be inherent, perhaps due to low tape tension

across the heads.

The overall record/replay frequency response shapes are smooth and accurate enough with just small variations at the high end of the passband - amenable to correction using the fine bias adjustment. The Dolby plot, however, is rather more questionable; Dolby C in particular is responsible for a quite severe loss of HF output.

Speed stability is fair for a deck in this price area, but the flutter figure is a little on the high side. Nevertheless the spectrum analysis is clean apart from a mild trace of what appears to be capstan wow. The amplifier chain is a low distortion design, but the head azimuth error on our sample was quite large. Below average noise figures are compensated by the fact that this recorder may be driven quite hard into the red - note the +4dB meter reading for IEC 0dB level. Conversely, *very* hot signals - such as can be accommodated by some of the best recent tapes - do cause the 737 to clip.

SOUND QUALITY

The intrinsic sound of this model is solid, weighty and tuneful, with a natural, airy, almost laid back top end that integrates unusually well into the rest of the sound picture. The basic character is benign, with nothing overtly aggressive or opaque.

Nevertheless, music did seem overlaid by a low level something, a kind of cross between muzziness and graininess, perhaps associated with the measured flutter and tape-to-head contact integrity shortcomings. The result seems to involve some loss of information and a rather non-specific kind of stereo image that tends to meander around uncertainly. Muddying and confusion are both mentioned in the listening notes, and underlined in the case of prerecorded material. The noise reduction circuitry worked more or less imperceptibly.

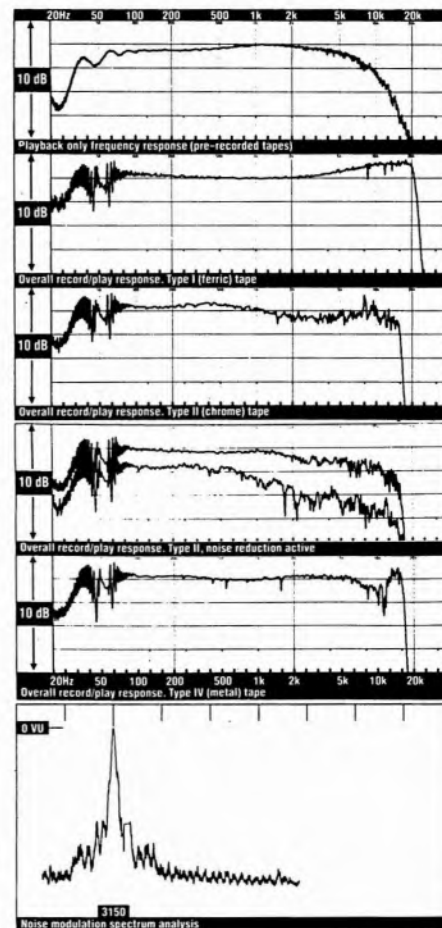
CONCLUSIONS

There's a truly interesting recorder in here trying to get out. Glimpses can be heard from time to time, but the sound is affected by

transport problems. Sorted out, this could be an exceptional purchase.

TEST RESULTS

Rec/replay response -3dB ref 1kHz	
IEC Type I	30Hz - 17kHz
IEC Type II	25Hz - 16kHz
IEC Type IV	25Hz - 17kHz
Wow & Flutter - Peak DIN wtd/unwtd	0.08%/0.24%
Wow/Flutter Peak DIN wtd	0.05%/0.20%
Speed error	+1.0%
Type I signal/noise CCIR/ARM 400Hz	47.5dB
distortion 0dB	0.95%
Type II signal/noise CCIR/ARM 400Hz	53.5dB
distortion 0dB	0.75%
Type IV signal/noise CCIR/ARM 400Hz	50.5dB
distortion 0dB	1.2%
Channel separation 0VU/1kHz	54dB
Line input sensitivity/overload	91mV/>7V
Line output for 0dB/maximum	500mV/2.4V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	0.4%
Azimuth check R-L phase at 8kHz	30 degrees
VU indication at IEC 0dB	4dB
Dimensions (w x h x d)	42 x 13.5 x 37cms
Typical Retail Price	£300



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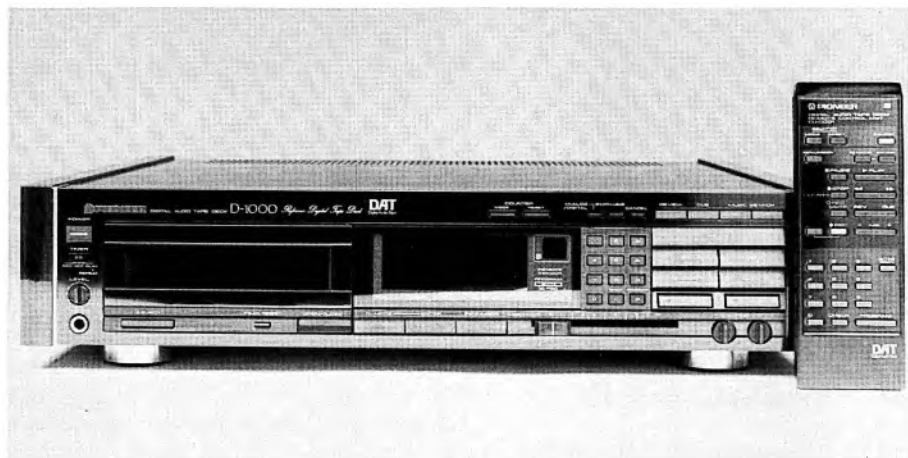
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PIONEER D-1000

PIONEER HIGH FIDELITY GB LTD., FIELD WAY, GREENFORD, MIDDLESEX UB6 8UZ. TEL: (01) 575 5757.

RECOMMENDED



Covered also in the 1987 edition of *Hi-Fi Choice: Cassette Decks and Tapes*, Pioneer's *D-1000* is almost certainly the most clearly audiophile oriented machine in the test group. Price in Japan is 1/4m Yen (around £1,000). However, it is symptomatic of the troubles of DAT in the interim that the sample submitted this year was from the very same 100Volt production batch as the earlier machine.

The *D-1000* is beautifully finished in that rather flowery manner beloved of Japanese exotica. Control organisation is good, if lacking the simple clarity of the equivalent Sony.

The transport is an elaborate design incorporating a tape clamp to reduce vibration. Normally a loading drawer would retract once a tape has been inserted, but in a bizarre stylistic twist this one may be left open so that the tape can be viewed as it runs.

All the usual features are fitted, including automatic or manual start and skip IDs, plus track numbering/renumbering. On playback, individual selections can be addressed directly using the telephone style numeric keypad, or indirectly, for example by requesting the third selection on from the present position. Intro-scan and a number of repeat modes are available, and so is a full function remote control. The record level meters have a 60dB dynamic range, with peak hold LEDs and numeric readouts.

There are no microphone inputs, but the Pioneer does have both optical and electrical digital socketry in addition to the usual analogue terminals. It will record/play at 48kHz with or without pre-emphasis ('with' for better noise figures, 'without' for better sound), and replay at 32kHz and 44.1kHz too. Tape wind is slightly quicker than the other models tested.

LAB REPORT

The internals look a little cluttered, a complex wiring harness coupling the various boards. The digital and analogue boards are arranged in piggyback fashion with the audio circuitry on top and shielded from below. The

digital circuits, consisting mainly of Sony ICs, are also totally enclosed within their own screened box. Other boards are fitted for power supply, display and tape transport purposes. The analogue circuits have separate 2x oversampling DACs - Burr Brown *PCM56Ps* - for each channel, with analogue low pass filtering housed in a screened can. All capacitors are selected high grade types, amongst them Nichicon electrolytics and polystyrene copper foils. The main supply caps are Duorex types rated at 3300µF.

The casework is constructed from copper plated steel panels, with a central brace, copper fixing screws and top panel damping. The tape transport is decoupled. Separate transformers are used for the digital and analogue circuits, wound with OFC cable. A multitude of power supply regulators are employed.

The lab tests gave mostly state of the art results. Channel separations at 20Hz and 1kHz are good but asymmetric. THD is very low and the IM spectrogram cleaner than usual. The frequency response is almost perfect. Ultrasonic spurious are well suppressed and signal/noise ratio is fair. Low level resolution shows virtually no error and the -90dB sinewave was well reproduced; numerically expressed resolution approaches 16 bits. The recorder has an ideally low output impedance and can therefore drive long leads if desired.

SOUND QUALITY

The Pioneer was the subjective star of the show. Compared to the other DAT recorders, it offered a more lucid quality and displayed less strain and greater consistency and purpose through loud, complex passages. At lower levels the sound was also expressive and detailed, while stereo images were steady, stable and slightly wider than normal.

On the debit side, there was a trace of 'furriness', the sound lacking a certain essential simplicity and clarity. But the machine still did well enough to rank as extremely good, and was alone in making recordings that were often indistinguishable under practical conditions from the originals, even

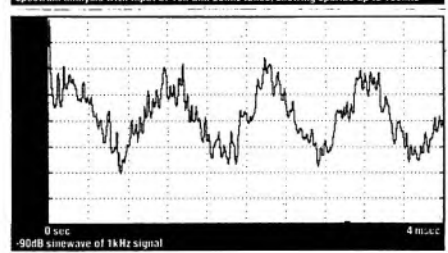
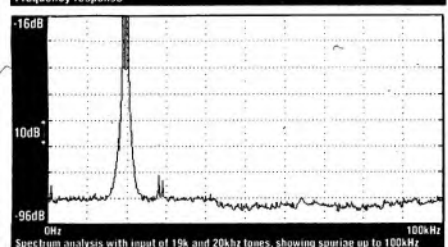
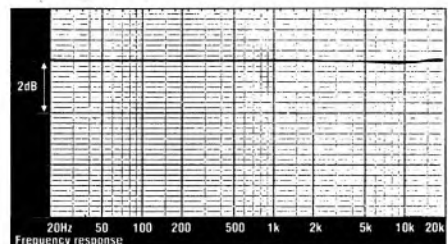
with close, critical listening. I was particularly impressed by the layering of the sound, which enabled loud and soft strands to co-exist in a mix without the usual strong mutual interference.

CONCLUSIONS

The best of the current crop tested on this occasion, if by only a narrow lead, the Pioneer is also extremely well equipped. Although it's almost certain that the *D-1000* will never go on sale formally in this country, it does show what Pioneer are capable of - with a little help from Sony.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel balance	0.10dB	0.10dB	0.06dB
Channel separation	92/118dB	97/106dB	84/84dB
Channel phase difference	0°	0°	3°
Total harmonic distortion inc noise, 20kHz bandwidth			
0dB	88dB	86dB	87dB
-10dB		82dB	
-60dB		40dB	
-80dB		25dB	
Intermodulation distortion			
L + 2 (0dB, 19kHz/20kHz)			-87dB
L + R (-10dB, 19kHz/20kHz)			-89dB
Frequency response			
L	-0.06dB	0dB	0dB
R	-0.06dB	0dB	-0.05dB
Output level 0dB			2.03V
Output impedance			100ohms
Mechanical noise			low
Signal/noise ratio (no emphasis unwt'd)			90dB
CCIR/ARM wtd (ref 1kHz)			84dB
Spurious to 100kHz			-104dB
Resolution (linearity) at -90dB L/R			-90.2dB/-90.0dB
Headphone socket/output impedance			variable 120ohms
Line in impedance (kohm)			450kohms
Line sensitivity/overload			310mV/>7V
Dimensions (w x h x d)			45.7 x 10.8 x 40.0cms
Typical Retail Price			Not readily available in UK



SONY TCW300

SONY UK LTD., SONY HOUSE, SOUTH STREET, STAINES, MIDDLESEX TW18 4PF. TEL: (0784) 67000.



Sony's new mainstream *TCW300* dubbing deck is released in September 1988 at the important £150 price point. It's a typically neat and purposeful device from the always distinctive Sony stable, and is notably free of extraneous controls. Well almost.

There's nothing fancy about the *300*. Neither transport has auto reverse, and only one of them records, and from line sources only (there's no microphone input). However, the basics have not been overlooked; the *TCW300* has both Dolby B and C noise reduction, and all normal tape types can be used on both transports. Record levels are set using very ordinary 16dB meters via record level and balance controls (a good combination for fades).

This is yet another of the seemingly inexhaustible supply of (otherwise) modern cassette decks which have manual instead of automatic tape type selection. These selectors are tiny and blend in with the styling in such a way that they practically cry out to be overlooked, though it's to Sony's credit that the slide switch is much easier to use than the regrettably still too common and confusing systems which involve mutually dependent buttons.

Of the very few remaining controls, two are used to select the active noise reduction circuits, and one selects normal or high dubbing speeds. There's no single key for dubbing starts.

There's a tape counter of course, and the tape transport controls themselves are manual and rather heavy; although very well engineered this lightweight deck will therefore slide around on many surfaces. The controls allow abrupt changes from play to fast wind or vice versa without passing through stop, but a measure of the recorder's simplicity can be gauged from the absence of auto-stop except on play and record.

LAB REPORT

Good transports are expensive, and low cost double cassette decks are inevitably under pressure on this score. Wow and flutter levels

here are high – the 0.32% peak DIN weighted figure, for example, is at least double that of a typical single cassette deck at this price level. Flutter levels are particularly high, and this can be seen graphically in the broad 'shoulders' of the spectrum analysis, which shows some significant discrete components separate from the main output peak centred on 3150Hz.

Noise levels aren't bad and the Type I and II frequency responses (the tape groups for which this deck is best suited) are commendably accurate. The lack of output below 60Hz is a striking feature of the measurements, but is not altogether obvious on audition. The two noise reduction circuits have a fairly small effect on amplitude linearity, though Dolby B is responsible for significant HF loss.

Prerecorded tapes are handled adequately, notwithstanding a significant head azimuth error. High speed dubs add a touch extra treble to reduce some of the usual 'waffle'. Note also the high 0dB IM distortion and the limited line output voltage, both of which would tend to prejudice clean behaviour at high levels.

SOUND QUALITY

The thumb's down, unfortunately. The Sony suffers the cassette equivalent of a speech impediment in the form of extremely shaky pitch (a problem magnified by the action of dubbing, especially when performed at high speed). But even without this added complication, the sound is all over the place to even the most casual listener.

Reproduction is messy, bloated, and quite devoid of anything that might be mistaken for a stereo soundstage on a foggy night. And for some reason the bloated aspects of the sound are magnified with Dolby processing. There was little musical advantage to be gained by using expensive tapes generally or metals in particular; the main limits lie elsewhere.

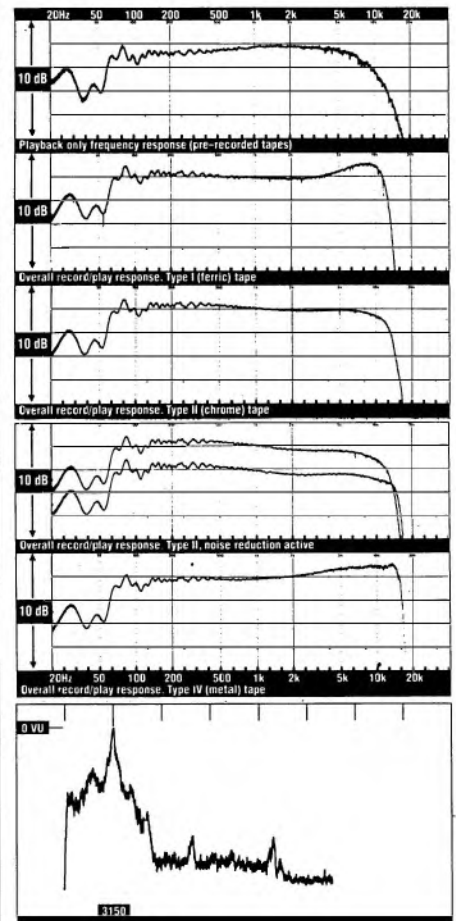
CONCLUSIONS

Some questionable features, notably the

absence of auto-stop and the well concealed manual tape type switches, take the gloss off this visually attractive design. The real clincher, however, is this Sony's utter inability to play with anything approaching stable pitch.

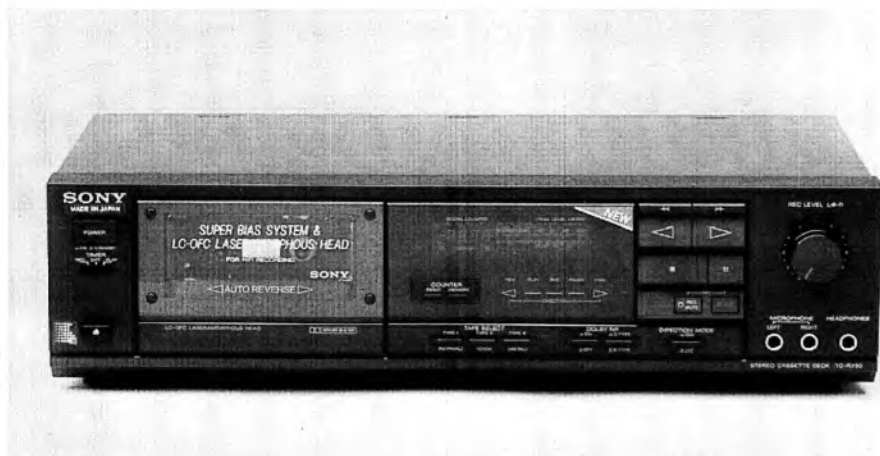
TEST RESULTS

Rec/replay response – 3dB ref 1kHz	
IEC Type I	58Hz – 13kHz
IEC Type II	55Hz – 14kHz
IEC Type IV	57Hz – 16.5kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.32%/0.46%
Wow/Flutter Peak DIN wtd	0.21%/0.42%
Speed error	+1.75%
Type I signal/noise CCIR/ARM 400Hz distortion 0dB	53dB
Type II signal/noise CCIR/ARM 400Hz distortion 0dB	0.95%
Type IV signal/noise CCIR/ARM 400Hz distortion 0dB	57.5dB
Type I signal/noise CCIR/ARM 400Hz distortion 0dB	1.6%
Type II signal/noise CCIR/ARM 400Hz distortion 0dB	55dB
Type IV signal/noise CCIR/ARM 400Hz distortion 0dB	2.2%
Channel separation 0VU/1kHz	46dB
Line input sensitivity/overload	98.5mV/>7V
Line output for 0dB/maximum	700mV/2.8V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	15%
Azimuth check R-L phase at 8kHz	30 degrees
VU indication at IEC 0dB	0dB
Dimensions (w x h x d)	43 x 12 x 25cms
Typical Retail Price	£150



SONY TC-RX50

SONY UK LTD., SONY HOUSE, SOUTH STREET, STAINES, MIDDLESEX TW18 4PF. TEL: (0784) 67000.



Due for launch about the time this issue hits the bookstalls, the £180 Sony *TC-RX50* is one of a new series of cassette decks with clean, modern styling and some attractive features, not the least of which is auto-reverse operation. There's no doubt that technical compromises are inherent in almost any auto-reverse cassette mechanism, but it's equally certain that the 45-minute (or at a pinch, one hour) maximum uninterrupted recording time available on compact cassette is a millstone around the medium that rankles with many people – especially those, like myself, who use cassettes for absentee recordings of long radio plays or concerts. Auto-reverse can be seen as a necessary evil.

As a convenience product then, auto-reverse helps the Sony shine. So, on the whole, does a control system which features large, clear transport and minor controls alike, good labelling and bright, clear displays. The Sony allows 'punch-in' recordings and has full audible cueing and auto-play following rewind. But the transport is a little noisy, especially when entering 'play' or 'fast wind/rewind', and can produce the most amazing collection of clicks and cranking noises when asked to do anything complicated, for example recording from pause mode.

Some features do not contribute much to the art of ergonomic design, and indeed are particularly surprising in a brand new design like this one, being points criticised in these pages before. One is the manual tape type selection. The other is a poorly designed Dolby switching arrangement which makes mistakes all too easy for the sake of reducing the button count by one.

Unusually these days the *TC-RX50* has microphone sockets in addition to the usual fixed level headphone socket, plus Dolby B and C noise reduction, an electronic memory counter and small but clear 28dB peak-holding two-colour record level meters.

The deck is not expensively built, though the standard of finish is exemplary. The technology is ordinary enough, the highlight being the laser amorphous alloy head which

is wound with LC-OFC coils.

LAB REPORT

For the most part, the standard of technical performance is modestly satisfactory, but almost inevitably wow and flutter is the exception. Both wow and flutter levels are high – there are odd discrete energy components within the spectrogram, and the general thickening of the 315Hz peak indicates a loss of pitch precision. The figures were not a lot different in the reverse direction. Wow levels were slightly worse, and the higher frequency flutter components a little better. But the audible difference clearly favours the forward direction.

This Sony gave a fine set of frequency response curves, save that the Dolby C curve was a mess, consistent at least in part with incorrect sensitivity alignment. The audible consequences were only too apparent, not just with the test tape but also using a broad spectrum of Sony's own tapes which were auditioned but not measured. Dolby B gave much better results and is recommended to the user, partly because noise levels are on the high side for use without noise reduction of some kind.

SOUND QUALITY

Prerecorded material was handled quite well, except that replay pitch was clearly too high despite measurements showing only a modest error. This contradictory result can only be explained by drift, and indeed the pitch differences did tend to come and go with time.

The real limitations of this Sony are found in its inability to play with a consistent pitch. With some material it simply sounded a little cluttered and hard; on other occasions, especially with pitch sensitive instruments like piano, the deck varied between the uncomfortable and (in the reverse direction) the quite unlistenable.

CONCLUSIONS

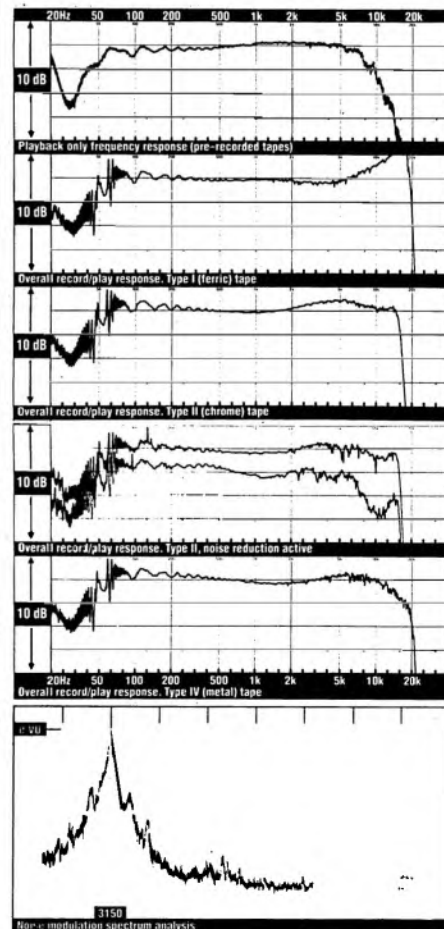
Certain basic qualities are essential regardless of price. In this instance the inability of

the Sony to reproduce piano and other instruments without obvious superimposed pitch wavering proved it's Waterloo.

TEST RESULTS

Rec/replay response –3dB ref 1kHz	
IEC Type I	35Hz – 20kHz
IEC Type II	35Hz – 16kHz
IEC Type IV	35Hz – 20kHz
Wow & Flutter –	
Peak DIN wtd/unwtd	0.19 (0.24)%/0.52 (0.46)%*
Wow/Flutter	
Peak DIN wtd	0.14 (0.16)%/0.50 (0.44)%*
Speed error	
	+0.5%
Type I signal/noise CCIR/ARM 400Hz	
distortion 0dB	51dB
Type II signal/noise CCIR/ARM 400Hz	
distortion 0dB	56dB
Type IV signal/noise CCIR/ARM 400Hz	
distortion 0dB	53dB
Channel separation 0VU/1kHz	
	48.5dB
Line input sensitivity/overload	
	113mV/>7V
Mic input sensitivity/overload	
	0.42mV/31mV
Line output for 0dB/maximum	
	722mV/3.3V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	
	0.5%
Azimuth check R-L phase at 8kHz	
	30 degrees
VU indication at IEC 0dB	
	0dB
Dimensions (w x h x d)	
	43 x 12 x 25.5cms
Typical Retail Price	
	£180

* (Reverse direction figures)



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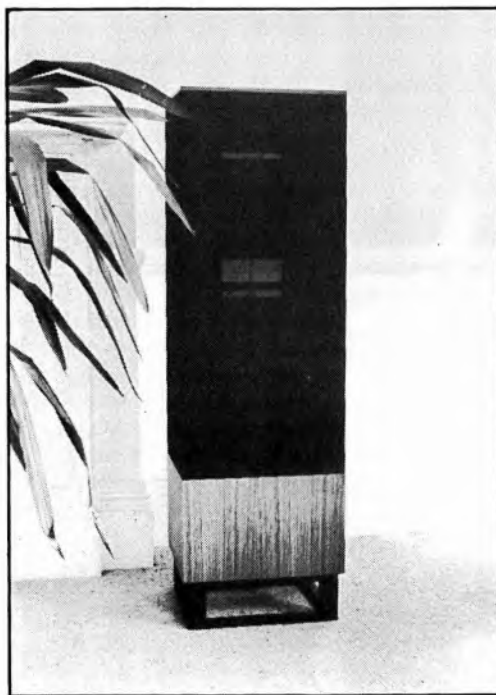
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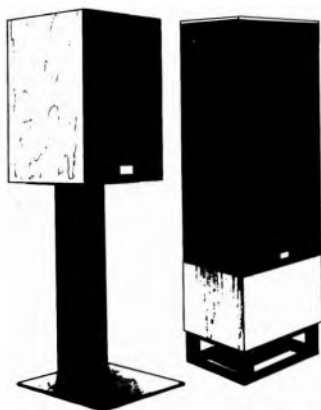
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SONY TC-RX60ES

SONY UK LTD., SONY HOUSE, SOUTH STREET, STAINES, MIDDLESEX TW18 4PF. TEL: (0784) 67000.



Here's a newcomer to the rapidly maturing *ES* range of Sony cassette decks, and a cheaper alternative based around the same transport, electronics and presentation as the *TC-RX80ES* (reviewed separately). In common with other *ES* equipment, the '60 is unusually well finished with good controls and a solid, engineered feel. Styling is not as stereotyped as usual, and has a heavy emphasis on black perspex.

The major selling feature is the auto reverse mechanism. The *60ES* is one of a still small number of 'serious' auto-reverse decks, designed to compete with good unidirectional models on roughly equal terms whilst offering the very real benefit of being able to make unattended off air recordings which break the 45 minute barrier.

The circuitry features Dolby HX Pro head-room expansion and the usual Dolby B and C noise reduction. A friction coupled control sets levels, aided by tiny but otherwise well designed 28dB meters. Tape recognition is automatic, with front panel tell-tales. The auto-reverse mechanism rotates the laser amorphous LC-OFC-wired record/playback head through 180 degrees, and is triggered at the tape/leader junction to minimise changeover losses.

Amongst the peripheral facilities a real time electronic tape counter has memory stop. There are also a number of tape search and related features, notably blank skip (if the circuit detects unrecorded passages over 10 seconds long), intro-scan and auto play after rewind. You can't use microphones directly with this deck, but headphones may be connected and the volume level adjusted as desired. Terminals are fitted on the rear for system integration with other specified Sony components. And remote control is available with an optional *RM-88* handset.

LAB REPORT

The record/replay responses were run with the usual test tapes rather than Sony ones – partly for consistency but also because the latest generation of Sony tapes was received too late for most of the bench testing. The

slight treble emphasis was later confirmed with most of the Sony tapes, though standard middle-range formulations like Sony *UX-S* was well matched, and higher energy tapes (*UX-Pro* for example) gave results almost indistinguishable from tonal neutrality.

Noise and distortion were moved a few dB further apart here, compared to the *TC-FX50* for example. This is sufficient to permit, say, the use of Dolby B where C was required previously, or no Dolby at all where the B type might have been deemed necessary before.

Speed stability is also a lot better than with the cheaper model. Flutter is a little on the high side, and there's a correlation here with some of the listening results, but wow is well restrained (0.07% in the forward direction, 0.06% reverse).

SOUND QUALITY

Reduced levels of wow (*cf* the *TC-RX50*) gives this deck a stability missing entirely from that cheaper model. It seems that the perception of wow is a threshold related phenomenon, and these two decks are on the opposite sides of the divide.

Pitch isn't a problem then, but there are other, less serious difficulties. One is a curiously inarticulate quality – an imprecision and excessively damped quality on transients – when recording with Dolby, and in particular with Dolby C (strangely this was nothing like as obvious with the *TC-RX80ES*).

Without any Dolby the Sony sounded fairly clean and dynamic, with good but not unimpeachable resolution of fine detail. Most tonal colours were drier and colder than the real thing. Prerecorded material reproduced well, but with a slight loss of airiness and, again, a slightly 'cold' balance.

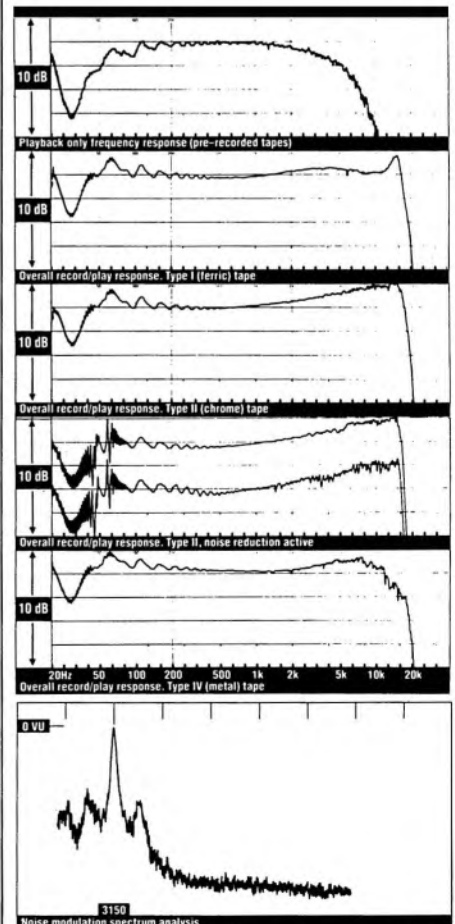
CONCLUSIONS

Sony's middle ranking auto-reverse player has some distinctive strengths and weakness, and ends up rather uncomfortably straddling the divide between convenience and sound quality. I'd rate it as not quite a clear Recommendation, but the *TC-RX60ES*

is certainly worth considering.

TEST RESULTS

Rec/replay response –3dB ref 1kHz	
IEC Type I	<20Hz – 17kHz
IEC Type II	<20Hz – 18kHz
IEC Type IV	<20Hz – 19kHz
Wow & Flutter –	
Peak DIN wtd/unwtd	0.10 (0.12)%/0.34 (0.34)%*
Wow/Flutter	
Peak DIN wtd	0.007 (0.06)%/0.29 (0.40)%*
Speed error	
Type I signal/noise CCIR/ARM 400Hz	55dB
distortion 0dB	1.4%
Type II signal/noise CCIR/ARM 400Hz	59dB
distortion 0dB	2.8%
Type IV signal/noise CCIR/ARM 400Hz	55dB
distortion 0dB	1.8%
Channel separation 0VU/1kHz	49dB
Line input sensitivity/overload	101mV/>7V
Line output for 0dB/maximum	680mV/2.8V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	0.9%
Azimuth check R-L phase at 8kHz	30 degrees
VU indication at IEC 0dB	0dB
Dimensions (w x h x d)	43 x 12 x 31.5cms
Typical Retail Price	£250
*(reverse direction figures)	



SONY TC-RX80ES

SONY UK LTD., SONY HOUSE, SOUTH STREET, STAINES, MIDDLESEX TW18 4PF. TEL: (0784) 67000.



This is the best and most expensive model in a three strong Sony range which majors on auto-reverse operation and which is covered for the first time in this issue. Although increasing price brings an improving specification, each shares a family appearance and certain internal components. All for example use a laser amorphous record/playback head.

In fact the two *ES* models in the range share a good deal more than that; to a first approximation the *'80* could be said to be a *'60* plus'. One of the pluses (and the most important one) is a semi-automatic record bias and sensitivity adjustment feature. In use, 'record calibration' and 'record' are selected, various signals are recorded on tape, the tape rewinds and replays and the user is left to adjust the three controls (one for bias, two for sensitivity) until they are set correctly according to a special display mode set aside for the purpose. The idea is not far removed from that used in the Aiwa *XK-009K*, but with that model there's no separate recording and rewind stage because the deck has three heads and can monitor off tape.

Less usefully but far more visibly the *'80ES* also comes equipped with what the manufacturer describes as a 'spectrum analyzer' - actually a concurrent bar graph readout of just five separate frequencies: 100Hz, 300Hz, 1kHz, 3kHz and 10kHz. Unfortunately there's a good deal of overlap between them (I checked with single tones), but I'm more concerned that the display, which can be disturbing in some lighting conditions, cannot be doused.

Dolby B, C and HX Pro circuits are fitted, and so are an electronic memory counter, track search, blank skip and intro scan modes. Headphones are adjustable for volume, and (thankfully) tape type selection is automatic. Dolby switching, however, uses two mutually dependent switches, which is annoying. Build and finish are excellent and operation is quiet apart from the transport solenoids.

LAB REPORT

It's hard to tell whether this model has

exactly the same transport as the *'80*, or a selected or modified one which might affect the measurements. The measurements do differ: wow levels are slightly (and imperceptibly) higher, whilst flutter is substantially lower. The spectrum analysis looks rather healthier on the whole, though there are discernible effects, perhaps due to motor coupling.

The noise and distortion measurements are not unlike those for the *'60ES*, and speak of a generally well engineered design with a usefully wide distance between noise floor and overload (often incorrectly described as dynamic range).

The playback response shape is a little curtailed in the treble - note the substantial 8kHz azimuth phase error. Record/playback response shapes are satisfactory using the preset bias/level settings, apart from the Dolby C plot.

SOUND QUALITY

I found it impossible to achieve a completely neutral response with Dolby C. As with the *'60ES* but to a much reduced extent there was a consistent 'woodiness' with this circuit switched in - a lack of transient bite that could not be overlooked.

Having said that, the *'80ES* always sounded stable and tuneful, and is also a lot more articulate and detailed than the cheaper models in the range. The differences between *'80* and *'60* were particularly striking, especially in view of their similarity under the skin. This deck is often capable of truly exciting, lively music making, with little smear or imprecision of the kind that plagues the medium. It made good use of higher energy tapes, especially metals like Sony's own *Metal-ES*.

In contrast, prerecorded cassettes were a little dull and sounded dynamically flat by the best standards.

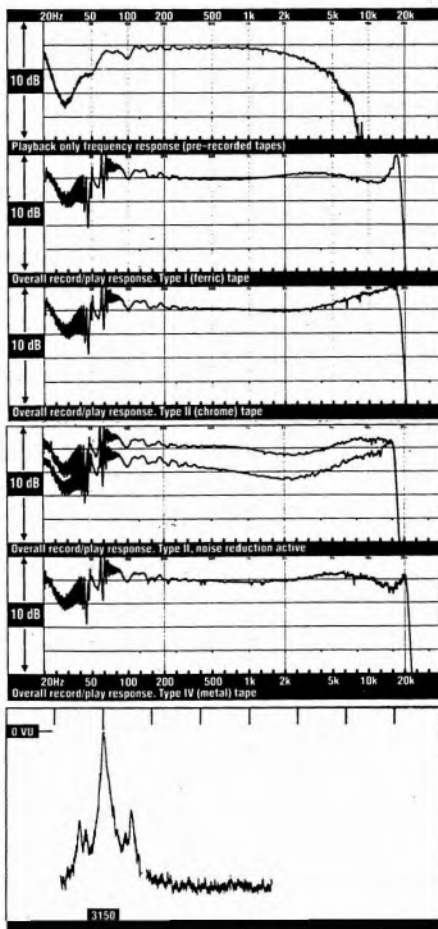
CONCLUSIONS

Some compromises for the sake of auto-reverse were both expected and found. Azimuth problems prevented the deck making

the most of prerecorded material, and the Dolby circuits were responsible for a generalised reduction in clarity and dynamics. Underlying all this, however, the *'80ES* is an excellent example of its type, and worthy of Recommendation.

TEST RESULTS

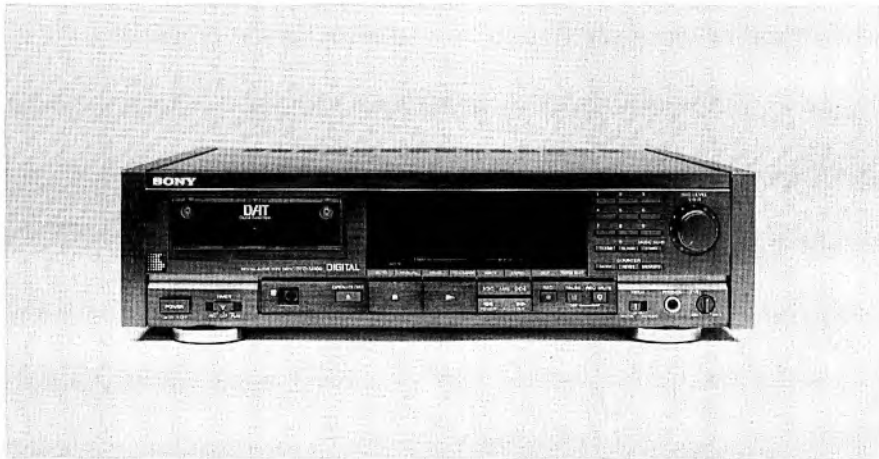
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz - 17kHz
IEC Type II	<20Hz - 16.5kHz
IEC Type IV	<20Hz - 21kHz
Wow & Flutter -	
Peak DIN wtd/unwtd	0.12 (0.15)%/0.22 (0.32)%*
Wow/Flutter	
Peak DIN wtd	0.09 (0.11)%/0.24 (0.30)%*
Speed error	+0.75%
Type I signal/noise CCIR/ARM 400Hz	53.5dB
distortion 0dB	0.95%
Type II signal/noise CCIR/ARM 400Hz	58dB
distortion 0dB	1.4%
Type IV signal/noise CCIR/ARM 400Hz	55dB
distortion 0dB	2.4%
Channel separation 0VU/1kHz	48dB
Line input sensitivity/overload	96mV/>7V
Line output for 0dB/maximum	670mV/3.7V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	1.0%
Azimuth check R-L phase at 8kHz	40 degrees
VU indication at IEC 0dB	0dB
Dimensions (w x h x d)	43 x 12 x 28.5cms
Typical Retail Price	£350
*(reverse direction figures)	



SONY DTC-M100

SONY UK LTD., SONY HOUSE, SOUTH ST., STAINES, MIDDLESEX. TEL: (0784) 67000.

RECOMMENDED



This surprisingly affordable machine was offered for review very shortly before finalising the project. I understand it is amongst the first samples to arrive in this country, and it appeared without packing, instructions or any data whatever. (And not, we hasten to add, via Sony UK.) It didn't even have its remote control, though I quickly discovered that the one supplied with the *DTC-1000ES* works fine. Furthermore, it was a 100V Japanese home market model, with Japanese labelling on the back panel and English, I mean English, on the front.

This recorder differs from the *1000ES* primarily in being cheaper, less exotically engineered internally – and smaller. Width is reduced to 38.5cm including the wood end cheeks, so it's probably packaged in an upmarket midi system back home.

Compared to the older, senior model there are extras: messages like 'OPEN' and 'CLOSE' in the display area, and a numeric dB read-out of peak level. There's a more important extra feature on the back: optical in and outputs, alongside an electrical digital input and the usual analogue sockets.

Operationally the Sony is directly comparable to its big brother. Track start IDs are normally assigned automatically but can be erased and edited at any time. Skip IDs can also be written into the subcode, instructing the player to skip to the next start ID. The real time counter has memory stop. A rather erratic sounding audible cueing feature is fitted. And 'music scan' plays a few seconds extract each time it encounters a track start (actually a start ID) until the end of the tape is reached. There are no microphone facilities but headphones may be fed via a volume control.

LAB REPORT

Well developed and sorted internal circuitry is based around two main boards, with sub-boards tacked on for the extra in/output functions which grace this model. One board is used mainly for the digital circuits and transport control; the other is home to the analogue and power supply circuits and a

DAC which appears to be one of Sony's own (it's labelled *CXA1009*). Good quality supply and decoupling caps from the likes of Nichicon, Rubycon and Duorex are used throughout.

The standard output stage is built around *NE5534* opamps. Although quite complex the internal wiring harness is neatly enough done. The box uses solid steel panels with a central steel brace dividing digital circuit areas from analogue. The top panel has some damping, and the tape transport is rigidly mounted. The sizeable transformer has its own housing tacked on the back.

The circuit appears to use a single timeshared ADC, with a similar DAC arrangement at the output, giving time coincident recordings only when recording and playing back on the same machine.

On test, channel separation is only adequate. Distortion rises at low levels, but on the whole the numbers are reasonable, as is intermodulation. Noise is poorer than usual, the CCIR/ARM weighted figure especially, but ultrasonic spurious are quite well suppressed. The -90dB waveform is well formed despite the noise, and resolution is near 16 bits.

SOUND QUALITY

I was impressed by this model. It doesn't quite equal the bigger Sony, or the Aiwa or Pioneer for that matter, but that's hardly the point. It actually gets very close, and in many cases the extra expenditure for the other machines won't make much sense – especially as there is stretch left in the *DTC-M100*, for example by using an outboard DAC, ideally connected to the optical output.

For much of the time, when auditioning recordings taken from records and discs, the two Sonys are indistinguishable. The *DTC-M100* is colourful and refined, with a strong bass and an accurate balance plus excellent 3-D imagery. At other times the *100* could be distinguished from its senior brother because it sounded perceptibly heavy and blurred. The more expensive machine is more agile and detailed, though both leave

something to be desired by the best CD standards.

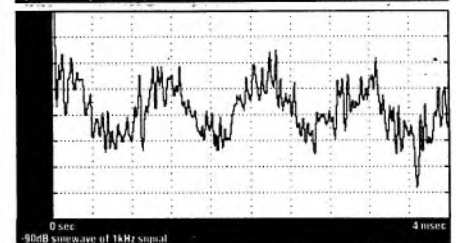
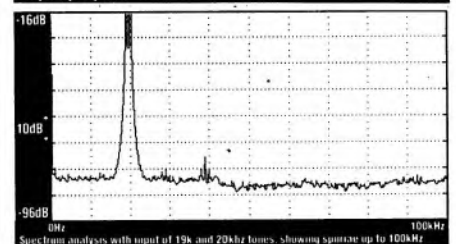
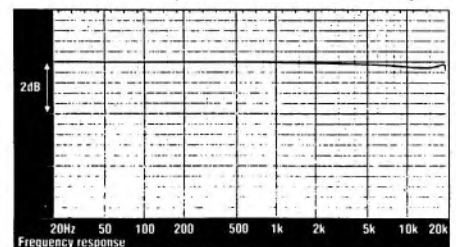
CONCLUSIONS

Here's the first of the anticipated fully rationalised 2nd generation DAT recorders, which unlike existing low cost models (like the Casio portable) does not sacrifice performance. It sacrifices remarkably little of the *DTC-1000's* attributes other than a few inches and quite a lot of pounds sterling.

TEST RESULTS

	20Hz	1kHz	20kHz
Channel balance	0.17dB	0.17dB	0.13dB
Channel separation	75dB	84dB	75dB
Channel phase difference	0°	0°	0°
Total harmonic distortion inc noise, 20kHz bandwidth			
0dB	95dB	82dB	85dB
-10dB		80dB	
-60dB		35dB	
-80dB		17dB	
Intermodulation distortion			
L + R (0dB, 19kHz/20kHz)			-80dB
L + R (-10dB, 19kHz/20kHz)			-83dB
Frequency response			
L	-0.02dB	0dB	-0.03dB
R	-0.02dB	0dB	-0.08dB
Output level 0dB			2.0V
Output impedance			430ohms
Mechanical noise			low
Signal/noise ratio (no emphasis unwt'd)			88dB
CCIR/ARM wtd (ref 1kHz)			80dB
Spuriae to 100kHz			-84dB
Resolution (linearity) at -90dB L/R			-89.8dB/-89.2dB
Headphone socket/output impedance			variable 220ohms
Line in impedance (kohm)			98kohms
Line sensitivity/overload			550mV/>7V
Dimensions (w x h x d)			38.5 x 10.8 x 39.0cms
Typical Retail Price*			£800

*This machine is not yet officially available in the UK via Sony UK. The price quoted is from Playback Ltd., Percy Street, London W1, who specialise in supplying the professional market with machines sourced from France and Germany.

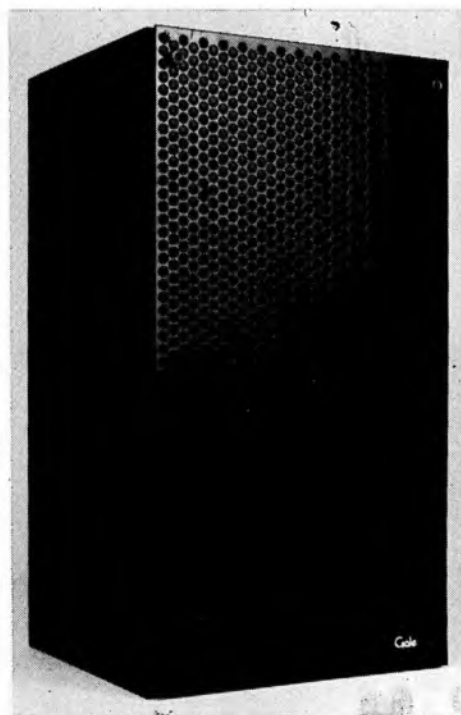


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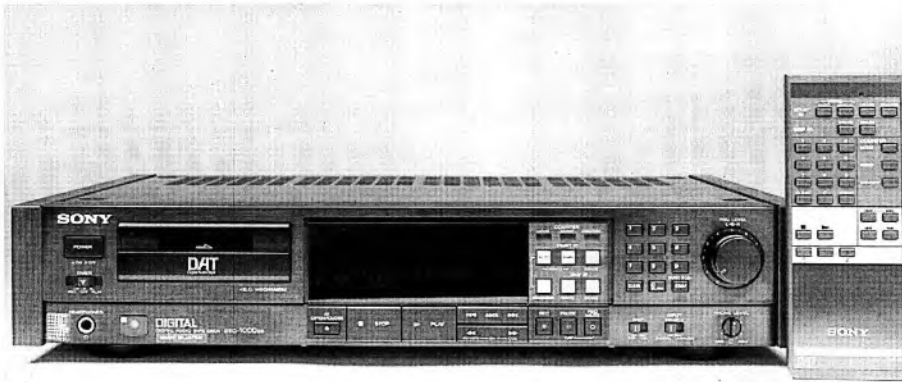
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SONY DTC-1000ES

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RECOMMENDED



As Sony was a key moving force behind the development of DAT, and as this is their longest running and most obviously mainstream model, the *DTC-1000ES* has a special place in the embryonic DAT market, as the yardstick against which others are measured. Thus 'cheap' means 'cheaper than a *DTC-1000*' and so on . . .

Every inch an *ES* (née *Esprit*) product, with classy build quality and a slick, well laid out, business-like control section, most of the unfamiliar controls are associated with the subcode feature. This sets recording track start, track number and 'skip to next track start' ID markers, which are recorded automatically but can be freely edited afterwards.

A multi-mode counter shows elapsed time, time into the current selection or remaining time on the tape. The meters have a 50dB range with peak hold facility. Other indicators warn of copy prohibit and pre-emphasis. (Pre-emphasis is used when copying in the digital domain from a pre-emphasised original, or when recording in analogue.) The recorder comes complete with full infra-red remote control. Search functions include a rather slow audible cue and review, and a very effective high speed track search.

Socketry includes electrical (not optical) digital in and outputs, as well as the analogue line in and out. Headphones can be connected; microphones can't.

LAB REPORT

The *1000ES* has three transport motors and uses a mixture of twin Sony 16-bit non-oversampling ADCs with analogue filtering and Philips 4x oversampling digitally filtered DACs. The deck records at a sampling frequency of 48kHz, but will play tapes recorded at 44.1kHz and 32kHz too, which is standard for a non-professional machine. A two hour tape can be rewound in about 45 seconds, and (curiously) wind forward in about 6 seconds less.

Internally identical to the Aiwa *Excelia XD-001*, the Sony in fact performed rather better on the lab bench, but it's not clear whether this is because Sony specially select

their DACs or whether this was just the luck of the draw. Channel separation isn't brilliant but is symmetric, and channel balance is good. Distortion is fine.

The frequency response is very accurately drawn, but with significant filter ripples, from the ADCs. Overall signal/noise measures 85dB weighted, which is fine for anything up to semi-pro standards, but well short of the state of the compact disc art. Ultrasonic spurious are satisfactory and linearity is near perfect - the -90dB waveform is one of the best around, with overall resolution estimated at around 15.7 bits. The IM graph spurious shows the effect of simple output filtering.

SOUND QUALITY

It's difficult not to be impressed by this machine - not forgetting the diminutive tape that makes it all work. Used over a period with a wide range of material and assessed within the context of a high resolution system, the *DTC-1000ES* always delivered a fundamentally high quality performance with strong dynamics, bold (but accurate!) tonal colours and good separation.

It may be criticised on a number of counts, not least an occasionally noticeable loss of clarity. There is also a tendency towards tightness and dryness, and an inclination to swamp quiet background instruments or blurr massed vocals. But such observations are endemic with hi-fi, and the dynamic shortcomings are certainly less than almost any cassette deck. Although it sounded perceptibly worse than the sources used for testing (vinyl disc and CD), this is not obvious in isolation - especially with CD, whose strengths and shortcomings are more nearly complementary.

CONCLUSIONS

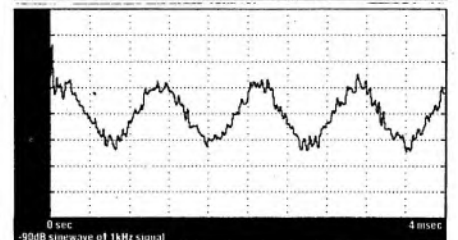
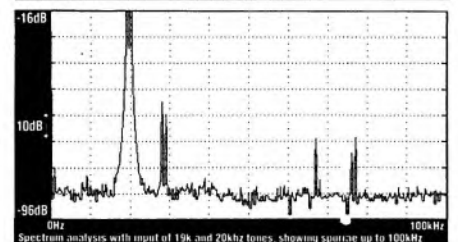
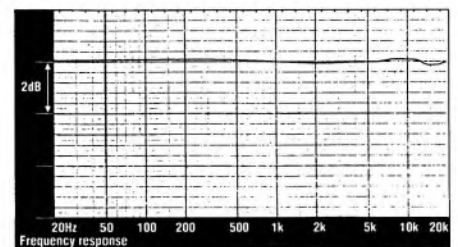
This machine sets a high though not unbeatable standard, and is clearly recommendable for those who have made the decision to 'go DAT'. It offers what amounts to a magic carpet ride, being utterly reliable and discreet in action, and ranks in audio terms

roughly on a par with a good CD player.

TEST RESULTS

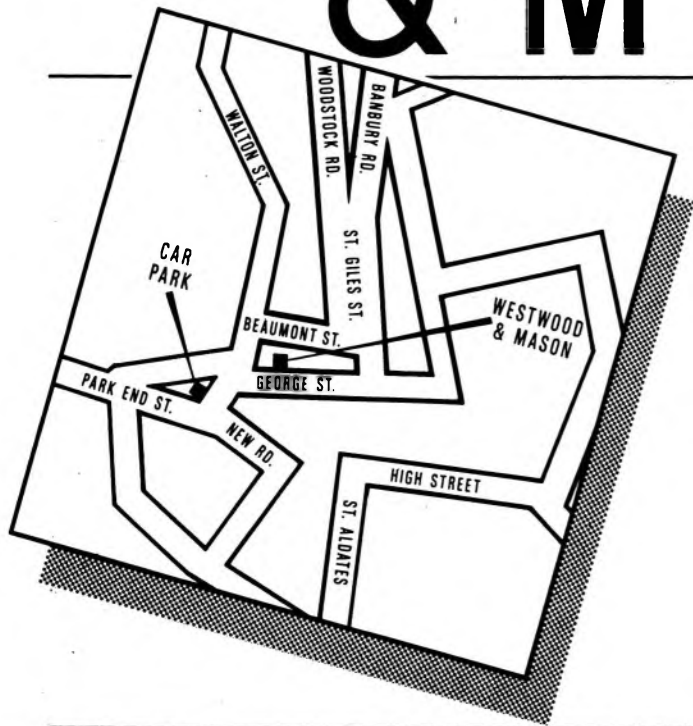
	20Hz	1kHz	20kHz
Channel balance	0.1dB	0.12dB	0.13dB
Channel separation	81dB	80dB	68dB
Channel phase difference	0°	0°	0°
Total harmonic distortion inc noise, 20kHz bandwidth	0dB	-85dB	-82dB
-10dB			80dB
-60dB			40dB
-80dB			22dB
Intermodulation distortion			
L + R (0dB, 19kHz/20kHz)			-76dB
L + R (-10dB, 19kHz/20kHz)			-85dB
Frequency response			
L	0dB	0dB	-0.08dB
R	-0.02dB	0dB	-0.09dB
Output level 0dB			2.04V
Output impedance			360ohms
Mechanical noise			low
Signal/noise ratio (no emphasis unwt'd)			92dB
CCIR/ARM wtd (ref 1kHz)			85dB
Spuriae to 100kHz			-85dB
Resolution (linearity) at -90dB L/R			-89.5dB/-90.0dB
Headphone socket/output impedance			variable 150ohm
Line in impedance (kohm)			42kohms
Line sensitivity/overload			300mV/>7V
Dimensions (w x h x d)			46.8 x 9.7 x 41.0cms
Typical Retail Price*			£1300

*This machine is not yet officially available in the UK via Sony UK. The price quoted is from Playback Ltd., of Percy Street, London W1, who specialise in supplying the professional market with machines sourced from France and Germany.



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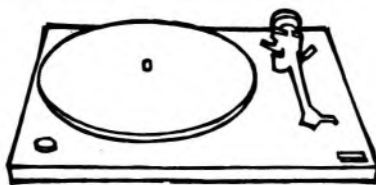
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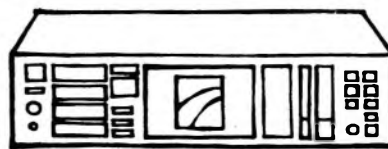
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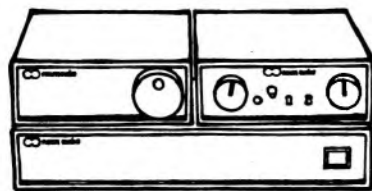
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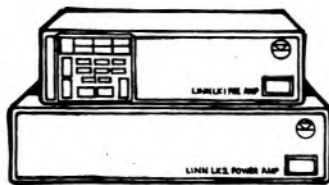
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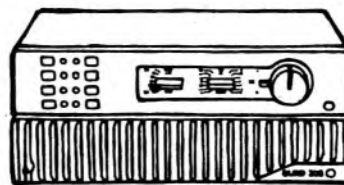
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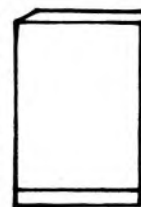
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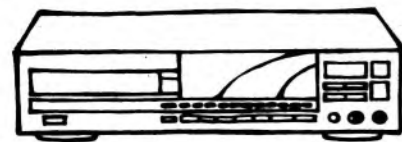
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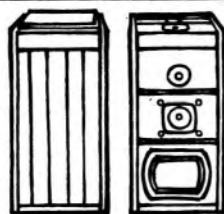
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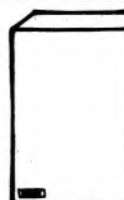
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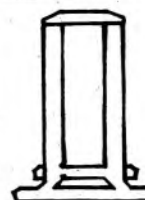
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TEAC V-250

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

RECOMMENDED



The most revealing statistic of this model is the number that follows the pounds sterling sign (just in case you're deaf, it says eighty-nine). Aimed directly at the low end market for those on a strict budget, or who simply want a cassette deck for occasional or non-critical purposes, the *V-250* is adequately turned out and utterly conventional in appearance.

The transport is entirely manually operated using a row of press buttons. These are none too firmly anchored in place, with the result that 'play' mode didn't always engage first time unless the appropriate key was pressed very firmly. Tape selection is manual, unfortunately using a combination of two switches to set the recorder up for the three tape groups – an arrangement excusable only on grounds of cost. Input levels cannot be adjusted differentially for the two channels since the control is a single knob, though the usual twin record level meters are available, covering in this case a very modest 16dB in five steps, 'minus infinity' LEDs simply showing whether the unit is plugged in and switched on. The meters are in mono by the way, although they look stereo to a casual glance. Dolby B noise reduction and a mechanical tape counter complete the package; there are no microphone or headphone sockets.

One seemingly minor but very annoying feature of the *V-250* is a constant mid-frequency motor (?) whine when the unit is under power. Because the note is so precise in pitch it's subjectively all the more annoying, but you're only likely to hear it if the recorder is close to the listening position, or perhaps if the frequency happens to excite a room resonance. Good (if circumstantial) evidence that we're talking about a design shortcoming and not just a sample flaw is that the *V-270C* (subject of a separate review) was similarly afflicted.

LAB REPORT

Given the price constraints this Teac behaves well. In one important respect it

performs better than the *270C* de-luxe version – wow and flutter levels are lower. The unweighted combined W&F figure is not much different, but the wow element itself is only a little over half that of the dearer model, and this is enough to make an important sonic difference. What is impossible to determine, however, is whether the differences are real (ie intrinsic) or simply due to sample variations. With all types of low cost hi-fi, quality control is one of the prime areas of compromise.

There's nothing much wrong with either noise or distortion figures which better some more expensive decks, though intermodulation is fairly high using our admittedly stringent test. The Teac appears to slightly overbias the test Type I (ferric) tape, but the others are handled accurately, albeit with some Dolby mistracking.

SOUND QUALITY

Confirming the relevance of the lab test findings, the *250* is clearly better than the *270C* – both sweeter in tone and more subtle. More intriguingly, however, the two decks sound much closer (and incidentally quite a bit better) when used without Dolby at all. The implication is that the *V-250*'s simple Dolby B installation sounds intrinsically better than the *270C*'s more elaborate B and C circuitry. There's more information and a greater range of colours and textures in the music. Pitch stability is also much better – though still objectively poor enough to make the deck hard on the ears with certain types of musical material.

There isn't sufficient innate ability to make much sense of the more expensive tape types, particularly metal Type IVs of course. Within the limits described, however, this Teac gave a surprisingly good account of itself. And it made some quite meaningful noises with some of my better prerecorded cassettes.

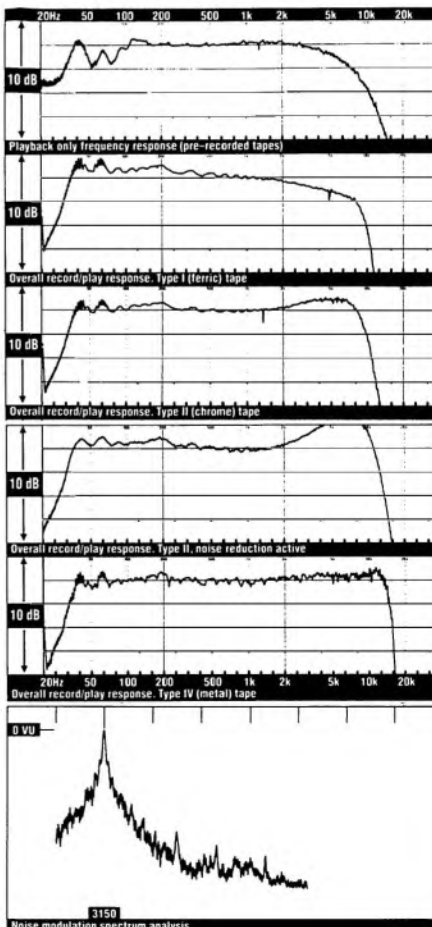
CONCLUSIONS

Choosing between this model and the *V-270C*

is easy; in my view, the extras included with the *V-270C* don't warrant the substantial difference in cost. At £89, some of the *250*'s sins are excusable, though for serious listening the speed stability problem is unacceptable. Nevertheless I believe this model deserves Recommended status on the grounds that it is OK for not too critical listening, and is also very cheap. The emphasis of course is on cheap.

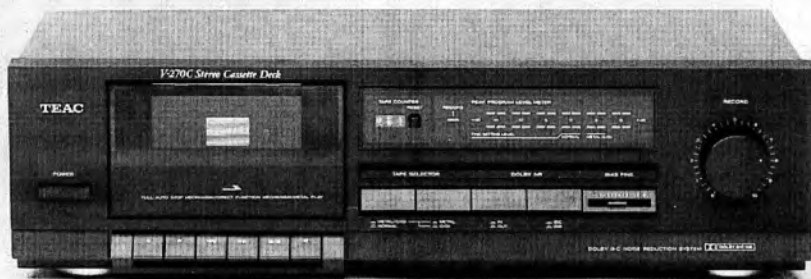
TEST RESULTS

Rec/replay response – 3dB ref 1kHz	
IEC Type I	29Hz – 13kHz
IEC Type II	30Hz – 13.5kHz
IEC Type IV	32Hz – 16kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.16%/0.36%
Wow/Flutter Peak DIN wtd	0.10%/0.30%
Speed error	+0.75%
Type I signal/noise CCIR/ARM 400Hz distortion 0dB	52dB
Type II signal/noise CCIR/ARM 400Hz distortion 0dB	53dB
Type IV signal/noise CCIR/ARM 400Hz distortion 0dB	53dB
Channel separation 0VU/1kHz	44.5dB
Line input sensitivity/overload	94.5mV/>7V
Line output for 0dB/maximum	516mV/2.5V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	14%
Azimuth check R-L phase at 8kHz	20 degrees
VU indication at IEC 0dB	0dB
Dimensions (w x h x d)	43.5 x 12 x 21.5cms
Typical Retail Price	£89



TEAC V-270C

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



The press release for this model must take some kind of prize for brevity. It takes in the V-250 (also reviewed) as well and simply says that they "offer the very best value for money with a high sound and construction quality at extremely competitive prices". So now you know.

The V-270C is an alternative, slightly up-market version of the V-250, and sells for the glorious sum of £109, which is £20 up on the 250. Two features set it apart. One is Dolby C noise reduction (both have Dolby B of course); the other a fine bias adjustment facility which gives the unit a degree of compatibility it otherwise lacks.

Otherwise it's the V-250 story all over... The newly designed transport is operated by a purely mechanical set of latch keys; they're floppy but all mod cons are provided including full auto-stop from all transport modes and the ability to go from play to fast wind or vice versa and without damage. The meters are very basic (5 steps/16dB) and the input level control is ganged so channel balance is not adjustable. Tape type selection is manual and awkwardly configured and a tape counter is included; headphone and microphone facilities aren't.

Unfortunately, the Teac suffers exactly the same mid-frequency mechanical whine as the V-250 (look in that review if you don't believe me) which in my test set-up was all too obvious during quiet passages, between songs or whatever. This is taking beer-budgeting too far. I also object mildly to the subterfuge used in the meter display. Although left and right hand channels appear to have their own display elements, they're in fact ganged together - mono in other words. This apart the V-270C looks and feels perfectly satisfactory, and may well fool some into thinking it costs more than it actually does.

LAB REPORT

Lab testing paints a picture of a workmanlike design similar but far from identical to the V-250. Over the main part of the audio frequency band the deck has a well engineered

frequency response, but the new IEC Type II tape (and near equivalents, which means the majority of the latest premium types) is significantly underbiased in the normal (centre) position of the bias adjust slider. The Dolby errors suggested in the partnering response are a faithful reflection of this basic mismatch. If the bias is adjusted to suit the tape in use, the error disappears.

Speed stability isn't the 270's greatest triumph. Wow components alone measured 0.18%, a figure well into the realms of audibility. The spectrum analysis shows several discrete frequencies (which may be related to the audible 'whine' from the transport). Signal/noise is satisfactory with all three tape groups, but the line amplifiers have relatively limited headroom - note the 20 per cent intermodulation distortion measurement (10/11kHz, IEC 0dB).

SOUND QUALITY

There is a suggestion of poor tape-to-head contact in the response plots. This was more than confirmed on audition, even after careful cleaning, as a rawness and a lack of subtlety and some rather metallic top end colorations. With pitch sensitive material - piano is the classic example - the deck gave an almost Lesley-like high frequency warbling effect. The deck doesn't have enough clarity to enable other faults to be forgiven, recordings all too often sounding opaque and crude.

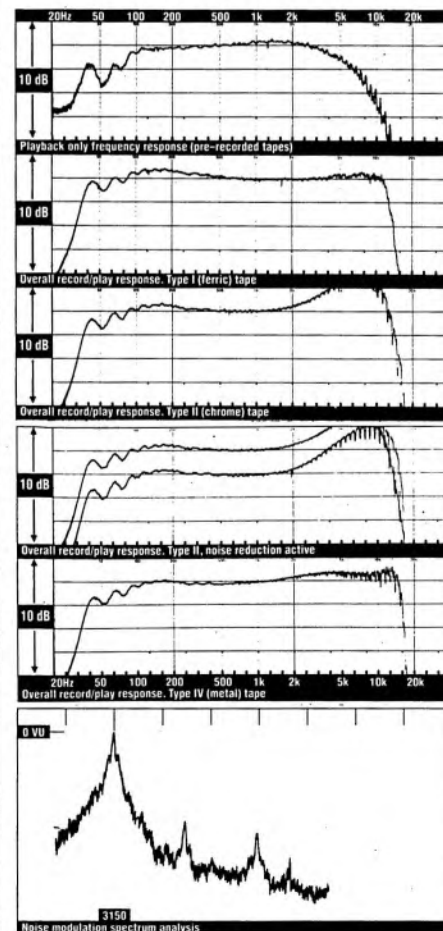
The 270C is at its best with prerecorded material where the single pass minimised the problems caused by the transport. Even here, however, the deck doesn't focus cleanly and lacks range and expression, even though pitch information is more explicitly and accurately reproduced.

CONCLUSIONS

Basic and purposeful, the V-270C nevertheless fails to better the much cheaper V-250 by any worthwhile margin. £109 will buy other decks which are better sounding all round.

TEST RESULTS

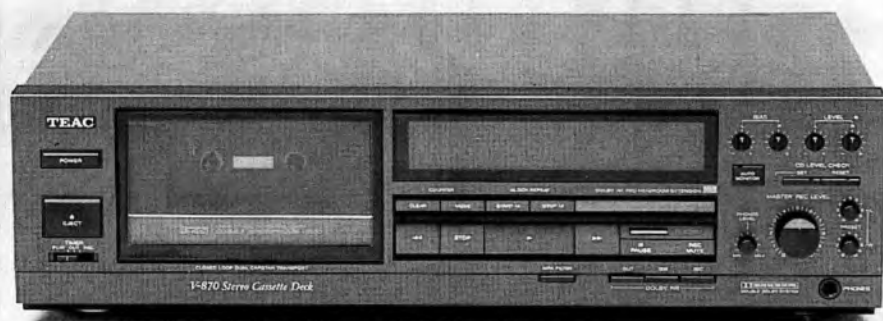
Rec/replay response -3dB ref 1kHz	
IEC Type I	34Hz - 13.5kHz
IEC Type II	35Hz - 15kHz
IEC Type IV	36Hz - 16kHz
Wow & Flutter - Peak DIN wtd/unwtd	0.24%/0.36%
Wow/Flutter Peak DIN wtd	0.18%/0.38%
Speed error	+1.5%
Type I signal/noise CCIR/ARM 400Hz distortion 0dB	53dB 1.4%
Type II signal/noise CCIR/ARM 400Hz distortion 0dB	55.5dB 1.9%
Type IV signal/noise CCIR/ARM 400Hz distortion 0dB	54.5dB 2.1%
Channel separation 0VU/1kHz	45.5dB
Line input sensitivity/overload	83mV/>7V
Line output for 0dB/maximum	518mV/2.5V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	20%
Azimuth check R-L phase at 8kHz	18 degrees
VU indication at IEC 0dB	0dB
Dimensions (w x h x d)	43.5 x 12 x 21.5cms
Typical Retail Price	£109



TEAC V-870

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

RECOMMENDED



Teac aficionados will recognise this machine as a stripped down V-970X, especially now I've told them. For the record, the £400 V-870 omits such features as dbx noise reduction, remote control, some of the clever tape search facilities and the signal generator used in the tape alignment system, adding up to a £100 saving.

That still leaves one very well endowed cassette deck. The basics are a unidirectional transport with closed-loop dual-capstan transport, plus three heads mounted on a diecast alloy base, which offers full real-time off-tape monitoring. Although dbx is left out (which won't upset too many people in this country - dbx tends to go one better in the US where mainstream magazines still encourage people to choose hi-fi 'by the numbers'), the deck is nevertheless equipped with Dolby B and C (with a separate MPX filter switch), and also has HX Pro headroom expansion circuitry.

The omission of the on-board oscillator doesn't mean there's no tape alignment system; there is, using the source/tape monitor switch and ears as final arbiters when setting up. Type I and II tape bias and sensitivity can be set for each channel independently, but for Type IVs Teac somewhat enigmatically state: "due to the characteristics of metal tape, the deck cannot be calibrated for optimum response with this type of tape."

The meters cover 32dB in two colours and with best case 2dB resolution. The electronic tape counter reads in either arbitrary numbers or elapsed playing time, and is associated with block repeat and memory play facilities.

There's quite a lot of attention to detail, which extends to gold plated socketry on the back (to resist corrosion) and a back-lit tape well so that an approximate idea of tape position is always readily available. Headphone monitoring level is adjustable, which is still far from common. Tape/source monitor switching is automatic but can be operated manually.

Little expense has been spared with the 3 dual-capstan 3-motor transport, which offers

superb stability and excellent tape/head contact.

LAB REPORT

The spectrum analysis shows little more than the ideal sharp, single spike at the 3150Hz test frequency. The figures support this analysis: the *unweighted* wow and flutter figure is better than most decks' *weighted* one!

The various record/replay responses look a bit of a mess, but in reality they're simply the opening bid with the tapes used with normal bias and sensitivity settings (ie with the relevant controls centred). The bass end remains a little excessive whatever, but the mid and top can be flattened out with no real difficulty.

The playback response (which is not readily amendable to adjustment) is almost perfectly accurate and the Dolby circuits are well integrated. Noise and distortion figures are also adequate.

SOUND QUALITY

This Teac gave genuinely excellent sound quality with both prerecorded material and also its own recordings. The trademark of the deck is its razor sharp clarity. The combination of Dolby HX Pro and the ability to tweak almost any tape into a more or less flat frequency response goes a long way to making the deck transparent to the tape.

A wide range of tapes are suitable, though there was a tendency for higher energy Type IIs to work best. This is one of the few decks able to make sense of capable but oddball tapes like TDK AD-X or That's' Type II metals. As with other high resolution recorders, use without noise reduction was preferred where possible. The excellence of the transport endows the deck with a certainty and stability rare at this price.

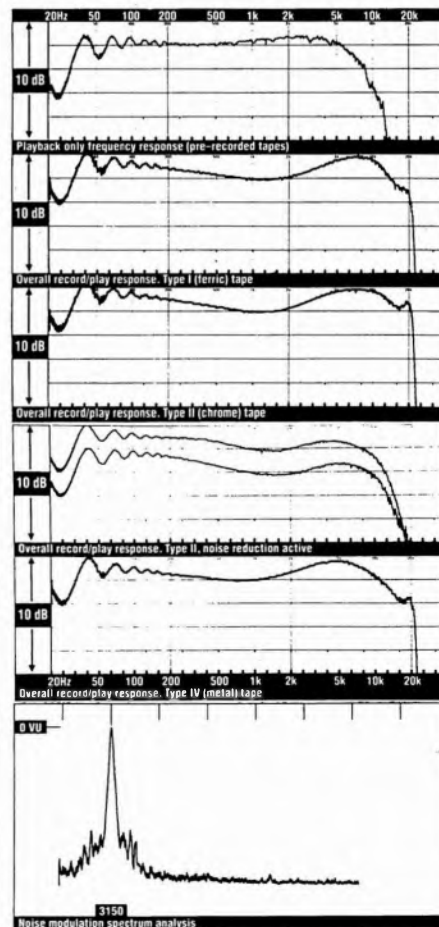
For all the good bits, however, the 870 lacks a certain something - subtlety, euphony, expressiveness, call it what you will. The result of this is a tight, dry and synthetic overlay and an almost palpable electronic fingerprint to the sound.

CONCLUSIONS

An inch short of true excellence, the Teac 870 does almost everything right. It only lacks the sparkle of transparency and life. We're entitled to take a critical view at this price level, but it still earns a Recommended flag.

TEST RESULTS

Rec/replay response - 3dB ref 1kHz	
IEC Type I	<20Hz - 22kHz
IEC Type II	<20Hz - 22.5kHz
IEC Type IV	<20Hz - 21.5kHz
Wow & Flutter - Peak DIN wtd/unwtd	0.054%/0.098%
Wow/Flutter Peak DIN wtd	0.05%/0.088%
Speed error	+0.75%
Type I signal/noise CCIR/ARM 400Hz	53dB
distortion 0dB	1.05%
Type II signal/noise CCIR/ARM 400Hz	56dB
distortion 0dB	2.2%
Type IV signal/noise CCIR/ARM 400Hz	53dB
distortion 0dB	1.2%
Channel separation 0VU/1kHz	46.5dB
Line input sensitivity/overload	95mV/>7V
Line output for 0dB/maximum	524mV/3.1V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	0.28%
Azimuth check R-L phase at 8kHz	14 degrees
VU indication at IEC 0dB	2dB
Dimensions (w x h x d)	43.5 x 12.5 x 28cms
Typical Retail Price	£399



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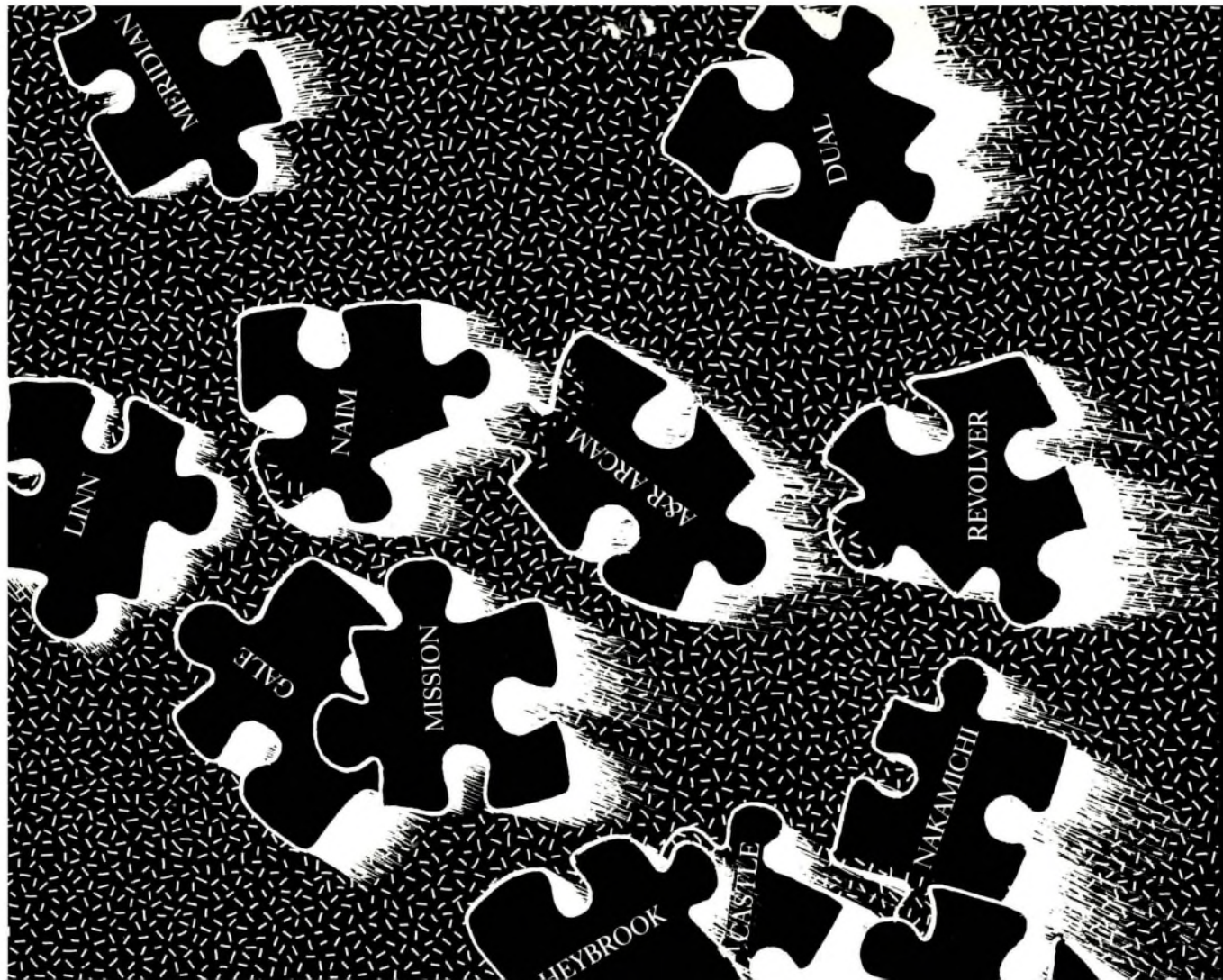
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TECHNICS RS-B355

PANASONIC (UK) LTD., 300-318 BATH ROAD, SLOUGH, BERKS SL1 6JB. TEL: (0753) 34522.

RECOMMENDED



This newly introduced near-budget model will set you back £140 should you be tempted. It's a mild 1988 style redesign of the identically priced *RS-B305* which achieved Best Buy status in *Issue 52*. About the only critical comment then concerned the lack of automatic tape type recognition, but this has been put right, along with a row of telltales for confirmation purposes. Oh yes – I did kind of suggest that the twin switch Dolby setting arrangement was 'awkward'. That's been changed too. Maybe someone was listening!

The result is a near ideal specification for a lowish cost unit. It now only lacks defeatable MPX filtering and decent meters in place of the grotty 26dB over five step type currently fitted. Maybe next year?

The deck is powered by twin rotary engines and is driven by a neat full logic control section. This has audible cue and review controls, the output here at a reduced level to avoid upsetting the dog. Aside from the aforementioned grotty meters and mechanical tape counter, the only significant other extra features are microphone sockets – an increasingly unusual provision whose passing is mourned by many enthusiasts – and a switch permitting unattended recording if coupled to an external timer.

The deck is surprisingly solid and healthily built for a model in this price area, operating with a degree of precision that is still above the norm. The only jarring note is a loud 'click' as transport modes are engaged.

LAB REPORT

If you have a successful formula, why change it? That at least must have been in Technics' (corporate) mind, since the *355* has many of the trademarks of the old model. The line and mike input sensitivities have been increased, however, and although most of the other figures are very similar, the transport does appear to have been modified.

The test equipment used to produce the noise modulation spectrum analysis and wow and flutter figures has been changed since the last issue, so the test results may not be entirely comparable. Nevertheless the *355*

has lower and more smoothly distributed noise artefacts with fewer of the discrete frequencies evident in the *RS-B305* spectrogram. Wow and flutter levels are not low, but the wow contribution (below about 4Hz) is a satisfactory 0.10%.

Noise and distortion results are very similar to the old model, and the amplifiers will tolerate being driven well beyond 0VU (using metal tape, say) by complex musical signals without obvious signs of distress.

Even the record/replay responses look almost identical. The Dolby circuits are well adjusted, but there's a significant HF loss with prerecorded cassettes, despite correct head azimuth. It is one thing to align a recorder accurately from input through to output, quite another to maintain consistency with tapes made elsewhere.

SOUND QUALITY

The *355* turns out to have an important weakness, and this as much as improving standards elsewhere has led to a Recommended rather than Best Buy rating. It's incapable of reproducing musicassettes adequately. My notes describe this Technics as dull, soggy and lacking in tonal colour and variety.

Happily the deck performs much better as a self contained recorder. I was especially impressed with its crispness, stability and lack of clutter, and also the way it is able to retain instrumental relationships and separation within an articulate and stable soundstage. The special characteristics of metal tapes like TDK *MA* – in particular its ability to handle dynamic range without compression – are particularly well exploited by this model.

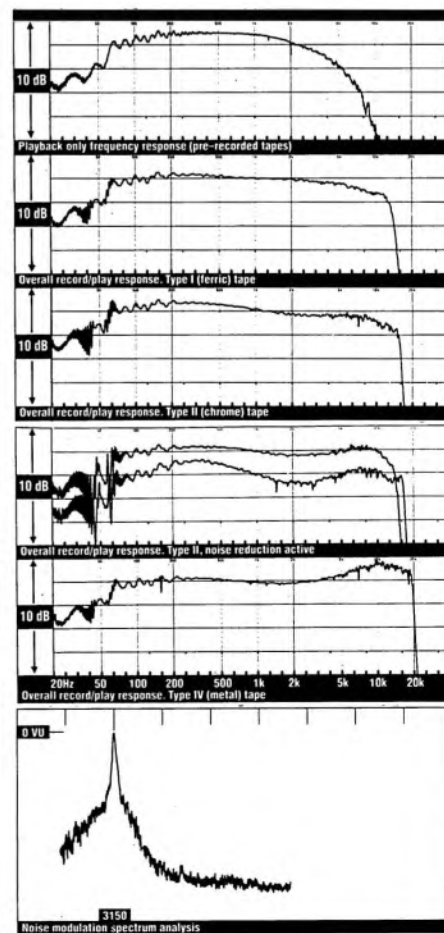
There's a trace of edginess at times, and some dryness and coarseness was also heard when the electronics were auditioned on their own (in the tape monitor loop of the partnering amplifier) – the *RS-B355* might be accused of being a better cassette recorder than it is an amplifier. But this is a common enough complaint, and the overriding impressions remain favourable.

CONCLUSIONS

With the few shortcomings of its predecessor thoroughly addressed in this new model, the outcome is an excellent, well rounded recorder, strongly Recommended for those who mainly make their own recordings.

TEST RESULTS

Rec/replay response – 3dB ref 1kHz	
IEC Type I	40Hz – 14kHz
IEC Type II	40Hz – 16kHz
IEC Type IV	40Hz – 20kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.18%/0.36%
Wow/Flutter Peak DIN wtd	0.10%/0.36%
Speed error	+0.5%
Type I signal/noise CCIR/ARM 400Hz	49dB
distortion 0dB	0.5%
Type II signal/noise CCIR/ARM 400Hz	53dB
distortion 0dB	0.8%
Type IV signal/noise CCIR/ARM 400Hz	50dB
distortion 0dB	0.65%
Channel separation 0VU/1kHz	48dB
Line input sensitivity/overload	107mV/>7V
Mic input sensitivity/overload	0.34mV/23mV
Line output for 0dB/maximum	660mV/3.1V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	0.63%
Azimuth check R-L phase at 8kHz	0 degrees
VU indication at IEC 0dB	3dB
Dimensions (w x h x d)	43 x 11.5 x 29cms
Typical Retail Price	£140



TECHNICS RS-T230

PANASONIC (UK) LTD., 300-318 BATH ROAD, SLOUGH, BERKS SL1 6JB. TEL: (0753) 34522.



I'm told Technics has had more than just a little success with previous budget dual cassette decks, so this one should prove a popular addition at the low, low end of the price spectrum band. There's nothing special about the equipment, which as expected has a record capable transport and one suitable simply for playback purposes. The appeal lies in the combination of the maker's name and the low price.

There are certain features expected of any dual deck though, and the £160 *RS-T230* has them all. They include, in no special order: the ability to dub cassettes at double speed; a method of dubbing involving a single press of a single key (Synchro-Start, accompanied here by Synchro-Stop which pauses the destination tape when the source one is ready to be changed over, or is stopped manually); and Dolby B and C, without which any cassette deck would seem undressed. Serial (or sequential) play is also available.

Inexpensive as this deck is, it still has a surprisingly slick set of transport controls which, remarkably, includes audible cue and review directly accessible from 'play' mode. Both transports also have automatic tape type selection with confirming LEDs on the record transport. Headphones (but not microphones) can be connected, and a timer switch allows the deck to be used for absentee recording.

The record level meters cover 16dB in 5 steps, which is adequate enough for a model in this price range. Fit, finish and control feel are simply remarkable considering the price. There were some rough edges in less accessible places, however - I have a cut to prove it - so take a little care when handling.

LAB REPORT

Although allowances have to be made for the price, the *RS-T230* behaves surprisingly well on the whole. Wow levels are broadly satisfactory, and although flutter is on the high side, the spectrum analysis shows that the undesirable artefacts are distributed in such a way that they should not prove excessively audible. The deck is a little noisy, however,

and it's not really practical to record without Dolby noise reduction, as is often the case with more expensive decks.

The frequency responses all tilt downwards over the full frequency bandwidth, which obviously is not correctable simply by changing tape types. This was confirmed on audition: modern high energy tapes tended to sound bright, leaving the soft middle centre frequencies in the background. The high speed dubbing option led to a much larger loss of output with increasing frequencies (this plot is not reproduced), amounting to about 1dB/octave over most of the audio frequency band. Prerecorded material was much more accurately handled.

The Dolby curves suggest accurate setting up in the case of Dolby B but a small but significant further rolloff in the case of Dolby C which is much as expected.

SOUND QUALITY

Dominating the sound of this player is an overall 'woolliness' that is hinted at but not fully explained by the falling response curves. Aside from being tonally dull, the player has relatively little real resolution and was often best described as glutinous in quality.

Changing tape types did relatively little to cure this malady, though in other respects the deck behaved adequately. There was little obviously wrong with pitch, and the deck generally sounded tidy and in control, whatever it lacked in terms of positive virtues. Matters were not substantially improved using high grade tapes - performance is on the whole machine limited.

Dubbing performance was plain bad. The sound lacked body and became distinctly dull; noise levels soared and the bass lost any sense of meaningfulness. Copies made at high speed were predictably worse still. On the other hand, prerecorded cassettes reproduced with a degree of class out of character with the deck as a whole.

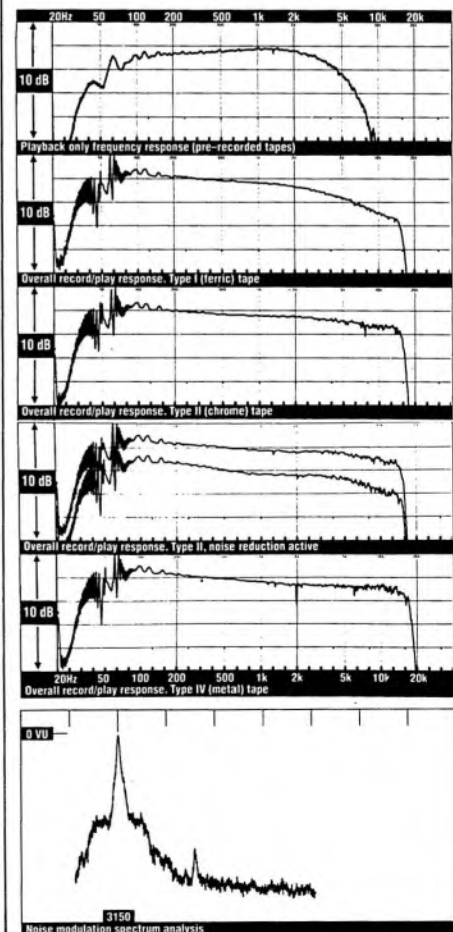
CONCLUSIONS

The *T230* is a gorgeous machine to use with

fabulous controls and facilities for the price. The sound is tidy but dull, though better with prerecorded material. Certainly it's worth considering.

TEST RESULTS

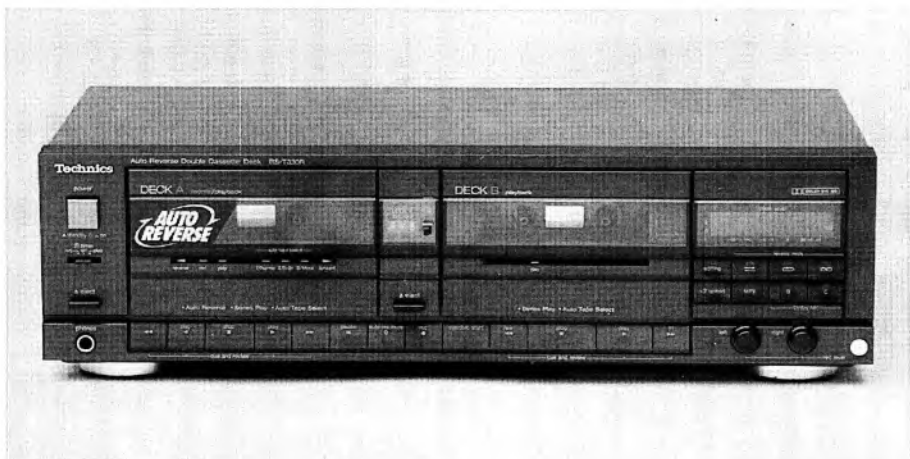
Rec/replay response - 3dB ref 1kHz	
IEC Type I	30Hz - 10kHz
IEC Type II	30Hz - 16kHz
IEC Type IV	30Hz - 18kHz
Wow & Flutter - Peak DIN wtd/unwtd	0.11%/0.38%
Wow/Flutter Peak DIN wtd	0.07%/0.28%
Speed error	+0.5%
Type I signal/noise CCIR/ARM 400Hz	48dB
distortion 0dB	0.55%
Type II signal/noise CCIR/ARM 400Hz	51dB
distortion 0dB	1.0%
Type IV signal/noise CCIR/ARM 400Hz	49dB
distortion 0dB	0.55%
Channel separation 0VU/1kHz	46.5dB
Line input sensitivity/overload	128mV/>7V
Line output for 0dB/maximum	595mV/2.5V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	4.4%
Azimuth check R-L phase at 8kHz	20 degrees
VU indication at IEC 0dB	+3dB
Dimensions (w x h x d)	43 x 12.5 x 23.5cms
Typical Retail Price	£160



TECHNICS RS-T330

PANASONIC (UK) LTD., 300-318 BATH ROAD, SLOUGH, BERKS SL1 6JB. TEL: (0753) 34522.

RECOMMENDED



The *RS-T330* is a twin cassette deck which fits within the £200 price break, pitched as a fairly sophisticated model. Most twins are built down to a cost rather than up to a specification; this one is in danger of doing the opposite.

It is one of a small number of slightly strange twins which combine an auto-reverse deck capable of recording and playing back, and a unidirectional transport for replay only. There may be several positive things to say about this arrangement (theoretically a high quality unidirectional transport could have a narrow head for optimum replay, but see later), but on the negative side must be included the purely personal observation that I can't quite see the point. The auto reverse record feature makes sense; it facilitates long, uninterrupted recordings, for example off radio. But the prime raison d'être for twin decks, at least for most users, is the ability to dub cassettes, and the inability of the play transport to switch sides automatically means that this facility is somewhat wasted on the record side.

Be that as it may, what can the *RS-T330R* do, and with what style? The answer to the second of these questions is 'considerable'. There is automatic tape type selection and full logic controls on both transports (with audible cue/review in both cases), neither of which is anything like universal with twin decks. Naturally, Dolbys B and C are fitted, but in a concession to sound quality I had not expected at this price or with this type of product, the 19kHz MPX filter can be defeated independently of the noise reduction circuits.

Some of the ergonomic decisions seem to have been made with more of an eye to aesthetics than dear old aunt Flo, but owners will certainly appreciate the 2x dubbing facility, the sequential play mode, the one key synchro-start (my car's got one of those too), the repeat facility, the 26dB meters (however minuscule), and the quick reverse feature which switches sides at the tape/leader junction rather than the end of the tape.

LAB REPORT

This is the most expensive of four twin transport decks newly tested in this issue, and easily the best. The lab results show some of the reasons why. Despite the auto reverse record transport which is a traditional recipe for poor performance, this Technics achieves a wow and flutter performance that places it truly in the hi-fi category, alongside some unidirectional decks in the same price area. The W&F spectrum plot tends to confirm this analysis.

The various frequency responses are also extremely well engineered. Note the ruler flat Type IV metal record/replay response shape which holds accurately to 15kHz before rolling off beyond audibility. The pre-recorded response shape is also quite accurate, whilst Dolby processing made little material difference, at least from the measurement point of view.

SOUND QUALITY

The *RS-T330* is a surprisingly strong subjective performer, and one of the best – arguably the best – moderately priced twin deck the author has tried. Sound quality is crisp, lean and tolerably stable – much more so than the other twin transport models tested for this issue. There's the suggestion of a soundstage, and a clean, light sound that suggests reduced modulation noise – even the hiss sounded more detached and less obvious than with the cheaper *RS-T230*.

Curiously, the unidirectional playback only transport was audibly inferior to the auto reverse record/playback one and this naturally reflected in the quality of dubbed tapes, which were perceptibly less accurate and stable than others. Dubbed piano recordings were plainly shaky in tone and pitch alike. Dubbed tapes also included a degree of hum, though at low level.

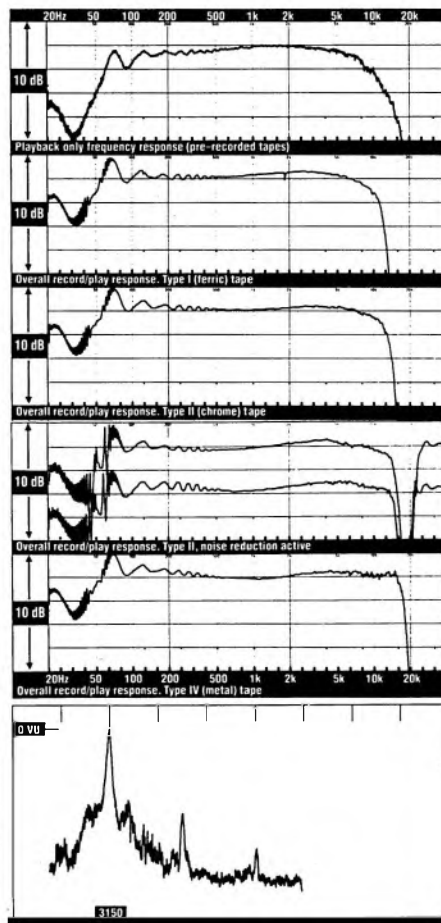
CONCLUSIONS

The *RS-T330* has an exceptionally practical user interface and is consequently a pleasure to use. A good single transport deck will still

beat it on music, but if the dubbing and sequential play facilities are important, this fine sounding model is an excellent purchase, and one of very few twins to deserve confident Recommendation.

TEST RESULTS

Rec/replay response – 3dB ref 1kHz	
IEC Type I	35Hz – 17kHz
IEC Type II	35Hz – 18kHz
IEC Type IV	35Hz – 18kHz
Wow & Flutter – Peak DIN wtd/unwtd	0.10%/0.15%
Wow/Flutter Peak DIN wtd	0.06%/0.26%
Speed error	+0.5%
Type I signal/noise CCIR/ARM 400Hz distortion 0dB	48.5dB
Type II signal/noise CCIR/ARM 400Hz distortion 0dB	54.5dB
Type IV signal/noise CCIR/ARM 400Hz distortion 0dB	51dB
Channel separation 0VU/1kHz	48dB
Line input sensitivity/overload	130mV/>7V
Line output for 0dB/maximum	62.4mV/2.6V
IM distortion 1kHz, ref 10kHz/11kHz 0dB	3.2%
Azimuth check R-L phase at 8kHz	15 degrees
VU indication at IEC 0dB	+3dB
Dimensions (w x h x d)	43 x 12.5 x 23.5cms
Typical Retail Price	£200



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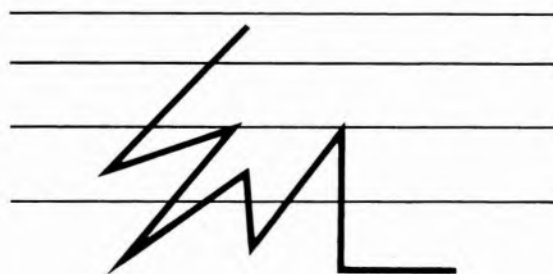
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TECH TALK

Alvin Gold describes the how and why of the various technical tests.

The true value of any *Hi-Fi Choice* project derives from covering a wide enough range of equipment to be fully representative of the market as a whole, and in reporting on them using common techniques and criteria, so that once the reader has learned to interpret the author's personal idiosyncrasies and prejudices, he can apply this knowledge to a large database of review information.

At the outset let me acknowledge the help I received from various sources: Robert King, an able assistant who did much measurement and donkey work; Chris Bryant, who did the sensitivity, overload, azimuth, intermodulation and VU indication at IEC 0dB measurements. All the remaining machine tests and most of the tape tests were done using the author's own facilities.

As in previous projects, the cassette decks were assessed in two distinct ways: first as hardware designed to play commercially recorded musicassettes, and secondly as recording tools. The vital distinction is that for the former the deck must correspond (in physical alignment and electrical equalisation) to the external standards applied during the duplication of prerecorded material. In the latter case, this stricture doesn't apply in quite the same way. Although a recorded tape ought still to replay accurately on other cassette decks (the owner's Walkman or ICE players, for example) some of the commonest errors (notably those due to head alignment) are essentially self-correcting with the same machine; they replay with the same error that was used at the record stage.

LAB TESTING

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

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

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

Signal/noise ratios are quoted with CCIR/ARM weighting. The test frequency is 315Hz, the distortion is shown at the same point (0VU on the deck's meters) for each of the three tape types.

Channel separation is measured with reference to a 1kHz signal at 0VU on the deck's meters.

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

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

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

IM distortion 10kHz 11kHz 0dB peak, 1kHz product. This test gives a useful measure of how well or badly the various machines respond when asked to record two high frequency signals at 0VU level simultaneously. Real life musical signals are much more complex still of course, and an inability to deal with this test cleanly suggests an inability to cope with up-front percussion or other high energy material without sounding hard, splattery or just plain distorted.

Azimuth check R-L phase at 8kHz. Expressed in degrees (of treble phase shift), this is a measure of azimuth misalignment. The higher the

error the greater the HF loss when playing commercially recorded cassettes.

VU indication at IEC 0dB. In principle, the 0VU point on a deck's record level meters is arbitrary, but it is usually set around +3dB ref IEC 0dB.

Dimensions (w x h x d). In centimetres, of course.

PLOTS & GRAPHS

In addition, a number of plots and graphs are included with each review. The frequency response plots were run with the highest pen writing speed available, which means that dropouts tend to show up in all their glory, and frequency response errors are not 'sanitised' as is often the case. The chart recorder was used with its greatest vertical resolution. This exaggerates response aberrations by a factor of 2.5 times compared to previous cassette deck tests but brings them into line with CD players, cartridges and amplifiers. The record/replay sweeps were also continued right up to 40kHz. All response plots were run at —10dB, which stresses the machines rather more than the traditional —20dB.

Also included are similar, comparable plots showing the effects of the noise reduction systems in the frequency domain. The playback only plots were also run in exactly the same way, giving an indication of the frequency response available with prerecorded material. There is no available sweep test tape for this, so the author made his own, calibrated against the official 120µS Amax IEC calibration test tape. The accuracy of this test tape is not absolute, but error is estimated at around 1.5dB maximum — and is constant from machine to machine.

We also performed spectrum analysis tests to investigate the mechanical behaviour of each of the decks, though space prevented the publication of more than one of these. The noise modulation spectrogram graphically illustrates the mauling endured by a 3150Hz sine wave when recorded and

replayed by the deck under test — there are close parallels with a similar analysis carried out in last year's edition. The central peak should be as fine and as thin as possible, any problem here being heard as a lack of pitch stability.

Then there's the question of test procedure/presentation defaults. With twin cassette decks, all measurements and plots shown are for the main record/playback transport, but both were checked, and any discrepancies reported as appropriate. Response runs were also made using the high speed dub option, but have not been reproduced for space reasons. With auto-reverse decks, all data refers to Side 1, but the reverse side was checked in the same way, and again discrepancies are reported as they arose. In the case of decks with automatic tape alignment, the alignment procedure was followed, and where a bias adjustment facility was fitted, the setting recommended for TDK, AD, SA and MA was used if available. Otherwise the central (usually 12 o'clock) setting was adopted.

LISTENING TESTS

The listening was divided into two sections. The first involved using each deck in turn in a system which included a Sony CDP-552ESD11 CD player, Musical Fidelity A1 amplifier and a pair of Stax Lambda Pro headphones. Much routine listening was done with this system, along with all the functional work — which button does what and so on.

Finally, and most important of all, each deck was auditioned in a high grade loudspeaker based system. Equipment used included a Musical Fidelity preamplifier (my own DNM preamplifier has no tape circuit at present), Musical Fidelity A370 power amplifier, a Roksan Xerxes/Rega RB-300/Koetsu Rosewood Signature record deck, the aforementioned Sony CD player with outboard 703 DAC amongst others and a pair of Apogee Caliper loudspeakers, all wired with solid core DNM.

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INDICES

fide'li'ty n. strict conformity to truth or fact; exact correspondence to the original; precision of reproduction.

a'ccū'ate a. careful, precise; in exact conformity with a standard or with truth.

dēfīnī'tion n. stating precise nature of thing, meaning of word; making or being distinct; degree of distinctness, in outline.

dŷna'mic(s) a&n.pl. (usu. treated as sing.) **1** + a. of motive force (opp. static); of force in actual operation (opp. potential) relating to volume of sound. **2** + n. amount or variation of volume of sound.

rē'al'ism n. fidelity of representation, truth to nature; insistence upon details; showing of thing as it is without glossing over what is disagreeable.

sy'stem n. **1** + complex whole, set of connected things or parts; organised body of material things. **2** + method, organisation, considered principles of procedure.

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CASSETTE DECKS: CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

Following the hiatus in plans to get DAT on sale over the past year or so, Aiwa were first to put their underemployed DAT engineers to work designing cassette decks instead of twiddling their thumbs. Almost out of desperation, someone twigged they could profitably redesign their cassette decks with the experience of DAT fresh in mind. I've heard similar stories from other companies since, and it helps explain the sudden rash of high grade Japanese cassette decks when the market had been all but written off by the pundits. It also explains why so many of the new decks look exactly like DAT recorders . . .

The (temporary) eclipse of digital audio tape is not the only factor of course. The fact is that cassette decks are Japanese – just about every last one of them – and the Japanese home market has shown some interest in up-market cassette technology, partly to fill precisely the gap DAT was designed to plug. Partly also, it is the desire to 'do justice' in some manner to the problems of capturing compact disc sound on tape. It's not generally realised that CD is actually a simpler medium than vinyl for the compact cassette to cope with, as, the latter tends to have quite a lot of uncorrelated (non-music related) low frequency energy which can excite problems in the the cassette just where it is demonstrably at its weakest. And also the cassette is widely perceived as technically the weakest in all high fidelity media, and the one most in need of improving.

Those then are the basics; so how well have the manufacturers succeeded? At the bottom end of the market little has changed, which was probably inevitable since manufacturing cost constraints call the tune. At higher prices, however, there has been real progress, and a number of manufacturers are making meaningful and effective strides in the general direction of audio nirvana.

Looking at cassettes (analogue) only, no less than 13

out of 25 are Recommended, but there is only one Best Buy. The former reflects the nature of the market, having made the decision to award a Recommended flag for one model, it turned out to be hard not to recommend a range of others because there was a base level of commonality between a number of the decks tested. Many of the manufacturers make extensive use of the same off-the-shelf transports, heads and other key components. Similarly, only one of the low cost models really stood out, and that is our sole Best Buy in these tests. However, had it been permissible to award Best Buy to expensive machines, the JVC *TD-V711* would have been added to the list, and maybe also the Aiwa *XK-009*.

There were some oddities. I make no excuses for again pointing out the deleterious effect of Dolby noise reduction where it was found, but it's far from simple trying to pin down exactly where the loss of quality occurs. In most cases it's a fact that when you turn Dolby off, very little other than some side chain processing is actually removed from the audio signal path. The circuit simply changes in its pass characteristics but continues to sit there in the signal path. The aforementioned JVC is an honourable exception. But there are cases where very high quality sound is plainly not spoiled by the presence of Dolby, and this at least shows there is nothing inevitable about the problem, and that rather than Dolby per se, it's almost certainly the implementation of the specific design that counts.

Preparatory to this test, I had a conversation with some senior engineers from Sony's tape division. In addition to making my day by explaining how about 20 per cent of their development work was taken up with listening to different formulations (a favourite being Whitney Houston – but nobody's perfect, are they?) they also confirmed what I had heard from other sources: the dislike of the Japanese audiophile for Dolby processing

in general. Looking at Sony's better tape formulations, ie ES-Metal, it is easy to understand why. Such tapes defy easy categorisation as simple (in this case) metal bias tapes, in much the same way that That's Type II metals don't sit happily in the Type II bias position. Naturally, if you introduce processing of the Dolby type which depends for record/playback integrity on knowing where its operating levels are, the sound is going to get awfully confused. Using dbx, which inevitably sounds worse, does so for quite different reasons of course – it can simply be heard working, but here too it is necessary for the recorder to produce a flat amplitude/frequency response if balance changes are not to be ruthlessly magnified.

All this inevitably leads to only one conclusion. Either all tapes must return to conformity with an accepted standard, the IEC Primary Reference for each tape group for example, but this is about as likely as a wholesale legalisation of mugging. Or the alternative, if Dolby is to be used, is that deck manufacturers must provide the wherewithal to enable their recorders to be tweaked to suit. At the very least

record sensitivity must be adjustable in addition to the ability to tweak record bias.

Many decks now have the latter, albeit sometimes only for Type I and II tapes (an absurdity that probably has much to do with the inability of many decks and record heads to handle additional record current, and very little to do with the supposed similar bias requirements of different metals). But painfully few decks have any facility to adjust record sensitivity. A calibrated control with a list of settings for commonly available tapes would be cheap and satisfactory. The Aiwa *XK-009* arrangement (see review) would be even better. As it stands though, the choice is all too often between using Dolby or using a high grade tape formulation – but not both.

Dolby will continue to win on basic noise levels, of course, but not always by an overwhelming margin – some recent high energy tapes can be driven to frighteningly high levels without saturation on the better cassette decks, with consequent reductions in background noise intrusion. But when it comes down to simple musical euphony the story is likely to be different.



BEST BUY

Dual CC8010 (£109)

RECOMMENDED

Teac V-250 (£89)
Onkyo TA-2120 (£120)
Technics RS-B355 (£140)
Kenwood KX-660HX (£170)
Pioneer CT-443 (£180)
Denon DRM-10HX (£180)
Technics RS-T330 (£200)
Sony TC-RX80ES (£350)
Teac V-870 (£399)
JVC TD-V711 (£380)
Nakamichi RX-202E (£545)
Aiwa XK-009K (£550)
NAD 6300 (£649)

In addition, Recommendations and Best Buys from previous issues (where they continue to be available) are carried over, but with some detail modifications to reflect changing market circumstances.

The models that have maintained their ranking (all Recommended unless otherwise stated) are the Akai GX-52 (Best Buy - £249) and GX-6 (£350), the Denon DR-M12HX (£220) and DR-M44HX (£400), Marantz models SD-45II, CP230 and SD-55 (£200, £300 and £349 respectively), the Nakamichi CR-2E, 3E, 4E and 7E (£395, £595, £745, £1,500), the Sony WMD6C ProWalkman (Best Buy of course - £249) and TC-K700ES (£499), the Teac V-970X (£499, though its thunder has been stolen by the V-870), and finally the Yamaha KX-400 and KX-500 (£200 and £210).

The following have been downrated as increased competition has rendered them less competitive: the Aiwa AD-WX909 (£400 - from Best Buy to Recommended) the Marantz SD-35 (£169 - ditto), Denon DR-M24HX (£290 - ditto) and Yamaha KX-200 (£140 - ditto). The Onkyo TA-2130 (£140), Sony TC-FX150 (£90) and Technics RSB-605 (£180) are no longer explicitly recommended but are still worth considering. Finally, the Denon DR-M07 (£125) is promoted from Recommended to Best Buy because Hayden Labs have reduced the price. Nice one!

DIGITAL AUDIO TAPE

Summing up the DAT tests this year is more a matter of placing the system in the known firmament than waxing deep and philosophical about individual machines. We have seen though that there is a range of ability; they do not sound the same. Second, although they tend to have quite similar facilities, there are significant differences. To give one example, using the track ID systems, which by the way are remarkably effective, track 6 on one machine is quite

likely to be a completely different song on other decks. Once written however, track IDs are quite unambiguous, unlike the gap that separates tracks on an analogue cassette tape from the point of view of a track search feature. Therefore with DAT a prerecorded tape with encoded track IDs would work the same on all machines. On many cassette machines, you never really know where you are.

In the inevitable comparison with compact cassette, DAT does well in principle, though in practical situations it would be at a considerable disadvantage unless the car player, the kitchen radio/cassette - even the kid's carry-around portable and the Walkman - were also switched for DAT based equivalents. That can't happen overnight, of course, and there is some reason to doubt whether a broadly based wholesale change of this kind will be possible at all in the foreseeable future.

However, simply as a surrogate for a cassette deck DAT is very impressive indeed. The tapes are small and wholly enclosed and so are safe to handle. There is no need to tell the recorder what type of tape has been inserted, and the compromises implicit in auto-reverse operation are a thing of the past. Track search is ultra-rapid and sure and you have the very important benefit of up to two hours uninterrupted recording time.

On sound quality, DAT is also on very strong ground. The best of the recorders tested for this feature are broadly similar in sound quality to a mid price CD player when used for recording in the analogue domain (you have no choice, of course). These are early machines and they will certainly get better, yet there are reasons to suppose they are unlikely ever to sound better than CD; in fact they'll probably be very similar or just slightly worse. Compared to compact cassette however, there the choice is simpler. Cassettes can rival or even better DAT musically, but only very exceptionally, for example in the case of the best Nakamichis which have particularly well designed audio circuits as well as transports and heads. For the rest of us, good DAT (I stress the word good, because there's going to be plenty of bad DAT too) will walk it.

The four models worthy of Recommendation are:
Aiwa XD-001 Excelia
Sony DTC-100ES
Pioneer D-1000
Sony DTC-M100

	Single deck	Dual deck/ single record	Dual deck/ dual record	High speed dub	Real-time counter	Counter memory
Aiwa AD-F370	•					
Aiwa AD-WX707		•		•		
Aiwa XK-007 Excelia	•				•	•
Aiwa AD-WX909		•		•		
Aiwa XK-009 Excelia					•	•
Akai GX-52	•				•	•
Akai GX-6	•				•	
Denon DR-M07	•					
Denon DR-M10HX	•					•
Denon DR-M12HX	•					•
Denon DR-M24HX	•					•
Denon DR-M34HR	•					•
Denon DR-M44HX	•				•	•
Dual CC8010	•					
Harman Kardon CD491	•				•	•
Hitachi D-003		•		•		
Hitachi D-007		•		•		
JVC TD-V711	•				•	•
JVC TD-W222		•		•		
Kenwood KX440HX	•					
Kenwood KX-660HX	•				•	
Luxman K105	•					
Luxman K-112	•					•
Marantz SD-35	•					
Marantz SD-45II	•					•
Marantz CP230	•					•
Marantz SD-55	•				•	•
NAD 6300	•				•	
Nakamichi CR-1E	•					•
Nakamichi CR-2E	•					•
Nakamichi RX-202E	•					•
Nakamichi CR-3E	•					•
Nakamichi CR-4E	•					•
Nakamichi CR-7E	•				•	•
Nakamichi Dragon	•				•	•
Nikko D-8011	•				•	•
Onkyo TA-2120	•					
Onkyo TA 2130	•					
Philips FC566	•					•
Philips FC567		•	•	•		
Pioneer CT-443	•					
Pioneer CT-737	•				•	•
Proton AD-200	•					
Proton AD-300	•					•
Revox B215	•				•	•
SAE C102	•				•	
Sony TC-FX 150	•					
Sony TC-W300		•		•		
Sony TC-RX50	•					•
Sony (WMD6C) ProWalkman	•					
Sony TC-RX60ES	•				•	•
Sony TC-RX80ES	•				•	•
Sony TC-K700ES	•					
Tandberg 3014A	•				•	•
Teac V-250	•					
Teac V-270C	•					
Teac R-515	•				•	•
Teac V-870	•				•	•
Teac V-970X	•				•	•
Technics RS-T230		•		•		
Technics RS-B355	•					
Technics RS-B505	•					
Technics RS-B605	•					
Technics RS-T330R		•		•		
Technics RS-B705	•					
Technics RS-B905	•					
Technics RS-T80R			•	•		
Yamaha KX-200	•					
Yamaha KX-300	•					•
Yamaha KX-400	•					
Yamaha KX-500	•				•	•
Yamaha KX-800	•				•	•
Yamaha KX-1200	•				•	•

FEATURES COMPARISON CHART

Auto reverse play	Auto reverse record	Track (music) search	Dolby B	Dolby C	dbx	Dolby HX Pro	Auto tape sensing	Tape alignment adjust	Tape azimuth adjust	Record bias adjust	Remote control	Auto repeat	Pitch control	
			•	•		•	•			•		•		Aiwa AD-F370
•	•		•	•		•	•			•		•		Aiwa AD-WX707
			•	•	•	•	•	•		•		•		Aiwa XK-007 Excelia
•		•	•	•		•	•			•		•		Aiwa AD-WX909
			•	•	•	•	•	•		•		•		Aiwa XK-009 Excelia
•		•	•	•		•	•			•	•	•		Akai GX-52
			•	•		•	•			•		•		Akai GX-6
			•	•		•	•			•		•		Denon DR-M07
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			•	•		•	•			•		•		Denon DR-M24HX
			•	•		•	•	•		•	•	•		Denon DR-M34HR
			•	•		•	•	•	•	•	•	•		Denon DR-M44HX
			•	•		•	•			•		•		Dual CC8010
		•	•	•		•	•			•		•		Harman Kardon CD491
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		•	•	•		•	•			•		•		Kenwood KX440HX
		•	•	•		•	•			•		•		Kenwood KX-660HX
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			•	•		•	•			•		•		Luxman K-112
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			•	•		•	•			•		•		Marantz SD-45II
			•	•		•	•			•		•	•	Marantz CP230
		•	•	•		•	•			•		•		Marantz SD-55
			•	•		•	•			•	•	•		NAD 6300
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•			•	•		•	•	•	•	•	•	•		Nakamichi Dragon
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			•	•		•	•			•		•		Sony TC-FX 150
			•	•		•	•			•		•		Sony TC-W300
•	•		•	•		•	•			•		•		Sony TC-RX50
•	•	•	•	•		•	•			•		•	•	Sony (WMD6C) ProWalkman
•	•	•	•	•		•	•			•		•		Sony TC-RX60ES
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			•	•	•	•	•			•		•		Technics RS-B905
•	•	•	•	•	•	•	•			•		•		Technics RS-T80R
		•	•	•		•	•			•		•	•	Yamaha KX-200
		•	•	•		•	•		•	•	•	•		Yamaha KX-300
•	•	•	•	•		•	•		•	•	•	•		Yamaha KX-400
		•	•	•		•	•		•	•	•	•		Yamaha KX-500
		•	•	•		•	•		•	•	•	•		Yamaha KX-800
		•	•	•	•	•	•		•	•	•	•		Yamaha KX-1200

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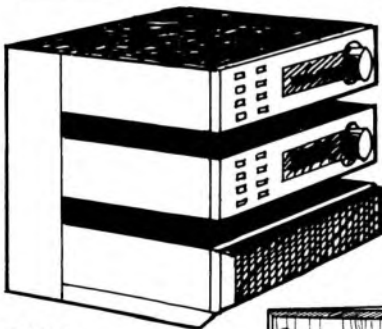
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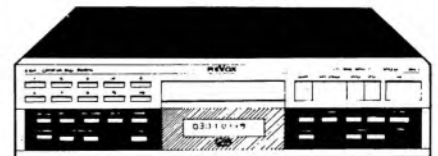
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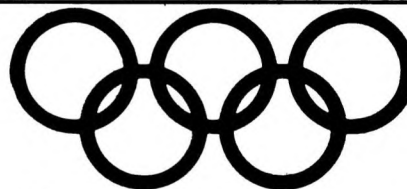
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NO 1 FOR SERVICE AND VALUE



PENTATHLON

The publishing of this magazine coincides with two important events. Firstly, The Olympic Games and of course The Penta Show – hence our title. Your interest in the 5 events which make up The Pentathlon may be strictly limited but we're sure your appetite will be whetted by the 6th event at The Heathrow Hotel! It signals the start of the hi-fi season.

We take this opportunity to highlight some of the 'goodies' being unveiled at the show plus some items which may have escaped your ears while you have been sunning yourself.

At the front of the system we've been delighted with the new Krell cartridge which has exceptional mid-range and the new Roksan cartridge which at £300 is devastating value for money. Roksan have also released a ingenious new pick-up arm which with the cartridge sets new price standards. We've never before offered an arm/cartridge of this quality at such a modest price and we urge you regardless of the turntable you use to audition now. We're also looking forward to demonstrating the exciting new SME arm which brings their technology into a more affordable price area. Significant turntable news is the introduction of a lower price model from Oxford Acoustics called 'The Crystal' which has the same elegant design which made their 'Reference' model such a success.

On the electronics front we have the superb new Krells destined to continue the tradition of the finest high-end transistor amps available in the UK. The KSA200 held us in awe when we first heard it, completely stopping the shop, customers were drawn into the dem room to enjoy this magnificent product (1600 watts into 1 ohm). Equally excellent in a different way are the exquisite new pre and power amps from Goldmund, true high-end 'state of the art' products from Europe made to the highest standards. The Memisis 6 power amp is a bargain, the pre amp whilst expensive is probably the best in the world bar none.

Our range of loudspeakers include the stunning new Apogee Duetta Signature, the Duntech range, the Ensemble Reference for those wanting the highest quality in small rooms and not forgetting TDL and ATC where we are proud to be leading UK specialists.

We equally enjoy serving more affordable products and have a fine range of products from A & R, Audiolab, Denon, Musical Fidelity, Monitor Audio, Manticore, Systemdek, Quad etc.

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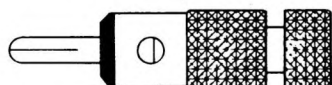


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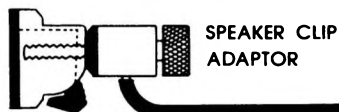
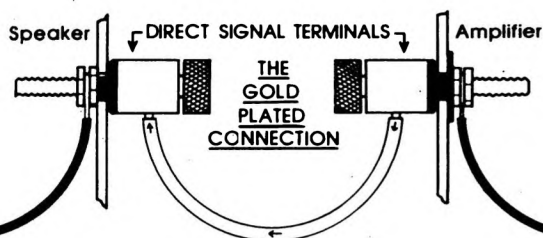
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CHOOSING AND USING . . . VALVE AMPLIFIERS

John Bamford has been listening to a group of valve amplifiers, while Paul Miller provided technical measurements. Here they explain the tests and outline some problems associated with valve amp ownership.

It's widely assumed you've got to be some kind of hi-fi nutcase to want to use a valve amplifier. Clicks and thumps and high hum levels are all problems one often associates with valve amplifiers, along with the hassle of needing plenty of space (valves get hot, so they need a free flow of air around them) and a lot of disposable cash.

The latter certainly hasn't changed much, valve amps today remain almost exclusively the province of the well-heeled enthusiast, although included in these tests there's one power amplifier priced at £299 and an integrated valve amp (now there's a novelty!) costing £339.

subjectively, but with an impedance of 50kohm and capacitance of 200pF the turnover frequency drops to just 16kHz. So, in the cases where a high output impedance is quoted (anything over a few thousand ohms) do try to avoid long interconnects.

Power amp input impedances are spread over an equally wide band. Those with an input around 10 or 20kohm will not pose a problem when matching up with any solid state preamp, but certain valve preamps may suffer a loss of bass extension simply through the current limitations of their output valve(s). Of course, this will

high input impedance. The choice of preamp is critical here, as is the type and method of screening of the interconnect.

It is important to appreciate these problems – many of which are peculiar to the very specialised world of valve amps – even though a good dealer should ensure you do not make a mistake by choosing incompatible components.

LAB TESTS

All input sensitivity (0dBV and 0dBW) and overload measurements were assessed according to IHF specification, dB headroom figures quoted for the latter being relative to 0.5mV for MC and 5mV for MM. Channel balance was taken at this sensitivity though stereo separation was assessed at +10dB. Power output was measured to a ceiling of 1 per cent THD, including the IHF dynamic headroom test.

A 3D graph accompanies each product and it may prove worthwhile when studying them to refer back to the Reference Plot printed on this page. Extensively averaged, this plot examines the performance of an amplifier while subject to a composite swept input of 0-20kHz (0dB reference), a constant 20kHz signal (-24dB) and a reversed sweep running from 0-50kHz and back again (-24dB). The input to the power amplifiers was adjusted so as to raise two-thirds output into 40hms relative to 1kHz. For the preamps a pre-equalised

composite sweep was introduced to the MM disc stage, the level referred to 5mV rms at 1kHz, equivalent to a composite peak of 77.8mV at 20kHz.

A mass of information concerning the linearity of the amplifier is divulged from the 3D plots and, we found a firm subjective correlation in the sound of many of the preamplifiers tested here. When it comes to power amplifiers, however, it seems we are all at sea when trying to determine how a particular component will sound judging by some of our results. According to the lab tests the Audio Innovations amplifiers in particular should have sounded like a bag of nails – yet JB is full of praise for the way in which they sound vibrant and extraordinarily dynamic. We're still scratching our heads. . .

LISTENING TESTS

Something approaching 80 hours was spent auditioning this selection of valve amplifiers in various combinations. Turntables used were the *Voyd* and *Townshend Rock*, with *Excalibur* and *Helius Cyalene* arms respectively, and a selection of cartridges ranging from the Goldring *Eroicas* (high and low output), an Audio Technica *OC9* and the rarified Audio Note *10 Limited*.

CD inputs were tested using a Denon *DCD 1500* (still going strong!) and the splendid Pioneer *FD91*, and speakers used for the tests were SD Acoustics *SD1* and Snell *Type C*.



Owners of MC cartridges will need a step-up transformer for most valve preamps. These come in all shapes and at all prices.

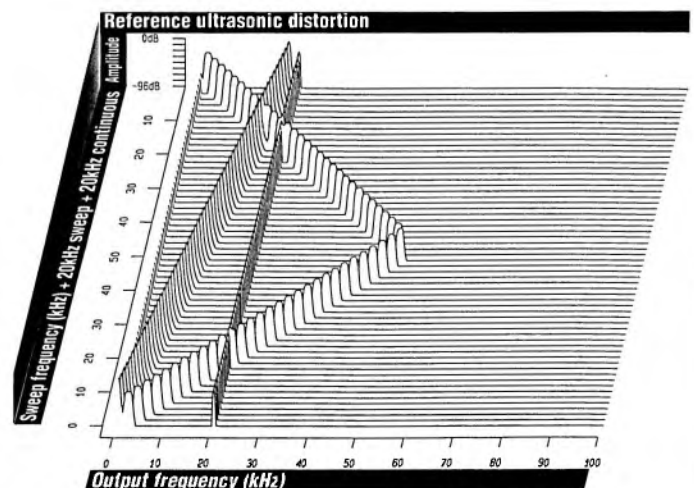
It's usually preamplifiers which are to blame for high noise levels in valve setups. However, none of the components tested this month gave any real cause for concern in respect to untoward background noise – although correct matching of separate components is a particularly important issue. Most valve preamplifiers offer a commensurately higher peak output voltage than their solid state brethren and are able to satisfy the input (sensitivity) of almost any power amp. However the output impedance of the preamplifier is an important parameter, not only in terms of straightforward voltage transfer to a load, but also with respect to the parallel capacitance of the interconnect cable that is used between pre and power amp.

For instance, a valve preamp with an output impedance of 10kohm used with a cable of a nominal 100pF capacitance will function as a low pass filter with a -3dB point at 160kHz. This might be acceptable,

depend very much on the topology chosen, but very low current double-triodes such as the ECC83 may cause problems if used in a lightly cap coupled output configuration.

This sort of problem is cured with high input impedances (up to 0.5Mohm has been recorded), though if used with a high and variable source impedance, such as that presented by a 'passive preamp' (in other words a simple volume control in a box for use with CD players and other line level inputs), it is possible that electromagnetic (hum) coupling will degrade the noise performance. It is also possible that the high frequency response may be curtailed, while connecting and disconnecting phono leads is likely to result in large thumps or hum-like burbles.

Similarly, those power amps with a very high sensitivity (that is, requiring just a few tens of mV for full output) will also be more susceptible to hum fields, especially if they also feature a



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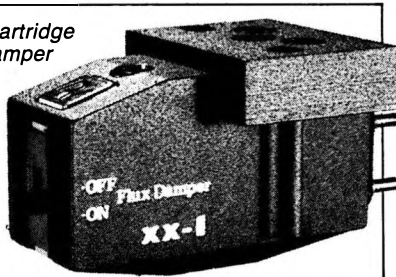
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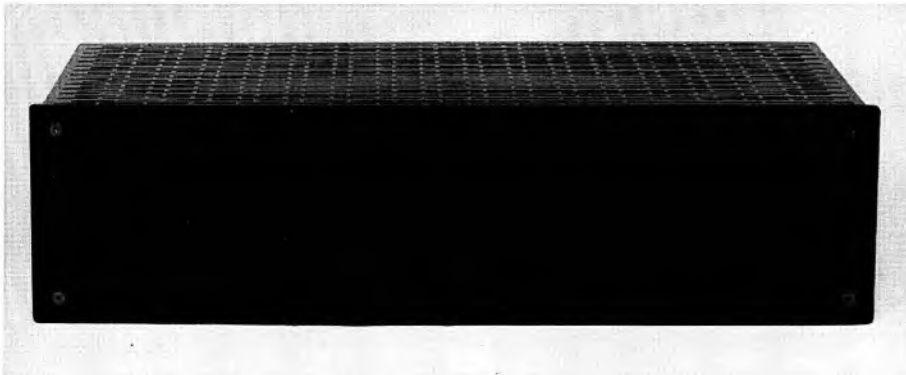
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BEST BUY



There's a complicated history to the *Aria 12* which needs to be explained. For some time Audio Innovations, the Brighton based valve amplifier manufacturer, has been marketing another range of valve separates under the Edison Technology brand name. They've not been heard of much in the UK as most of the production has been for export and only a small handful of dealers stock them here.

Until a few weeks ago this simple 12 watt class A power amplifier was known as the Edison *Model 12*, but for marketing reasons the brand name was changed recently to Aria Acoustics – this model becoming the *Aria 12*. The front panel of our review sample used to sport the Edison Technology banner; as the new panels with the Aria Acoustics Logo were still at the factory waiting for the paint to dry we were left with no alternative but to show you a photograph of an extremely boring looking black box.

Not that there's much to look at anyway. The *Aria 12* is intended to be a real 'beer budget' audiophile amplifier. The front panel is a solid enough affair but the rest comprises a somewhat ill-fitting wrap-over case, held in place by the self tapping screws which secure the rubber feet. On the rear there's one pair of nickel input phono sockets, one set of reasonable quality speaker outlets which will accept 4mm plugs or bare wire, and an IEC mains socket which incorporates an on/off switch.

Talking of low budget, this power amplifier is also available in kit form for £220. The board is pre-assembled, so it's a matter of simply securing the transformer, socketry, pcb, etc into the case and wiring it all up.

LAB REPORT

In contrast to other amplifiers that have emerged from the Audio By Design stable, the *Aria* is subject to around 30dB of feedback – a fact reflected in the low 20kHz distortion figures. Two PCC88 triodes are shared between the left and right channels, these forming a differential input and phase splitter array, each followed by the remaining 'half' of the double triode. Two pairs of *EL84*s comprise the output stage, these being driven in a straightforward push-pull pentode configuration. No regulation is deemed

necessary but at least decent polypropylene capacitors and 1 per cent metal film resistors have been used around the signal path.

A small but noticeable +0.41dB power increase was measured at 1kHz between 8 and 40hm loads, the output transformer being configured with fixed 60hm tapplings. Furthermore some +0.68dB headroom was observed during the IHF dynamic toneburst test, this being equivalent to 10.8W into 8ohms. However, there was a restriction in output at the frequency extremes if the 1 per cent THD guidelines were followed, this being especially true at 20Hz where saturation occurred almost immediately. The amplifier was observed to be unstable above a nominal output of 2.2W (8ohms @ 20Hz). Phase measurements indicated the presence of a LF pole situated at 10Hz so the output below this frequency is rapidly curtailed. At 20Hz, 0.5W the distortion had reached 1 per cent, climbing to 5 per cent at just 1W!

A mediocre -76.1dB squarewave linearity was observed despite the extended 100kHz bandwidth, the amplifier exhibiting a peculiar distortion mechanism that produced both 2nd and 3rd order summation IMD but only 3rd order difference products! This asymmetry is likely to introduce certain grainy colorations at HF just as the high 0.53ohm output impedance is likely to reduce low bass resolution.

SOUND QUALITY

I was a member of the staff on *Hi-Fi Answers* magazine when it was decided to promote this as the '*HFA 12*' kit amplifier. And the reason we chose to do so was because we thought this amp was something special.

Listening to it again for these tests I found nothing to change my opinion. The *Aria 12* lacks control and definition in the low bass, and the treble can sound rather vague and rolled off when used with some loudspeakers, but the sound is vivid and colourful and gloriously transparent through the mid-band.

More importantly, the *12* sounds vibrant and 'alive', image width and depth is first rate, and this amplifier has the ability to respond to dynamic swings in the music and convey real emotion.

CONCLUSIONS

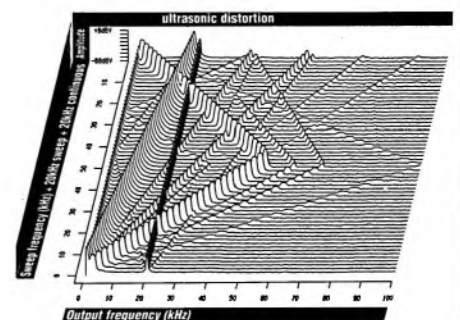
Close your eyes and forget that this is a puny little valve circuit in a tacky tin case; the *Aria 12* is capable of astonishing musical performance way beyond its price point.

Obviously it needs to be partnered with sensitive speakers due to the modest power output, although in a small room we've achieved respectively high sound pressure levels with old-style Spica *TC-50*s rated at only 85dB. But speakers in the 89-90dB range are a safer bet.

With large floorstanding speakers like the SD Acoustics *SD1* I've achieved results which easily fooled visitors into thinking they were listening to a £1,000 power amplifier. In terms of sound quality the *Aria 12* is clearly a Best Buy.

TEST RESULTS

	Power amplifier		
	20Hz	1kHz	20kHz
Maximum Continuous Power Output 8ohms	0.5W	9.23W	7.92W
4ohms	0.4W	10.14W	7.18W
Dynamic Headroom (IHF)		+0.68dB	(10.8W)
Output Impedance	0.53ohm	0.473ohm	
Damping Factor	15.1	16.9	
Stereo separation (0dBW)	68.5dB	80.9dB	62.7dB
Total Harmonic Dist. (0dBW)	5.1%	0.039%	0.041%
($\frac{1}{2}$ power)	5.5%	0.197%	0.093%
CCIR Intermodulation Distortion (0dBW) 2nd order			-67.8dB
3rd order			-72.4dB
CCIR IM Distortion ($\frac{1}{2}$ power) 2nd order			-62.4dB
3rd order			-61.2dB
Squarewave linearity			-76.1dB
Absolute Phase			Positive
Noise (A wtd, 20Hz-20kHz) 0dBW			-78.9dB
(A wtd, 20Hz-20kHz) $\frac{1}{2}$ power			-78.3dB
Residual noise			-71.3dB
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(for full output)			101.9mV
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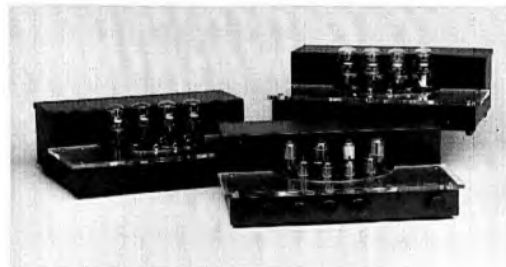
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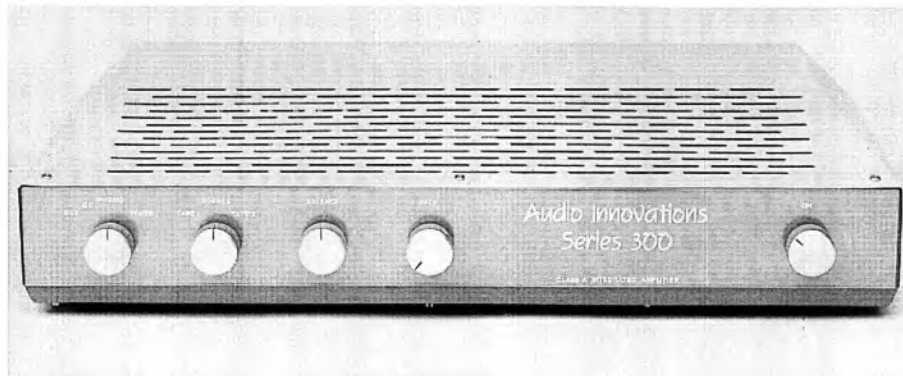
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BEST BUY



Audio Innovations' cheapest amplifier, the *Series 300* is a valve integrated model – a rare species indeed in hi-fi today.

Styling is, er, quirky. Either you'll love it or you'll hate it. The one pictured is the 'Export' version finished in light grey with a Perspex front plate – which we're told goes down a treat in Denmark – and carries a £50 premium. The standard British item comes in an austere black case.

The construction of the casework is decidedly British, complete with self tapping screws sticking out all over the place, and is hardly anything to be proud of. Nonetheless the *300* feels sturdy enough, internal construction is adequately robust, and the rear panel sports some exceptionally chunky speaker binding posts (connections for one pair of speakers only) and good quality phono socketry.

Five identical knobs grace the front panel. Far right is power on/off; the others are for input selection (aux/CD/phono/tuner), switching between source and either of two tape decks, balance (with centre indent) and 'gain'. The controls are at once positive and smooth in action.

Considering this is an amplifier from a specialist manufacturer which aspires to producing serious high fidelity equipment, the *300* is surprisingly well equipped, having as many line inputs as many a self respecting Japanese integrated amplifier. Break-through between inputs is obtrusively high, but this isn't the problem it might be if the amp were equipped with separate listen and record facilities. After all, you can only listen to one source at a time! However, it's ironic that because of price constraints none of the inputs are buffered. Consequently you can hook up two decks, a tuner, a hi-fi VCR and goodness knows what else, but when it comes to playing records you really need to disconnect the whole lot again to enjoy maximum sound quality. Ho hum . . .

LAB REPORT

A peculiar design, reflected in an equally peculiar set of measured results, the *Series 300* has obviously been designed extensively by ear. The disc input uses a single *ECC83* double-triode in a differential configuration

with full solid-state regulation. Polyester capacitors and 1 per cent metal film resistors are employed in a passive RIAA equalisation network, the initial gain to provide +29.4dB (rel to IHF) of headroom at 1kHz. However, this is reduced to +21.3dB at 20kHz whereupon the amplifier is already slew-limiting on positive slopes.

This is reflected in the ultrasonic 3D plot taken via the MM input. Here, a catastrophic multiple-order intermodulation has been precipitated by slew-limiting; witness the 2nd and 3rd-order sum and difference routes associated with all the input sweeps. The eq plot demonstrates a fair degree of tailoring, the MM input falling above 1kHz to reach –7dB at 20kHz. However, the proliferation of odd-order artefacts will ensure the amp does not sound as dull as the curves suggest.

The remainder of the amp consists of a second *ECC83*-based gain block, followed by the volume control, phase splitter and *ECC86* triode/pentode output which is transformer coupled with nominal 60hm secondaries. Adhering to a 1 per cent THD ceiling, the power measurements were naturally restricted even though greater output was available with commensurately greater distortion.

SOUND QUALITY

What can I say? Yes, the *Series 300* measures like a dog's dinner – but it sounds sharp, lucid, tactile and wonderfully dynamic. And just look at those frequency response plots! I'd always suspected the CD input was 'slugged', but it doesn't sound *absurdly* dull – far from it. And on vinyl replay I would criticise the amplifier for sounding a bit sharp and ragged at the top end, coupled with a loose and ill defined bottom end. Although lacking control and finesse, on disc the *300* sounds like an extremely wide bandwidth design. How can it measure so badly yet sound so enjoyable? Maybe the manufacturer would care to comment . . .

CONCLUSIONS

I know that several dealers up and down the UK have been knocking people's socks off demonstrating the *Series 300* with efficient speakers such as Snell *Type K*s (which Audio By Design import from the US). Yet accord-

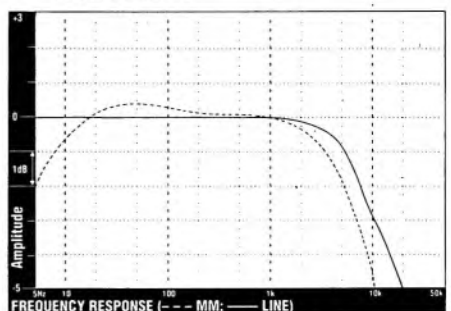
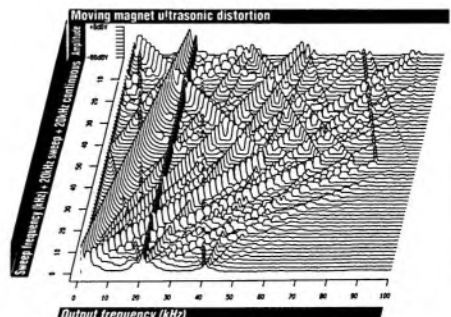
ing to the measurements there is no way this amplifier could be described as being a high fidelity product.

And I know from extensive listening that on disc this is a cracker of an amplifier. It does sound ragged and loose at the frequency extremes, but overriding this is a sense of speed and agility which makes the musicians come alive in the soundstage. For sound quality I think it deserves Best Buy status.

Just think of the cachet of ownership. When friends call round you can say, "Hey, come and have a listen – I've just bought one of the worst amplifiers in the world!"

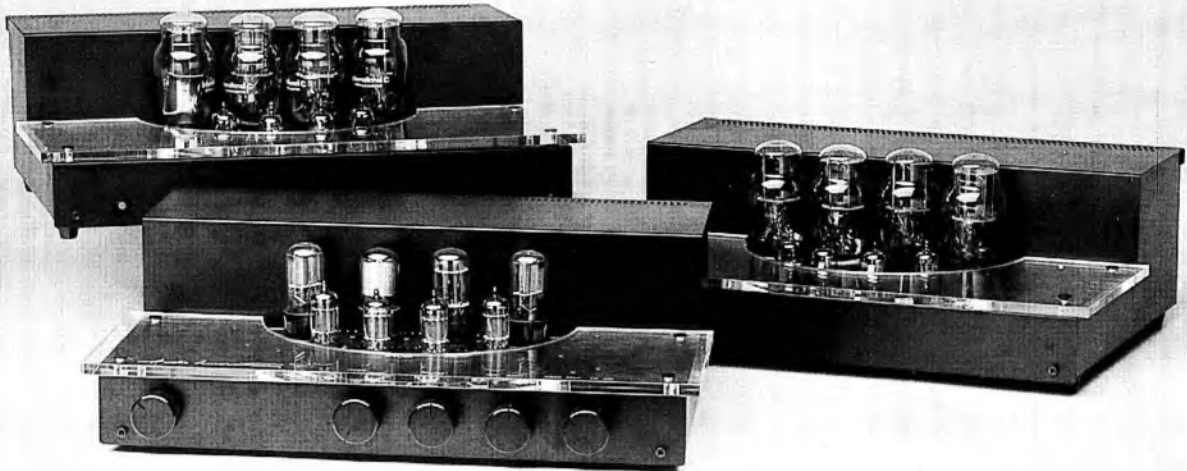
TEST RESULTS

	20Hz	1kHz	20kHz
Maximum Continuous Power Output 8ohms	1.34W	7.8W	3.7W
4ohms	3.2W	7.0W	0.8W
Dynamic Headroom (IHF)		+0.37dB	(8.5W)
Output Impedance	0.455ohm	0.371ohm	
Damping Factor	17.6	21.6	
		CD/Aux	MM
Stereo separation (20Hz)		71.5dB	54.7dB
(1kHz)		53.7dB	44.8dB
(20kHz)		29.5dB	27.1dB
Channel Balance (1kHz, –20dBV)		0.42dB	0.09dB
Total Harmonic Distortion (0dBW)		0.054%	0.077%
(½ power)		0.37%	0.48%
CCIR Intermodulation Distortion (0dBW)		–73.0dB	–33.1dB
CCIR IM Distortion (½ power)		–64.8dB	–23.9dB
Squarewave linearity		–79.8dB	
Noise (A wtd, 0dBW)		–65.3dB	–63.8dB
(½ power)		–46.9dB	–48.2dB
Residual noise		–63.6dB	–46.4dB
Input Sensitivity (for 0dBW)		20.41mV	—
(for full output)		57.41mV	583µV
CD/Aux overload			>13V
Disc Overload (500Hz)		106.4mV (low)/81.2mV (high)	
(1kHz)		147.1mV (low)/126.7mV (high)	
(20kHz)		577.8mV (low)/479mV (high)	
Disc Eq. Accuracy (±1dB)			8Hz – 7kHz
Input loading		47kohm	47kohm
DC offset, left/right			0mV/0mV
Retail Price			£339



AUDIO INNOVATIONS SERIES 1000 & THE 2ND AUDIO AMPLIFIER

AUDIO INNOVATIONS, UNIT 8 DYKE ROAD MEWS, 74-76 DYKE ROAD, BRIGHTON BN1 3JD. TEL: (0273) 601544.



Audio Innovations is a brand name new to *Hi-Fi Choice*, although the company is establishing an ever-growing number of enthusiastic dealers up and down the country. They've exhibited their wares at several British hi-fi shows in the past, however the majority of the amplifiers they produce end up going overseas. Denmark and Sweden are good markets for the brand, and I understand that a growing market also exists in Taiwan! Talk about shipping coals...

Having already become acquainted with the 'Audio Innovations sound', and having experienced some memorable demonstrations of prototype versions of the company's triode coupled valve power amps at recent hi-fi shows, I've been expecting these separates to appear on the market for some months.

The design of the 'chassis' is based on the company's *Series 500* integrated amplifier (not tested this time around), with exposed valves glowing away seductively and reflecting off the Perspex 'top plate' at the front. In addition to the *2nd Audio Amplifier* 15watt monobloks the company also produces a model called the *1st Audio Amplifier* (cheeky names, huh?) which is available in two versions: $7\frac{1}{2}$ watt stereo (£999) or $7\frac{1}{2}$ watt monobloks (£1,299/pair). The *Series 1000* is the company's top preamplifier at present.

On the rear of each power amplifier a row of four output binding posts provide a choice of 2, 4 or 8ohm taps, input is via a gold plated phono socket, and a simple push button on/off switch is at the front.

The *Series 1000* preamplifier in particular can be mistaken for Audio Innovations' *Series 500* integrated amplifier when viewed from a distance, especially as it has a similar layout of plain black control knobs along the front. Facilities include inputs for disc, tuner, CD and aux, along with a proper tape monitor

loop and balance control. Internally the preamp is all hand assembled, on the rear panel all socketry is gold plated, and a nice touch is the second pair of output sockets to facilitate bi-amping in cost-no-object systems.

The *Series 1000 2nd Audio Amplifier* combination displayed no operating problems, the only slightly alarming quirk being the very low frequency warbles from the power amps on switch-on. The amps took only a few seconds to 'stabilise', although the combo clearly only began to come on song after a good ten minutes. The *Series 1000* preamplifier proved to be commendably quiet for a valve design, although in common with all Audio Innovations' (pre)amplifiers I've tried the disc input appears to have much more gain than would ever be necessary - yet it isn't quiet enough to allow direct connection of low output moving coil cartridges.

LAB REPORT

The preamp uses a single *ECC83* double-triode at the disc input, with one side of the valve acting as a constant-current source for the other in what is known as a series regulated push-pull configuration. Passive disc equalisation is effected using specially selected polypropylene capacitors and tantalum film resistors, the equalisation curve itself seemingly a little inaccurate at very low frequencies. The +2dB boost at 20Hz is sufficient to give the preamp a slightly soft and bloated sound via disc, though the satisfactory +33dB headroom available at 1kHz is sufficient to prevent premature overload.

The CCIR (MM) product of -51.3dB is simply a reflection of other non-linearities in the system; witness the 2nd-order residues that pick up towards the origin on the 3D (MM) plot. The 0-20kHz sweep incurs about 0.35 per cent second harmonic while the simple IMD routes at $F_0-50k-0 - F_0-20k$ and

$F_{20k} - F_0-20k$ increase in amplitude as a function of the RIAA curve. A-wtd noise was good (for a valve amp) at -71.5dB even though the unweighted measurement was compromised by the ingress of mains harmonics. Channel separation and balance were also fine.

Subsequent to the RIAA stage another *ECC83* feeds the third-stage SRPP output which comprises a 6SN7 double-triode operating as a cathode-follower to reduce the output impedance. Both disc and direct line inputs now meet at the volume control which is capacitor coupled using a selected $0.82\mu F$ paper-foil. Independent solid-state rectification (valve regulation) is employed at all stages, the chunky power supply employing no less than 18 450V/47 μF Dubilier electrolytics in series/parallel to maintain the very high 485V HT rail.

Naturally, a higher energy supply featuring 2x220 μF /400V BHC electrolytics is used in these mono power amps with basic solid-stage regulation. Two low-voltage *ECC88* double-triodes form both input buffer and phase splitter, feeding a further two *PCC88* triodes which are configured as push-pull drivers operating at a slightly higher voltage. A total of four 6B4G direct-heated single triodes comprise the paralleled, push-pull output stage and these are responsible for the spurious LF burbles noted by JB during the first few seconds of thermal equilibration.

By coupling the input directly to the grid of the *ECC88* a high and easy 500kohm load is presented, though its abnormal 31.5mV sensitivity may well result in serious hum problems when used with other preamps or poorly shielded cables. The A-wtd 0dBW noise figure was itself fairly poor at -68.1dB. Adhering to a 1 per cent THD ceiling the power output of this amp was naturally restricted; the values of 3.89W at 1kHz and

4.16W at 20kHz are simply a reflection of the slightly reduced distortion at high frequencies despite there being no feedback correction. However, with no true clipping point in sight the amp just became gradually more non-linear, offering 9.4W at 1kHz at 3 per cent THD for example. The output impedance was ridiculously high at 4.19ohm, this offering a notional damping factor of just 1.91 – note the observations from the listening tests concerning bass performance.

CCIR intermodulation proved to be quite high at -50.2dB (0dBW) but both second and third-order effects proved fairly constant with both frequency and amplitude. As such the squarewave linearity was reduced to -67.4dB, despite the extended -3dB response points at 20.5Hz and 92kHz. This uniform distortion trend is obvious from the 3D plot, with virtually constant 2nd and 3rd harmonic and IM routes being produced by the amp, though this is more likely to be caused by the triodes themselves than non-linearities in the output transformer. $F_{0-50k} - 0 \pm y(F_{0-20k})$ and $F_{20k} \pm y(F_{0-20k})$ (where $y = 1$ or 2) routes are remarkably uniform, even at the point of 'reflection' where the terms of the IMD equation are reversed at the origin. Subjectively, this type of amplitude-dependent IMD is relatively innocuous compared to those non-linearities which do not faithfully track the input signal.

SOUND QUALITY

Contrary to anything you might expect from the lab tests these '15watt' triode coupled power amplifiers sound powerful beyond belief. Subjectively the dynamic range was nothing short of awesome on classical and rock music alike, coupled with superb transparency and wonderful soundstaging.

Where listeners might criticise the sound of this combination – especially when compared with something like the EAR combo tested in this issue – is the feeling it gives of lacking 'grip'. Rather than sounding taut and controlled at frequency extremes these amplifiers have what can only be described as a 'free-breathing' quality, creating a soundstage that you swear you could walk into. I don't think I've heard anything quite like it from my hi-fi system before, the sense of real musicians performing in real space was at times breathtaking, yet I can imagine some listeners complaining that the bass in particular sounds loose and lacking control.

In a sense this Audio Innovations combination provides a unique listening experience. Despite the bass *sounding* loose it is nonetheless remarkably detailed and powerful, and the timbre of instruments appears to have been faithfully preserved. Certainly there's no confusing the bass kick drum and bass guitar – they're there and they sound real.

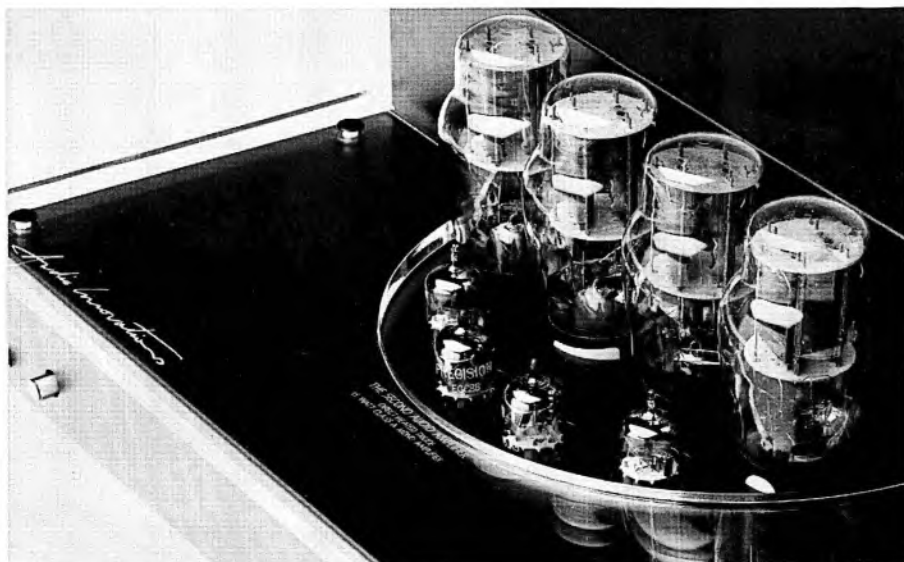
It wasn't possible to determine which component I was hearing most, the preamp or the power amps, as any attempts at mixing and matching with alternative products has so far proved to be fraught with problems. Note the outrageously high input sensitivity of the power amps which causes all sorts of problems when you try to hook up an alternative preamp.

There's more investigating to be done with these components for sure. It's been accepted in hi-fi circles for many years that an amplifier can measure 'perfectly' on the test bench but then sound awful when trying to reproduce real music, yet never before have we come across amplifiers which measure so abominably and yet sound so vivid and 'alive'.

CONCLUSIONS

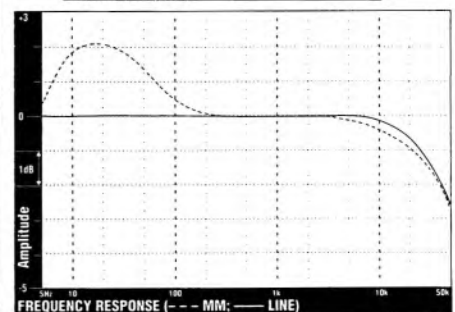
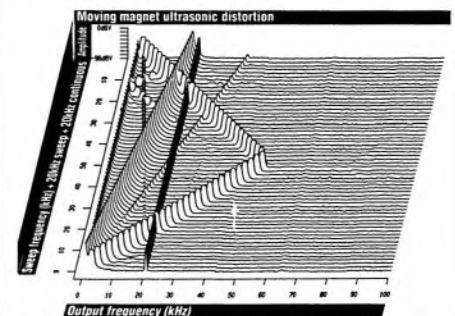
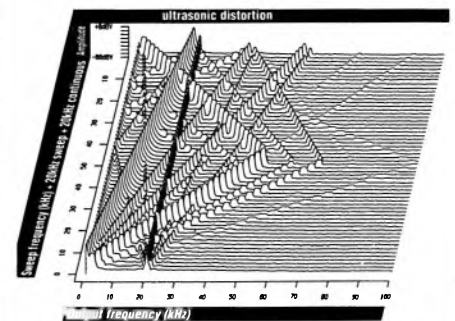
Compared with Audio Innovations' less ambitious amplifiers such as the *Series 300* integrated model and the *Aria Acoustics Aria 12*, the *Series 1000* preamp and *2nd Audio Amplifier* monoblocks are horrendously expensive. We're deep into the territory of diminishing returns, of course, and there's no denying that the sound quality is in another league to the company's less expensive models, but I'm inclined to believe that when most enthusiasts consider spending £3,000 on amplification they want to see they're getting something for their money. Doubtless the manufacture of these amps is very labour intensive as all the circuits are hard wired, and the internal components have been selected on grounds of sound quality with little regard to cost, but the finish of the casework is identical to that of the company's *Series 500* integrated amp which costs a fraction of the price. What I'm saying is these amplifiers don't offer much in the way of pride of ownership, the appearance being rather utilitarian (if distinctive).

Still, if all you're interested in is sound quality these amplifiers demand auditioning. Recommended.



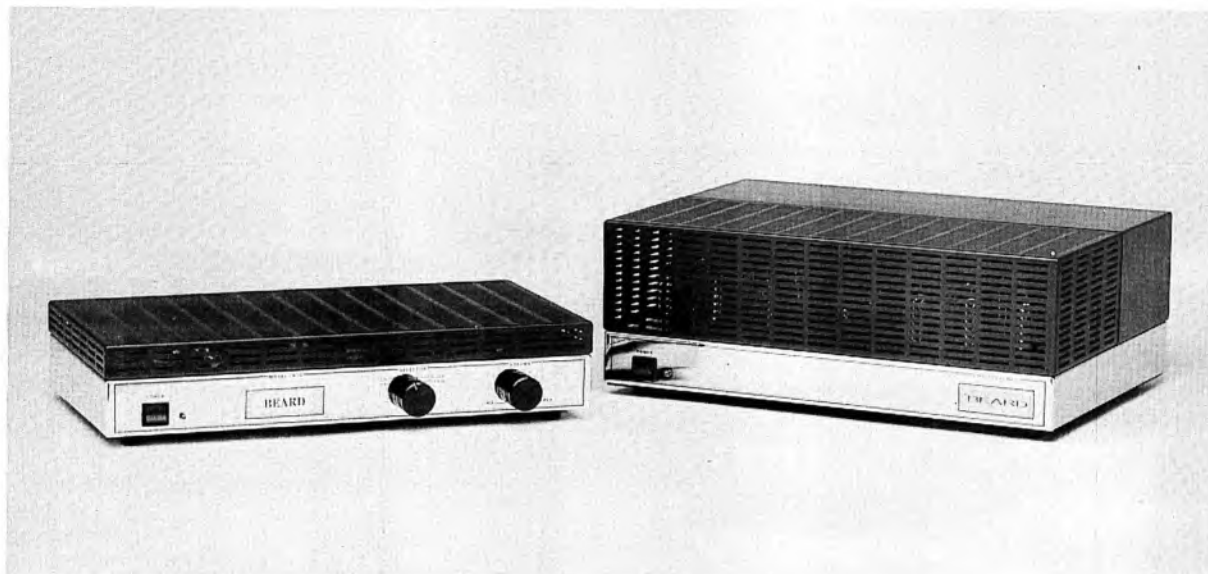
TEST RESULTS

	20Hz	1kHz	20kHz
Triode power amplifier			
Maximum Continuous Power Output			
8ohms	0.66W	3.9W	4.2W
4ohms	0.22W	3.7W	4.8W
Dynamic Headroom (1HF)	+0.53dB (4.4W)		
Output Impedance	4.19ohm	4.24ohm	
Damping Factor	1.91	1.88	
Stereo separation (0dBW)			monoblock
Total Harmonic dist. (0dBW)	0.95%	0.345%	0.203%
($\frac{1}{2}$ power)	1.25%	0.62%	0.47%
CCIR Intermodulation Distortion (0dBW) 2nd order	-50.2dB		
3rd order	-59.1dB		
CCIR IM Distortion ($\frac{1}{2}$ power) 2nd order	-46.2dB		
3rd order	-50.2dB		
Squarewave linearity	-67.4dB		
Absolute Phase	Positive		
Noise (A wtd, 20Hz-20kHz) 0dBW	-68.1dB		
(A wtd, 20Hz-20kHz) $\frac{1}{2}$ power	-70.5dB		
Residual noise	-89.7dB		
Input Sensitivity (for 0dBW)	15.82mV		
(for full output, 1% THD)	31.5mV		
Input loading	500kohm		
DC offset, left/right	0mV		
Retail Price	£1999		



BEARD AUDIO CA35/P35mkII

BEARD AUDIO, INDUSTRIAL UNIT B1, ASKEW CRESCENT WORKSHOPS, LONDON W12 9DP. TEL: (01) 749 4258.



We can expect to see Beard Audio gaining a much higher profile in the British hi-fi scene in coming years. The company has been producing valve amplifiers since 1977, with much of its production going to export, but only recently was a large shareholding in Beard Audio purchased by General Securities, part of the giant McAlpine Group – a move which will doubtless allow the company to expand its range of products and promote them enthusiastically.

Beard amplifiers have always been well turned out, however, this CA35/P35mkII combination is extraordinarily well finished for the price. To my thinking only the plastic power rocker switches and the two control knobs on the preamp (which are also plastic) give the game away that this is a £1,400 pre/power combo, and not something costing twice the price. The power amplifier in particular glows beautifully in the dark. . .

Facilities on the CA35 preamplifier are the bare minimum, with no balance control or proper tape monitor loop, the front panel sporting just a volume control and rotary source selector (phono/CD/tuner/tape). Oh yes, and there's the power switch too. What does make the preamp unusual, though – and this is all the more surprising given the price and the fact that this is a valve design – is the inclusion of a pair of in-built moving coil transformers. There are phono sockets on the rear for MC and MM cartridges, a push button switch selecting either input. Just one pair of output sockets is supplied, and all socketry is gold plated.

The P35mkII power amplifier is especially handsome, the rear looking very business-like with two sets (L and R) of Michell-type output binding posts (you know the type – with thumb screws to clamp the cables). I've not seen connectors quite like this before mind you, as these ones have been drilled end-on enabling you to use 4mm banana

plugs if that's what you've already got. Given the high level of finish it goes without saying that the input phono sockets too are gold plated.

Noise levels were not as low as they could be, however, from your listening seat you'd be hard pushed to tell the amplifier was switched on – which is to say that noise was not a problem.

Background noise on the MC input was particularly quiet, while mild breakthrough between inputs was noted. Microphony effects appeared to be next to non-existent.

LAB REPORT

Having recently tested an earlier sample of both pre and power amplifier, it is clear that a number of running production changes have been effected over the last few months. Most importantly, crosstalk problems associated with the MM/MC selector switch have been rectified, while all the input sensitivities have been brought up to more realistic levels. This said, the line stage on the CA35 is still very sensitive at 79.66mV (ref. 0dBV) while the MM/MC disc inputs are closer to the standard levels at 1.118mV and 84.8µV respectively. Moreover, the headroom available on all inputs was most impressive; +49.3dB (rel. to IHF) was measured at 1kHz on the MM input with +42.4dB offered via MC.

Two ECC83 triodes are employed at the disc input while a third valve (ECC82) is operated as a cathode-follower and provides a low source impedance for the final line stage, via the input selector and volume control of course. The first ECC83 acts as a buffer while the other is subject to frequency-dependent feedback as part of the active RIAA network. Suflex polystyrene capacitors and Holco resistors are used in the disc eq network which has been carefully adjusted to result in a steady roll-off above 10kHz, MC

(dotted line on the response plot) reaching a nominal –1dB at 20kHz.

The line stage has been extensively modified and now includes two ECC81 triodes together with a single ECC82 low impedance/high-ish voltage output valve. However, JB's preamp was even more up-to-date with a total of three ECC82's together with new anode load resistors – the line input should now sound closer to the (smooth) MC stage, the sharp, glassy colorations caused by the single 12AX75 line triode in the original CA35 having been avoided.

Stereo separation was a little weak at 20Hz (–41dB) and 20kHz (–33dB) via both disc inputs, the high frequency values being compromised by capacitive coupling in the selector switch which also influenced the line inputs. Channel balance and conventional distortions were very good indeed, the 3D plot taken through the MM input showing no artifacts above the noise floor. However, a degree of LF flicker was observed on the MM input and this degraded its noise performance to –55.3dB (wtd) or –25.6dB (unwtd hum). A 500ohm output impedance should not cause any matching problem while the peak 65V output is taking the concept of a wide dynamic range a little too far!

Armed with six paralleled EL84 pentodes per channel the P35mkII amplifier just exceeded its specification, managing 39.9W into 8ohms with saturation beginning earlier at the frequency extremes. With a 20-cycle toneburst an additional +0.35dB headroom was obtained before THD reached 1 per cent, this being equivalent to 43.2W. The amplifier was not very load tolerant however, and fell some –2.1dB into 4ohms at 1kHz. More important, perhaps, the output impedance seemed a trifle high at 1.25ohm (DF=6.38) and this is likely to impair bass resolution, in addition to modifying the frequency response of some loudspeakers towards the treble end.

Reflecting the dual-mono power supply and valve layout the *P35mkII*'s stereo separation was exceptionally good, only falling to 91.4dB at 20kHz. THD was mainly 3rd and 5th harmonic in nature due to non-linearities in the output transformer while IMD residues were shared between both 2nd and 3rd order effects. This is clearly shown by the two-thirds power 3D plot where the IMD routes $F_{0-50k} \pm y(F_{0-20k})$ [$y=1$ or 2] are comparable with the Audio Innovations *2nd Audio Amplifier*. However, the *P35mkII* also exhibits a peculiar compressive action at low levels whereupon signal artifacts are boosted from, say, -100dB to -90dB . This explains the rippling effect in the HF noise floor seen on the graph; this type of low-level non-linearity has been previously associated with certain coarse and grainy treble colorations.

SOUND QUALITY

Sounding smoother and, dare I say it, more 'valve like' than either the EAR or Audio Innovations pre/power combos tested for this issue, the *CA35/P35mkII* is clearly a very fine amplifier destined to provide hours of fatigue-free listening.

That said, if you've steered clear of valve amps in the past thinking that they're too laid back for your taste, then the Beard combo is best left alone too. Treble quality was wispy and vague, while what sounded like a degree of 'softness' in the upper bass gave cause to an impression that the amplifiers lacked punch and 'wallop'. The CD and MM disc inputs displayed less of this – you could never accuse the combo of sounding bland and undynamic – but the moving coil input was not up to the task of revealing the improvement in resolution between, for example, a Goldring *Eroica* cartridge and an Audio Technica *OC9*. (With the *Eroica*, in fact, the sound was particularly 'flat' and lifeless.) With something like a low(ish) cost

Audio Technica MC the high gain disc input would probably suffice, but if you're fortunate enough to own an exotic MC cartridge you'll hear clear improvements by upgrading to a high quality separate transformer.

Since the *CA35/P35mkII* was first launched the amplifier has doubtless improved beyond recognition, as most of the comments from reviews published in other hi-fi magazines during the past few months no longer seem valid. Yes, the sound will be too mellow for those listeners who demand an up-front and exciting presentation of their favoured music, but otherwise the manufacturer can be proud of having created an extremely good combination for the price.

Hooking up the Audio Innovations *Series 1000* in place of the *CA35* showed that much of the vagueness in treble definition was attributable to the preamp. The *P35mkII* can sound quite fast given a good source signal, though still it could never be described as anything other than warm and 'polite'.

Imaging was stable, with instruments clearly focused, though image size was observed to be restricted both in depth and width. Again, the preamp was the main culprit here, although the *P35mkII* still failed to resolve the 'nth degree' of image depth even when fed by alternative preamps.

CONCLUSIONS

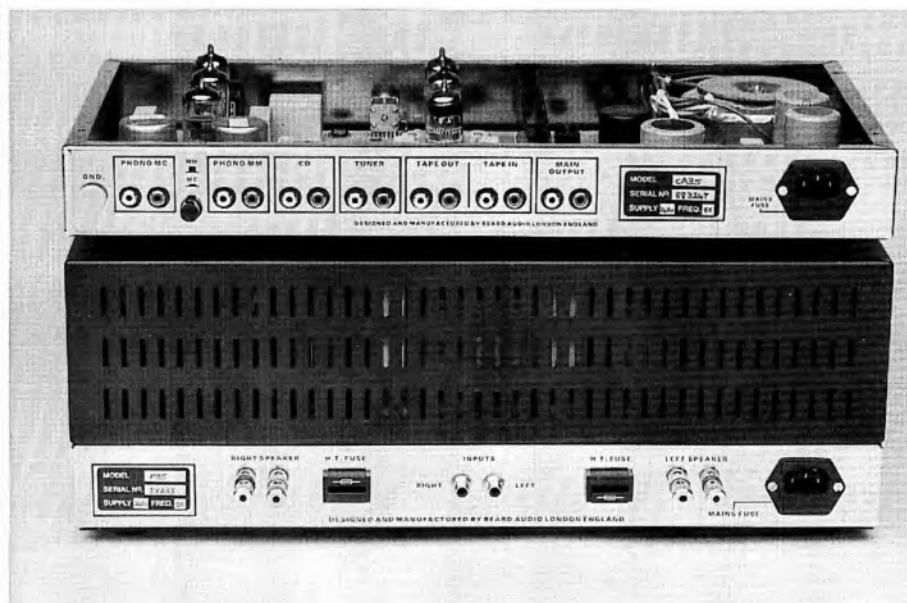
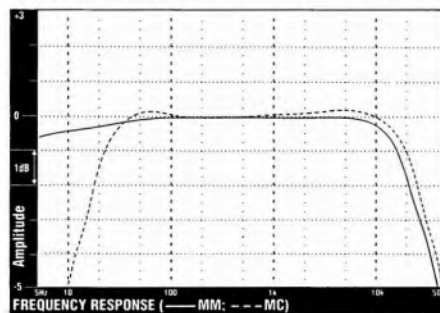
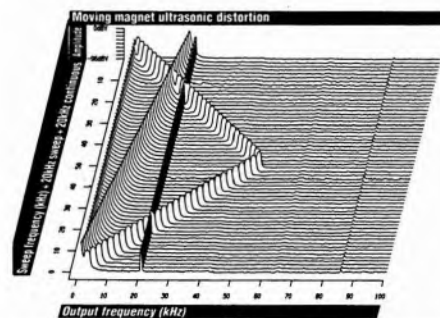
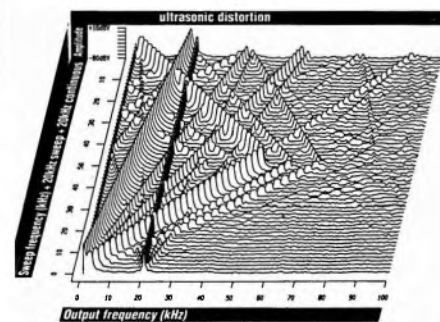
Beard Audio's *CA35/P35mkII* is high in perceived value thanks to its good build quality and very smart finish. And although it sounds less vivid and obviously dynamic than many other amplifiers, there's no arguing that it does display all the hallmarks of a first class valve amplifier, with a sweet and open mid-band and wonderfully relaxed air.

Recommended, then, as a combination offering much in the way of pride of ownership combined with a sound which is bound to provide hours of musical enjoyment.

TEST RESULTS

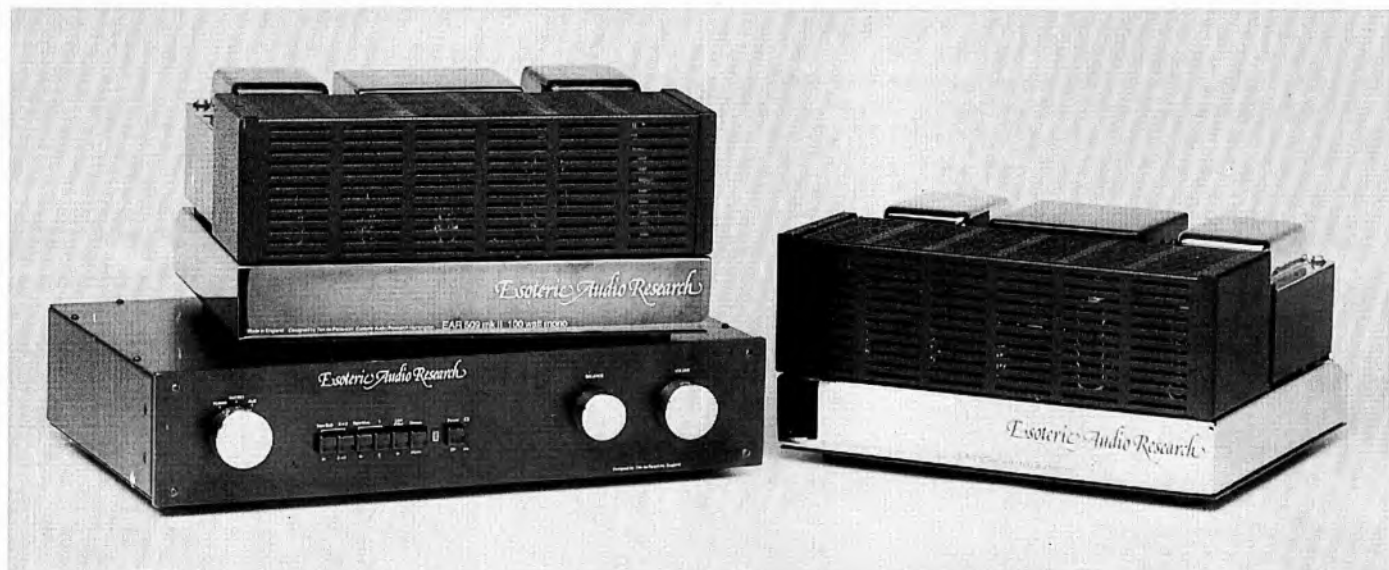
	CD/Aux	Preamplifier	
		MM	MC
Stereo separation (20Hz)	78.5dB	41.3dB	40.5dB
(1kHz)	58.1dB	59.3dB	57.5dB
(20kHz)	36.9dB	32.9dB	32.2dB
Channel Balance (1kHz, 0dBV)	0.32dB	0.14dB	0.45dB
(-20dBV)	0.42dB	0.41dB	0.10dB
(-60dBV)	0.42dB	0.15dB	0.38dB
Total Harmonic Dist. (0dBV)	0.0096%	0.015%	0.019%
CCIR Intermod. Dist. (1:1)	-76.6dB	-55.3dB	-43.2dB
Squarewave linearity		better than -93dB	
Noise (A wtd, 20Hz - 20kHz)	-88.9dB	-58.6dB	-87.2dB
Hum residual	-5.4dB	-25.6dB	-48.3dB
Input Sensitivity (for 0dBV)	79.66mV	1.118mV	84.8 μ V
CD/Aux overload		> 13V	
Disc Overload (500Hz)		1102mV	49.8mV
(1kHz)		1452mV	65.7mV
(20kHz)		4808mV	215.3mV
Disc Eq. Accuracy ($\pm 1\text{dB}$)		3Hz-16kHz	12Hz-20kHz
Preamplifier Output (max)/Impedance		64.98V/500ohm	
DC offset, left/right		+6.5mV/+9.1mV	
Retail Price		£595	

Beard P35mkII power amplifier	20Hz			1kHz	20kHz
	Maximum Continuous Power Output				
8ohms	33.6W	39.9W	33.9W		
4ohms	24.1W	24.6W	23.9W		
Dynamic Headroom (IMF)				+0.35dB (43.2W)	
Output Impedance	1.25ohm	1.26ohm			
Damping Factor	6.38	6.37			
Stereo separation (0dBW)	102.5dB	107.5dB	91.4dB		
Total Harmonic dist. (0dBW)	0.076%	0.041%	0.031%		
($\frac{1}{2}$ power)	0.056%	0.169%	0.158%		
CCIR Intermodulation Distortion (0dBW) 2nd order				-63.4dB	
3rd order				-73.9dB	
CCIR IM Distortion ($\frac{1}{2}$ power) 2nd order				-51.7dB	
3rd order				-58.3dB	
Squarewave linearity				-82.9dB	
Absolute Phase				Positive	
Noise (A wtd, 20Hz-20kHz) 0dBW				-76.1dB	
(A wtd, 20Hz-20kHz) $\frac{1}{2}$ power				-84.1dB	
Residual noise				-58.0dB	
Input Sensitivity (for 0dBW)				164.1mV	
(for full output, 1% THD)				1.088V	
Input loading				100kohm	
DC offset, left/right				0mV/0mV	
Retail Price				£795	



E.A.R. 802/509mkII

ESOTERIC AUDIO RESEARCH, UNIT 11, STUKELY MEADOWS INDUSTRIAL ESTATE, HUNTINGDON, CAMBS PE18 6ED. TEL: (0480) 53791.



Esoteric Audio Research is the company run by Tim de Paravicini, one of the country's leading electronics designers. The 802 preamp and 509mkII monoblok power amplifiers tested here appear long in the tooth compared to some of the other models reviewed this month as they've been available for more years than I can remember. However, they continue to enjoy a fine reputation for their sound and solid build quality.

Styling of the preamp is a little austere, but it has a rugged, purposeful feel to it and proved faultless in operation. No worries of annoying hum or high background noise here; the 802 is as well-behaved as many a transistor preamplifier. Facilities are reasonably comprehensive too – with two tape monitor loops and dubbing between them – to cater for the requirements of professional users in sound studios. More so than most other UK hi-fi designers, Tim de Paravicini is particularly active in professional circles building studio equipment and customising tape recorders to improve sound quality. The most commonly cited example of his work is at The Exchange (previously called the Sound Clinic), a well known disc mastering facility in London which until recently was owned by Island Records.

Recently the company launched a more expensive version of the 802 (£100 premium) with an in-built moving coil input, though I understand this is regarded as something of a compromise if you're really serious about getting the utmost from your MC. For top-notch sound you're best advised to use *The Head*, a separate high quality MC transformer.

Other inputs cater for tuner and 'aux' – the latter being used for CD. (Like a vast number of high-end valve manufacturers, EAR don't take compact disc very seriously.) A balance control is included, and output sockets are gold plated throughout.

Rated at 100W, the 509mkIIs are compact and solidly built, available finished in silver or black chrome (we were given one of each) with black metal grille covers. Power on/off is via a rocker switch at the rear, an unusual feature being the level control sited next to the input phono socket. This allows for versatile matching with just about any control amplifier.

For professional applications the amplifiers are available with XLR input connectors and balanced semi-floating inputs at additional cost.

LAB REPORT

Proving that valve amplifiers – even ten year-old valve amplifiers – do not have to measure atrociously, the EAR 802/509mkII combination turned in a perfectly acceptable set of test results.

The 802 preamp has a total complement of six valves, three per channel, with a single ECC83 double-triode operating as a paralleled transconductance input stage for the disc section. This is followed by a PCF802 pentode/triode that incorporates the passive eq network in an inverting/summing gain block. A cathode-follower output reduces the source impedance into the line stage, this employing a reversed PCF802 (triode/pentode) which also forms part of the active volume section.

A degree of interchannel capacitive coupling has degraded the stereo separation at higher frequencies, the virtually equal results (38dB/40dB) on both disc and line stages indicating that perhaps the selector switch is at fault. Anyway, the channel balance was held to tight 1dB limits over much of its range, falling to ± 1.5 dB at -60 dBV on the disc input. The input overload margins proved generous while the disc eq curve was reasonably flat, rising $+0.4$ dB at 100Hz and falling -0.55 dB at 10kHz rela-

tive to 1kHz. The line and disc (0dBV) sensitivities were set at textbook levels, while with higher inputs the 802 offered sufficient gain to raise a peak output of 32.8V with a sensible source impedance of 580 ohm.

Distortion was very low, typically <0.08 per cent, though the results for intermodulation and, particularly, noise were marginally less impressive on the MM input. This is demonstrated by the 3D plot taken with a pre-equalised signal via the MM input, for here only a second harmonic route is in evidence. Following the RIAA characteristic, straightforward 2nd-order difference IMD routes can just be seen tracking in towards the origin, these attributable to $F_{20k}F_{0-20k}$ and $F_{0-50k-0}F_{0-20k}$ interactions.

EAR's partnering 509mkII power amps proved something of a powerhouse even if they were not quite as load tolerant as the better solid-state amplifiers around. Up to 127W was available into 8ohms, this falling by 0.6dB into 4ohms even though a further $+0.69$ dB was available under dynamic conditions (equal to 148W into 8ohms). Saturation occurred more readily at low rather than high frequencies, the power output holding up very well at 20kHz. No feedback is applied around the output transformers so the source impedance of 0.444ohm was largely determined by the DC resistance of the secondaries.

Three differential stages are employed in the power amp with localised feedback stabilising the gain of the two ECC83 and one ECC85 double triode. Two paralleled beam-tetrodes, the PL509/519, are employed at the output with the anode leads taken from a cap at the apex of each valve. A high 1400mV is required for full output but the 23kohm input impedance has been especially chosen to minimise hum-thumps when plugging in and removing phono leads. Noise was fine at

-72.5dB (full band, A-wtd) while the absence of any very low-level artifacts should ensure a cleaner high treble character than the Beard amplifier, for example.

Harmonic distortion was remarkably low for a tube design, stabilising at less than 0.04 per cent at 1W and no more than 0.15 per cent at two-thirds power across the entire audio bandwidth. CCIR intermodulation distortion rose to -59.4dB at this power but the product was second-order and rapidly decreased once the relative amplitude of the test tones was altered. For instance, the 1:16 ratio of the swept tones in the 3D plot has exacerbated far less IMD, -75dB being typical. Moreover, the bulk of the distortion products are harmonic and these extend out to the 6th while the associated IMD routes are simply 2nd-order, the summation routes $F_{20k} + F_{0.20k}$ and $F_{0.50k} + F_{0.20k}$ exceeding the amplitude of the equivalent difference routes.

SOUND QUALITY

There are audio enthusiasts around the world who rate Tim de Paravicini's EAR amplifiers as the best in the world - and on listening to the current version of the 802/509 combination it's not difficult to hear what all the fuss is about.

In a 'hi-fi' sense the presentation of the music is more conventional - more transistor-sounding, if you like - than the majority of valve amplifiers around, in that the sound is powerful and 'punchy' and fairly up-front. But don't take this comment the wrong way; I'm exaggerating in order to make the point that the EAR's are far removed from that coloured vision many of us have of how all valve amplifiers sound soft and syrupy and terminally - well, coloured. In fact, the combination exhibits fine image depth and width, instruments are sharply focussed and clearly delineated, and I suspect that much of the reason for the amplifier sounding 'up-front' (as I call it) is that it

possesses superb diction - which subjectively gives an impression of the music being projected forward into your lap. Truth is, the EARs are very fine amplifiers indeed.

Bass appears lean when compared with some of the other amplifiers tested this month, which in many systems will be a blessing. Certainly the bass has precision and tautness, and given a good source signal you get the feeling the bass must go down for ever. Treble is extended too, with no sense of strain or sibilance.

With this EAR combination you find you are able to listen at astonishing sound pressure levels (the neighbours will love 'em!), this being at odds with most hi-fi enthusiasts' expectations of a valve amplifier.

CONCLUSIONS

If I've painted a picture of these amplifiers sounding powerful and dynamic and easy-on-the-ear, then I've managed to portray why it is these amplifiers are so highly regarded. It might even sound like they surely must be the best amplifiers in the world, but I don't think they are. There are EAR's 549 power amps for a start!

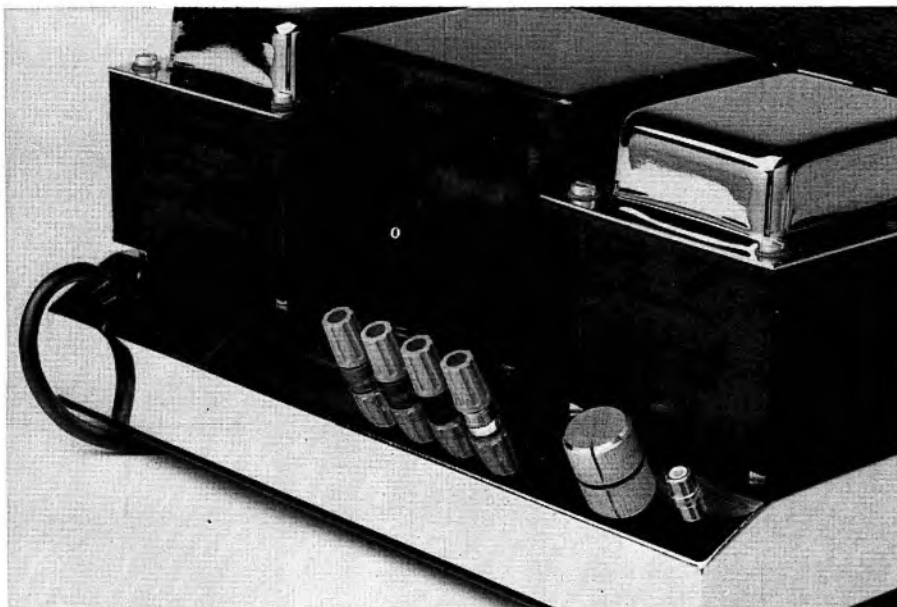
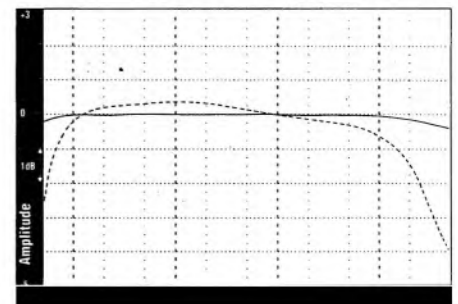
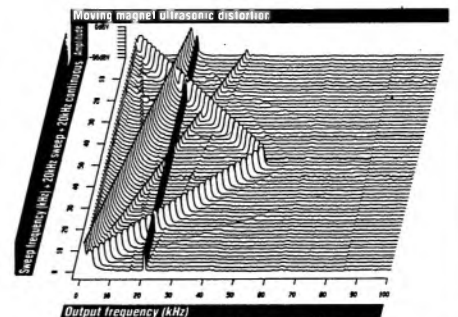
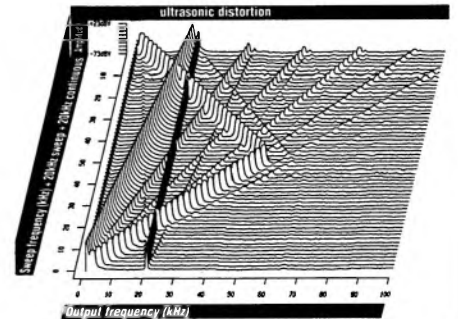
The emotional experience we get from listening to reproduced music is subjective anyway. We all have different expectations of how our systems should sound, and whereas I hear that the EARs sound lucid and controlled, more so, for example, than the Audio Innovations pre/power combo tested in this issue, I also hear that the 'Innovations combo sounds more 'open' and free-breathing with enhanced out-of-the-box imaging.

But then you have to get the cheque book out and make the decision - and it's clear from just looking that with these EARs you really do get your money's worth. Solidly built and well engineered, the 802 preamp and 509mkII monobloks are the sort of amps you buy so that you can forget about hi-fi and get on with the business of enjoying your records. Highly Recommended.

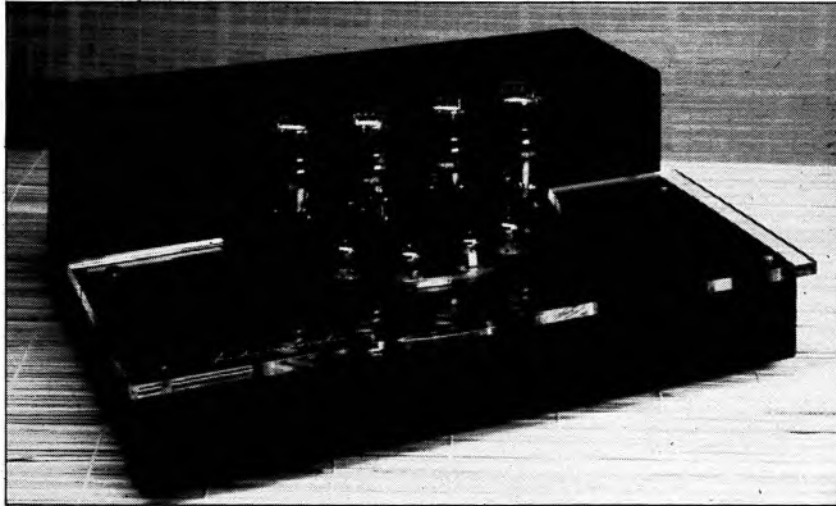
TEST RESULTS

	CD/Aux	MM	Preamplifier
Stereo separation (20Hz)	96.2dB	79.4dB	
(1kHz)	63.1dB	65.8dB	
(20kHz)	38.1dB	40.1dB	
Channel Balance (1kHz, 0dBV)	0.07dB	0.04dB	
(-20dBV)	0.68dB	0.68dB	
(-60dBV)	1.16dB	1.45dB	
Total Harmonic Distortion (0dBV)	0.072%	0.058%	
CCIR Intermodulation Distortion (1:1)	-61.6dB	-56.9dB	
Squarewave linearity		-74.1dB	
Noise (A wtd, 20Hz - 20kHz)	-89.2dB	-54.9dB	
Hum residual	-80.2dB	-38.8dB	
Input Sensitivity (for 0dBV)	168.5mV	2.179mV	
CD/Aux overload		>13V	
Disc Overload (500Hz)		419.0mV	
(1kHz)		559.8mV	
(20kHz)		3710mV	
Disc Eq. Accuracy (± 1 dB)		6Hz - 16kHz	
Preamplifier Output (max)/Impedance		32.75V/580chms	
DC offset, left/right		+19.7 μ V/-7.5 μ V	
Retail Price			£920

Ear 509mkII power amplifier	20Hz	1kHz	20kHz
Maximum Continuous Power Output			
8ohms	112.3W	126.6W	122.5W
4ohms	101.3W	110.4W	101.6W
Dynamic Headroom (IHF)			+0.69dB (148W)
Output Impedance	0.444ohm	0.46chm	
Damping Factor	18.0	17.3	
Stereo separation (0dBW)			Monoblok amplifier
Total Harmonic dist. (0dBW)	0.035%	0.027%	0.023%
($\frac{2}{3}$ power)	0.052%	0.088%	0.14%
CCIR Intermodulation Distortion (0dBW) 2nd order			-69.8dB
3rd order			-81.3dB
CCIR IM Distortion ($\frac{2}{3}$ power) 2nd order			-59.4dB
3rd order			-73.9dB
Squarewave linearity			-84.1dB
Absolute Phase			Positive
Noise (A wtd, 20Hz-20kHz) 0dBW			-72.5dB
(A wtd, 20Hz-20kHz) $\frac{2}{3}$ power			-81.7dB
Residual noise			-62.5dB
Input Sensitivity (for 0dBW)			122.9mV
(for full output)			1.400mV
Input loading			23kchm
DC offset, left/right			0mV
Retail Price			£1550



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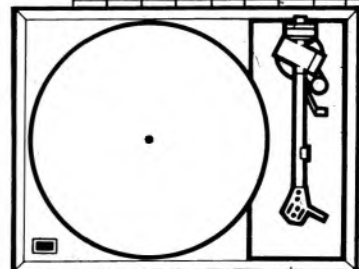


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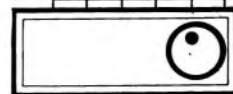
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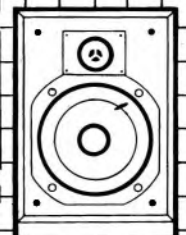
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OAKLEY IMAGE

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Distributed in the UK by the same company which imports the highly regarded Kuzma arm and turntable, the Oakley *Image* is an 'affordable' valve preamplifier from Yugoslavia. Apparently they wanted to give it a British sounding name!

Aimed fair and square at the hi-fi enthusiast, the *Image* is a minimalist design with the bare minimum of controls: on/off, volume and input select. The only concession to 'luxury' is a true tape monitor loop, selected via a toggle switch on the front panel. Construction is solid enough, however the unit takes on a somewhat home-made appearance when put beside the Rose *RV-23* preamp included in these tests.

If I understand correctly, you don't *have* to have the glass top plate, though I can't imagine many people not wanting it. From experience, I'd say there's nothing an enthusiast likes more than to peer inside at the glowing valves.

There's no balance control, the phono sockets at the rear are of the bread-and-butter nickel variety, and the chunky control knobs on our review sample were proving a little too heavy for the insubstantial rotary selector switch and potentiometer. Audiofreaks, who themselves are serious audio enthusiasts, expressed some dissatisfaction with this when delivering the unit for review, and subsequently have decided to uprate the internal components.

LAB REPORT

Still in pre-production guise the Yugoslav potentiometers fitted to this preamp suffered from a collapsed track on the right channel, hence the huge 32dB balance error detected at -60dB. Retail samples will apparently be equipped with decent ALPs pots.

RC filters are used for both phono and line stage triodes, only the heaters benefitting from proper regulation. *ECC83* and *ECC81* double-triodes are employed in a cascade configuration for the disc input, the output taken directly from the plate of the second triode (*ECC81*) to minimise any matching problems. RIAA equalisation is actually *active*, employing frequency-dependent feedback around the latter triode but only offering +29.6dB of headroom at 1kHz and

+17.8dB at 20kHz. The eq curve was also a trifle irregular, rising +1.5dB at 12kHz rel to 1kHz.

The disc stage was fairly sensitive at 1.187mV (0dBV out) but the A-wtd noise figure seemed a trifle high at -61.2dB, this being corroborated by the unweighted hum figure of just -42.72dB. JB noted some noise during the listening tests while an anomalous ± 11 mV infrasonic flicker was measured at the output. This together with the +7.4dB rise at 1.75Hz on the line input suggests a problem with one of the two *ECC82* output triodes.

Furthermore, despite the healthy 20.56V peak output the source impedance was quite high at 1.8kohms. Subjectively, the LF hump combined with a tailored high frequency response could well result in a dull, muffled sound. By contrast the rising RIAA characteristic combined with falling overload margins at high frequencies may well be responsible for a bright and coarse character via disc, especially with today's extended output MCs - note JB's remarks on sound quality.

THD and IMD results were acceptable, especially as 2nd-order effects predominated.

SOUND QUALITY

The Oakley was not without problems, notably an unusually high degree of noise even at zero gain. Still, noise didn't actually get worse as the listening level was increased.

And despite the channel imbalance problems at low volumes, it was easy to hear that inside the *Image* there's a great product trying to get out. Sounding less like the Rose and more like the Audio Innovations *Series 300* integrated amplifier on disc, the Oakley displayed a good sense of immediacy and speed and detail. Best described as sharp and lean in character, it revealed a good sense of perspective and detail within the soundstage and like all good components it allowed you to listen into the recording and follow the individual instruments. What marred the performance was its tendency to sound ragged at high frequencies, erring on sibilance on 'bright' cuts.

On CD the sound was less strident, the Oakley delivering a more polite, easy-to-live-

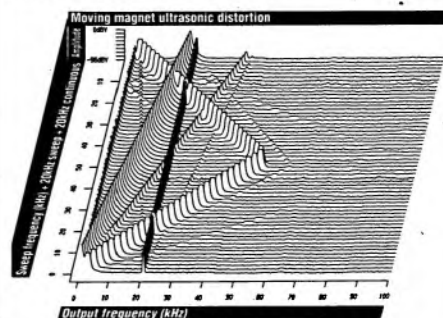
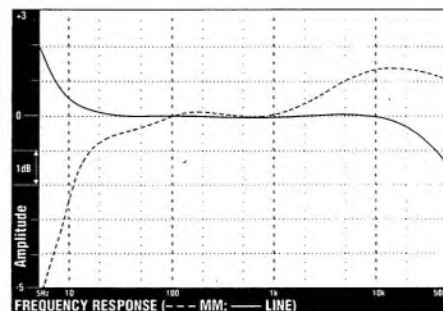
with sound. However this shouldn't be misinterpreted - the sound could never be accused of being veiled or 'wooly'.

CONCLUSIONS

This was the first sample to arrive on these shores, so teething troubles were perhaps inevitable. As it stands the *Image* can't be wholeheartedly recommended, however Audiofreaks have a good reputation for helping to support and develop products (witness the improvements to the Kuzma tonearm) and based on what we've heard so far this preamp could become hot property. The sound is detailed and dynamic with good imaging and focus, and if the treble quality on the disc input and noise levels can be improved the Oakley should find a nice niche for itself in the marketplace.

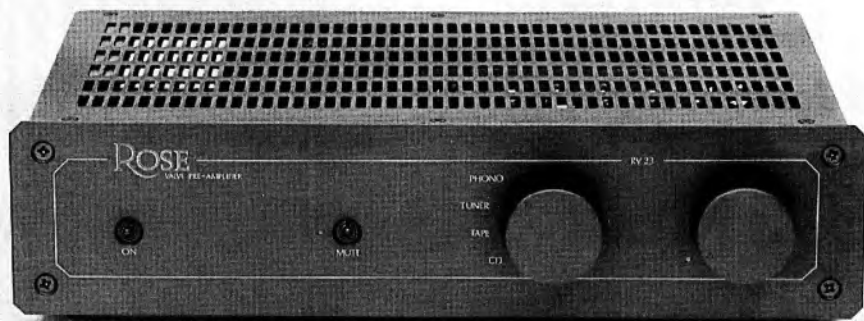
TEST RESULTS

	CD/Aux	Preamplifier MM
Stereo separation (20Hz)	76.4dB	85.2dB
(1kHz)	43.9dB	75.5dB
(20kHz)	20.4dB	50.1dB
Channel Balance (1kHz, 0dBV)	0.58dB	0.64dB
(-20dBV)	1.72dB	1.73dB
(-60dBV)	32.1dB	29.2dB
Total Harmonic Distortion (0dBV)	0.0296%	0.132%
CCIR Intermodulation Distortion (1:1)	-68.1dB	-50.3dB
Squarewave linearity	-87.2dB	
Noise (A wtd, 20Hz - 20kHz)	-91.7dB	-61.2dB
Hum residual	-45.4dB	-42.7dB
Input Sensitivity (for 0dBV)	75.96mV	1.187mV
CD/Aux overload	12.95V	
Disc Overload (500Hz)		116.3mV
(1kHz)		150.7mV
(20kHz)		385.9mV
Disc Eq. Accuracy (± 1 dB)		18Hz - 5kHz
Preamplifier Output (max)/Impedance	20.56V/1.788kohms	
DC offset, left/right	variable, $< \pm 11$ mV	
Retail Price		£425



ROSE RV-23

ROSE INDUSTRIES, 142 BRASENOSE ROAD, DIDCOT, OXON OX11 7BS. TEL: (0235) 814631.



A new name to the British hi-fi scene, Rose Industries' first product is the *RV-23* pre-amplifier. Aimed at the quality conscious audiophile, it is a simple, no-frills design which really does appear to be a well thought out, thoroughly finished product.

The case is a solid non-resonant affair with a most substantial front panel sporting nicely chamfered edges and tasteful legends, secured by discrete countersunk screws. The controls have a gorgeous 'feel' to them which inspires much confidence in the product, while the phono socketry at the rear is gold plated throughout.

There are the bare minimum of controls – just an input selector knob, mute switch and volume control. The inputs cater for disc (MM only, as one expects with valve gear), tape, tuner and CD; note there is no balance control or proper tape monitor facility, so if you own a 3-head cassette deck you'll need to monitor on headphones off the deck when making recordings.

Tasteful orange coloured LEDs indicate 'power on' and 'mute', the latter taking 60 seconds to extinguish after first switching on the unit. It sounds silly to say it, but with valve preamps this is important: the Rose *RV-23* works properly – by which I mean there are no untoward pops or whistles, and background noise is extremely low.

LAB REPORT

Apparently designed by computer, the passive RIAA network incorporated in the *RV-23* furnished an extremely flat response that demonstrated only the mildest tailoring at high frequencies. With a near-DC -3dB point of just 0.3Hz the disc stage rolled off to -2.8dB at 50kHz , while the all the line inputs were faintly lifted, attaining $+0.25\text{dB}$ at 50kHz . Passive equalisation is employed using good quality polystyrene capacitors and metal film resistors, the disc input comprising cascode-coupled *ECC83* and *ECC82* triodes with the latter acting as a buffer prior to the volume control.

All the line inputs are routed via an *ECC82* double-triode and volume control, the second half of the valve acting as a unity gain buffer which is capacitor-coupled at the output using a $3.3\mu\text{F}$ polypropylene component.

Furthermore, the tape output is also buffered by an *ECC82* operating in common-anode mode while the line input sensitivity of 1081mV simply reflects the finite losses incurred through the preamp.

Channel separation fell to around 25dB on all inputs at 20kHz , possibly as a result of capacitive coupling on the PCB, while a breakthrough of -39.4dB was measured between line inputs and -55.1dB between line and disc inputs (rel. to 0dBV). Most distressing however was the very limited headroom offered by the disc stage, amounting to $+14.9\text{dB}$ at 1kHz with 1 per cent THD or $+24.5\text{dB}$ with 3 per cent THD (figures in brackets refer to this higher level of THD). This was exemplified by the CCIR test (50mV rms composite input) which resulted in a second-order product at just -9.45dB , equivalent to over 30 per cent distortion.

SOUND QUALITY

Much preferred on its CD input, the *RV-23* sounded like a classic valve preamp. A trifle 'slow' and laid back, the sound was nonetheless rich, colourful and reasonably sharp while lacking any sense of 'grain' or harshness. The *RV-23* proved to be delightful to listen to long term, displaying superb transparency through the midband and excellent stereo soundstaging.

Much of this euphonic character was evident on disc too, but clearly the sound was not in the same league as the line inputs. Imaging was less explicit and on complex musical passages there was evidence of muddling of instruments, making it difficult to 'hear into' recordings. Clearly the disc stage sounded veiled and 'thick' – and it soon became apparent that the *RV-23* was making all recordings sound the same. However, it still displayed a natural, fatigue-free tonal balance which invited you to listen for hour upon hour.

CONCLUSIONS

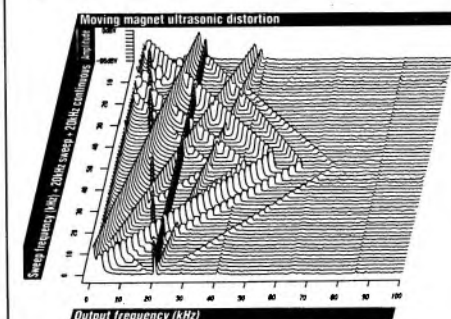
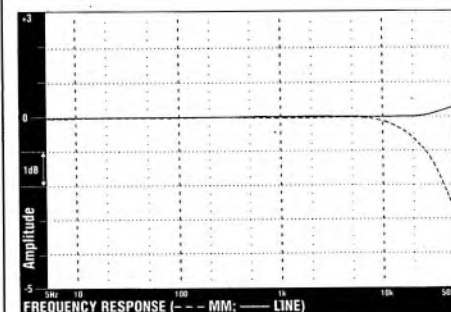
Paul Miller's test measurements showed immediately that the overload margin on the disc input is woefully inadequate, and doubtless this explains my misgivings in the listening tests. Having spoken to the manufacturer it seems we may well have been supplied

with a faulty sample to review, which on the surface may appear to be a lame excuse but in this instance we are strongly inclined to believe it. Much design effort must have gone into the *RV-23* to create such a well built and well behaved valve preamp, and it just doesn't seem possible that the manufacturer could have made such an oversight. Maybe we'll get the opportunity to try a second sample in the not-too-distant future.

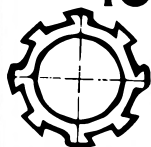
Meanwhile, although hardly representing the final word in audio nirvana – and assuming the disc input overload marking is properly sorted – the Rose *RV-23* can be judged to be well worth considering. Build quality, inside and out, is exemplary and the price competitive.

TEST RESULTS

	CD/Aux	Preamplifier MM
Stereo separation (20Hz)	80.9dB	93.4dB
(1kHz)	50.7dB	51.7dB
(20kHz)	24.9dB	25.5dB
Channel Balance (1kHz, 0dBV)	0.32dB	0.67dB
(-20dBV)	0.18dB	1.29dB
(-60dBV)	1.90dB	4.25dB
Total Harmonic Distortion (0dBV)	0.018%	0.578%
CCIR Intermodulation Distortion (1:1)	-75.4dB	-9.45dB
Squarewave linearity	-89.1dB	
Noise (A wtd, 20Hz - 20kHz)	-107.9dB	-77.7dB
Hum residual	-63.7dB	-54.7dB
Input Sensitivity (for 0dBV)	1.081V	3.344mV
CD/Aux overload	> 10V	
Disc Overload (500Hz)	19.3mV (63.1mV)	
(1kHz)	27.8mV (84.3mV)	
(20kHz)	27.4mV (81.5mV)	
Disc Eq. Accuracy (50-15kHz)		1Hz - 25kHz
Preamplifier Output (max)/Impedance		8.133V/600ohms
DC offset, left/right		-1.068mV/+161μV
Retail Price		£370



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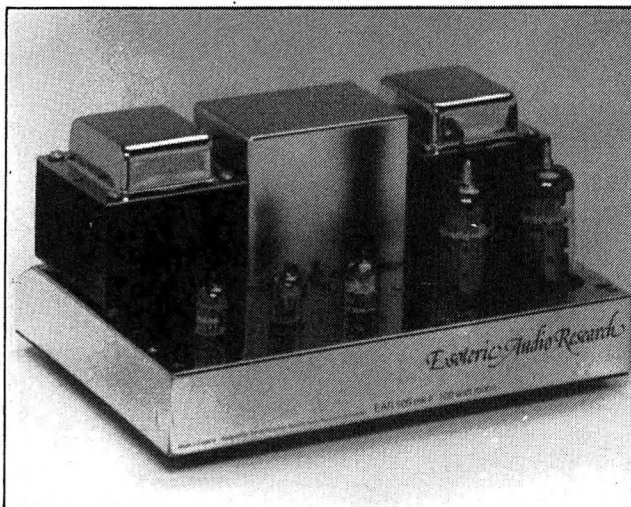
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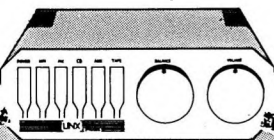
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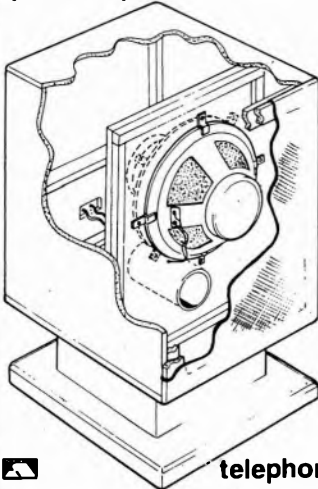
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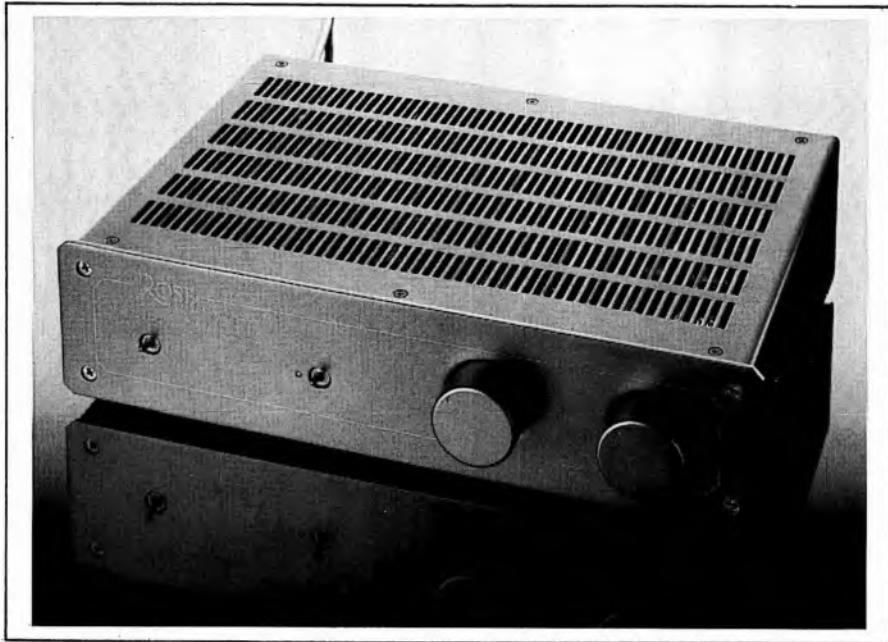


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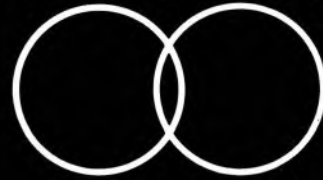
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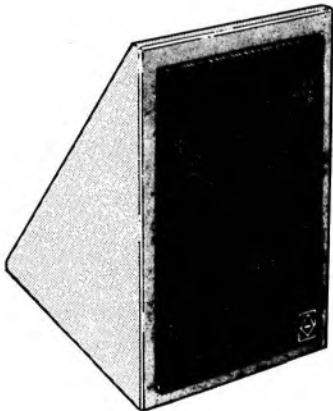
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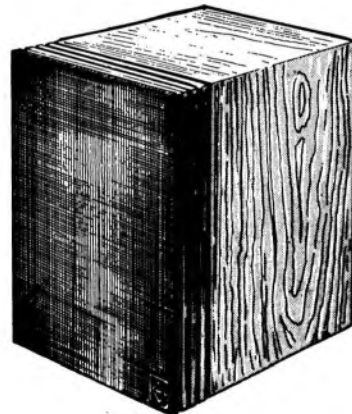
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CHOOSING AND USING . . . HEADPHONES

Jason Kennedy details the listening tests and outlines some of the points to consider when selecting headphones.

Although it was the end of '87 it doesn't seem that long ago that I was untangling the leads of the last bunch of cans *Choice* reviewed in February. The selection we've managed to round up for you this time contains models from all the companies represented last time and more.

One of the brands that wasn't covered last time is AKG, an Austrian company that has been around for quite some time and enjoys success in the professional field. We also have some home-grown Ross 'phones and one model from the American Koss company, the latter managing to coincide a swop of distributor from Ortofon to HW International with our request for a review sample – bad timing.

On the exotic front we have the professional version of the Stax *Gamma* reviewed last February which, along with the *SRD-X* energiser was used as a reference throughout the listening tests. We've also tested one of Stax's electret models, the *SR84* but the other 18 are more modest, some of them even affordable, dynamic models.

The important factors to consider when buying headphones are primarily sound quality and comfort, though the latter is perhaps the more important. A pair of 'phones may sound great on first impression but if they become uncomfortable after a while one is unlikely to carry on wearing them. Comfort to a large extent is related to the size of the head and ears. There are quite a few ostensibly circumaural headphones, ie with ear pads that rest on the side of the head, such as the more expensive Beyers or Quarts that aren't really large enough to avoid pressing on some part of the ear, especially if your shell-likes aren't all that shell like. Some circumaurals create problems with pressure but this is more obvious with supra-aural designs, those which press on the ear itself and which are more predominant at the budget end of the market. However, if your

head is of average or more width many supra-aurals tend to press rather hard and prove ear bending after little more than five minutes.

Our comfort ratings are based on the collected opinions of the *Hi-Fi Choice* comfort crew, made up of both sexes and a good variety of ear sizes, therefore the higher rated 'phones are those that felt good on everyone. There was definitely a difference of opinion on some models though, so make sure you try before you buy even if you can't listen.

As far as sound quality is concerned, very few models exhibited a flat, neutral response when listened to through the reference system and compared with the *Gamma Pros*, so it's sensible to find a 'phone which will balance any weaknesses in the system with which they will be used. For instance, if you find your system a little aggressive or bright then a warm sounding headphone will probably work quite well. When matching headphones to an amplifier consider the sensitivity of the 'phone and how it relates to the gain range available. Some 'Walkman' oriented models proved very sensitive to the hum on the headphone sockets of several amplifiers and one model, the Koss, was really too loud. At the opposite extreme some cassette decks have quite low outputs at their headphone sockets which may prove a minor problem with some inefficient

models. As ever, the rule is to try the required combination out for yourself.

Noise on the headphone socket proved to be a problem on the amplifier we had originally selected (for its versatility and pedigree) as our listening reference and in the end a QED *5/3* adaptor was used with an Audio Innovations *Series 500* integrated amp and Audionote cable. Admittedly this set-up was also plagued by low level hum but it was at low frequency and thus less obtrusive than that created by certain solid state alternatives.

The front end used was a Roksan *Xerxes* turntable, Rega *RB300* tonearm and Audio Technica *AT OC7* cartridge, the output of the latter suitably boosted with an Audio Innovations *1000 Series* impedance matching step up unit. The volume adjustable socket on a Hitachi *DA-1000* CD player was also used with Michael Hedges material to see how the cans fared with the digital alternative. Many of the phones encountered were emblazoned with the 'for digital' logo. Amongst our test tracks were *No* from the Prince album *Lovesexy*, a multitrack soul funk piece with no shortage of FX, a relatively simple but well recorded acoustic track from Adrian Legg's *Fretmelt* called *Frank The Part Time Clown*. But the track that really sorted the men from the boys was the

exceptional Decca recording of Mozart's *Notturmo in D major, K286*, an early sixties pressing with remarkable dynamic range which the electrostatics revealed, and many of the dynamic models ignored.

A trend which was evolving on the first test was the fitting of dual sized jack plugs (a system that Sony have used for some time now but which the Europeans are just catching onto), a 3.5mm plug fitted to the cable with a standard 6.3mm one screwing or pushing over the top. This time around they were a lot more prevalent, a result no doubt of the increasing popularity of better quality personal stereos and portable CD players. Another area of development that follows in the footsteps of domestic audio is the use of better quality cables – virtually all the Japanese 'phones encountered had adopted oxygen free copper cables. This undoubtedly has something to do with the above average standards that they achieved and is a pointer for European brands.

In order to make space for more juicy pieces in the magazine's Front End we've abandoned the usual Conclusions page and instead would point readers towards the *Directory* at the back of the issue where they can find potted summaries of the headphones from this and the last test.



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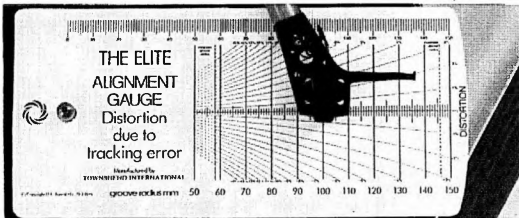
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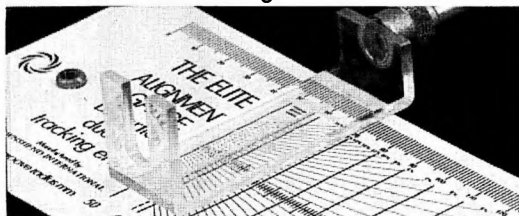
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The Aiwa *HP-X8* has been custom designed for the upmarket personal stereo user – or, to use technical jargon, the yuppie. It has everything that the young aspirant could desire in a headphone; it's small, high tech and of course matt black. It even has a rather svelt rubbery black cord that terminates in a gold plated dual sized jack plug. The *HPX8* should make it onto the shelves at Le Set if none of the others do.

From a more practical standpoint these are quite sensibly designed headphones, and a degree of thought has gone into making them comfortable. The earpieces can swivel in both planes and the supra-aural pads are simple velvet rings which feel very pleasant on the ear. One crucial element, the physical pressure exerted on the ear, seems to be just right for long term comfort.

Technical novelties include an oxygen free copper litz wire cable and samarium cobalt magnets. The closed back principle completes its Walkman qualifications, though I must question the appropriateness of a 2.4 metre lead, which seems like a last minute attempt to keep everyone happy.

Given the Prince track *No to transduce*, they came up with a remarkably good sound, one which was tonally quite well

balanced and fairly dynamic if a bit light in the bass. One could even push for more volume without any raggedness appearing. The next piece was rendered in an appealingly open way, the notes sounding rounded and reasonably natural. A degree of hardness was apparent but depth and life were both evident.

The Mozart sounded particularly charming, smooth and open. Not as revealing as some models perhaps, it still sounded remarkably fluent and relaxed for this type of headphone. The piece would have benefitted from greater low frequency extension, but this wasn't all that obvious without direct comparison to references.

As a partner to the better personal stereos around – such as Aiwa's own *PX-101* – these 'phones seem highly appropriate. They are not quite as impressive as some of the home-base oriented competition perhaps, but are not far behind so Recommendation seems apt.

GENERAL DATA

Type	supra-aural, closed-back, dynamic
Mass	100g
Size rating	small
Length of cord	2.5m, dual jack
Comfort rating	very good
Sound quality rating	good
Price	£49

AIWA HPEX-200 EXCELIA

AIWA (UK) LTD., UNIT 2, DUKES ESTATE, WESTERN

AVENUE, LONDON W3 0SY. TEL: (01) 993 1672.



Excelia is the name that Aiwa has adopted for its top of the range models and the stylish *EX200* headphones are no exception. These £90 closed back dynamic headphones with their high tech styling are probably the slickest lookers in this group, the unusual ribbed rubber adjustment covers giving them a particularly 'eighties' look. Ergonomics have also received some consideration, the headband being angled forwards so that the 'phones are at the right angle to the ears whilst the weight sits on the top of the head. This seems to work OK in practice but a wider strap would have been more comfortable with this fairly heavy headset.

The *Excelias* use a simple but attractive rubber insulated connection cord with LC-OFC (linear crystal oxygen free copper) cable terminated in a gold plated dual jack. So if you feel swanky you can use them with your Walkman, although the two and a half metre cable length might be a nuisance.

The circumaural earpads have a thin matt black plastic covering and are quite well shaped, if a bit on the small side to avoid resting on the average British audiophile's ears (depending on what size is average I guess), reducing this listener's comfort in the long run.

But the real reason that the

Excelias were created was for listening to reproduced music, and this is a job they do quite effectively. The strengths include a nice meaty bass which is not quite as taut and rounded as the reference but is well extended with plenty of weight. The sound is reasonably informative for dynamic headphones and is able to give some coherence to the various vocals, guitars, synthesizers etc, on the first test track.

They couldn't compete with the open natural sound of the reference on acoustic guitar, but still managed to recreate the jangle of new steel strings and sounded very open for a closed back design. The classical track sounded a bit processed perhaps, lacking the full freedom and dynamic range that is on the vinyl.

All in all the *Excelias* worked better with electronically created music than its more natural acoustic counterpart. But at the price they don't quite warrant Recommendation.

GENERAL DATA

Type	circumaural, closed-back, dynamic
Mass	360g
Size rating	large
Length of cord	2.4m, dual jack
Comfort rating	good
Sound quality rating	good
Price	£90



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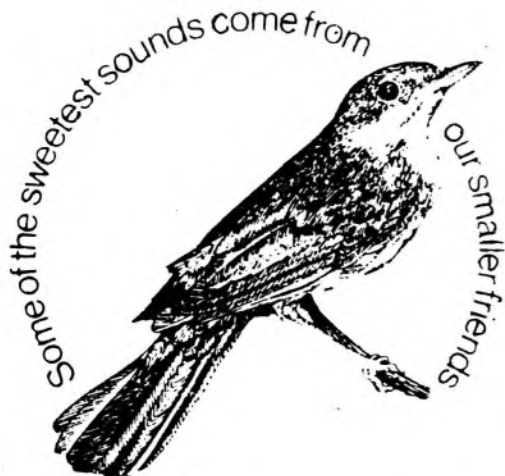
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AKG K135

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What is it that middle Europeans have about headphones? All those German companies and now an Austrian one – perhaps loudspeakers are verboten in the average German living room. Best known for professional audio products, especially microphones, AKG's *K135* made a good first impression because of its bold industrial design and the stylish use of typeface. These should find their way into Docklands flats on looks alone.

The simple two part headband uses a nylon webbing strap to bear the weight; the earpieces slide up and down on a track on the inside of the strap.

Comfortwise this seems quite good for a supra-aural design; the earpads are reasonably thick, but once again pressure is a bit on the high side, and the strap could do with a bit more flexibility. Comfort is an area where many supra-aurals fall down, I find. Head shape and size obviously come into the equation, but there must be many who find cans considerably less comfortable than I do, and therefore don't use them. But I oughtn't to let the *K135*s bear the brunt for what is very much a general failing.

Audio qualifications include semi-open backs, but only just, and a good quality 6.3mm jack plug. The *K135* sounds quite on the ball and in touch with the

essence of the music. Rock presentation seems a little thick in the lower midrange but higher frequencies are quite clear if potentially a mite wearing. Acoustic guitar seems lively and a bit up front – almost nervous by comparison with the reference.

Guitar also had a tendency to sound more electric than acoustic, an impression that at least one other set of 'phones managed to create. Classical music had a similarly slightly unnatural timbre, but was essentially fluent and relaxed. Information seemed somewhat veiled, but not too seriously for a headphone of this price.

Musically the *K135* has a better ability to present the rhythm and tempo of a piece than deliver the clarity and information, which it ain't so hot at. For my money these are the most tastefully designed headphones in this test, but I won't let that sway me.

GENERAL DATA

Type	supra-aural, semi-open, dynamic
Mass	160g
Size rating	medium
Length of cord	3m
Comfort rating	poor
Sound quality rating	fair
Price	£35

AKG K240 MONITOR

AKG ACOUSTICS LTD., VIENNA COURT, LAMMAS ROAD,

GODALMING, SURREY GU7 1JG. TEL: (04868) 25702.



The AKG *K240 Monitor* (there is also a *K240DF*) is the sort of chunky headphone one expects from this professionally oriented Austrian company. It has the classic wire superstructure and a broad headstrap emblazoned with the company name. The bigger AKGs – unlike any other cans I've come across – have a kind of automatic adjustment system which uses short elasticated cords to hold the headband at the right height for one's ears; what's more this actually seems to work. It makes one wonder why every other headphone needs to be grappled with for five minutes in order to make it fit properly.

The *K240* is an extremely comfortable headphone. Sumptuous circumaural earpads have a universal joint type of connection to the earpiece back so that it's able to tilt to any reasonable angle. And because of the wide headband and ergonomically calculated pressure on the ears, these fairly heavy 'phones manage to create the impression of being lighter than they really are, and are one of the few pairs which invite long term use. The price of this sort of physical luxury is £60.

Despite the large earpieces the drivers are only quite small, around 30mm, but this closed back design uses a reflex system to enhance the low frequency performance of the speaker. In

use the *K240* proved to be rather too polite, rock material sounding rather veiled and losing a lot of information that the electrostatics revealed. Only the fundamental elements of tunes come across, the fine details being lost in the clouded presentation.

However, acoustic guitar has a warm, open, even bold sound that is remarkably relaxed and fluent, if still a bit unrevealing. The *K240* takes the metallic edge off the sound but manages to reproduce a good impression of acoustic space.

Classical music also sounds open with a good sense of depth and an appealing midrange. A distinct veiling of information was again noticeable against the reference, but the sound is essentially relaxed and informative enough to keep one's attention.

These nicely designed and very comfortable headphones seem to work very appealingly with acoustic and classical music, and as such warrant Recommendation.

GENERAL DATA

Type	circumaural, semi-open, dynamic
Mass	240g
Size rating	large
Length of cord	2.5m
Comfort rating	very good
Sound quality rating	good
Price	£60

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AKG K280 PARABOLIC

AKG ACOUSTICS LTD., VIENNA COURT, LAMMAS ROAD,
GODALMING, SURREY GU7 1JG. TEL: (04868) 25702.

RECOMMENDED



"Parabola - curve traced by point which moves so that its distance from a fixed point is equal to its distance from a fixed straight line". That is how the *Penguin English Dictionary* defines the root of parabolic, which may explain the design of the AKG K280. This headphone uses two drivers per earpiece, arranged to reproduce the effect of a parabolic reflector. (The same principle is used in a satellite dish which beams the signal towards a point in front of it.) The twin 30mm diaphragms in the K280 don't have any form of grille cloth and are mounted and angled one above the other.

From a comfort point of view this is in the same class as the K240 - extremely comfortable. The 280 uses the same auto fit headband system and has large, well padded circumaural earpads. There's not the same universal flexibility, and the 280 only swivels in the vertical plane.

The unusual design of this AKG proves extremely successful when it comes to reproducing music. Just for starters I'd say that it was the best dynamic phone in the group. The first impression was of remarkable clarity throughout the frequency range coupled with superb treble extension. The effect on a Prince track is to make lyrics that much more intelligible and to convey

much more information than usual. Brighter than the reference but not in a nasty way, the 280 has a fine immediacy and 'quickness'.

Not surprisingly notes from a steel stringed guitar are presented with a knife like edge placed within a deep ambient acoustic. A triangle on this track is almost frighteningly realistic - that is if a triangle can be frightening!

Classical music is no less exciting, the timbre of instruments becoming alive and vibrant. Whilst it still concedes the last word in natural informativeness to the Stax Pros, I found the bite and drama very appealing, and only slightly fatiguing.

Not for the fainthearted or for owners of vicious source equipment, the K280 is certainly a remarkable dynamic headphone and one that's almost worthy of a Best Buy. But I guess £110 is a bit steep for that accolade, so Recommendation will have to suffice.

GENERAL DATA

Type	circumaural, open-backed, dynamic
Mass	250g
Size rating	large
Length of cord	3m
Comfort rating	good
Sound quality rating	very good
Price	£110

AUDIO TECHNICA ATH-911

AUDIO TECHNICA LTD., TECHNICA HOUSE, LOCKWOOD
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RECOMMENDED



Audio Technica's £75 ATH-911 is the top of their current dynamic headphone range and naturally has all the trimmings. These entail a PCOCC cord (translated in the guff as 'perfect crystal by Ohno continuous casting') and gold plated jack plug, the former even advertised on the head-strap.

The shape is the same as the cheaper 'phones that we tested earlier this year, but the 911 has softer, more comfortable earpad upholstery. Although nominally circumaural, the pads are a little too small for my ears and long term comfort is not as good as first impressions led me to expect. They could hardly be described as uncomfortable, but are better suited to small or medium sized ears. Adjusting the strap whilst wearing the phones is very easy, left and right channels are well marked, so all told this is a quite intelligent as well as attractive design.

These open backed headphones proved worthy of their highish asking price on audition, and gave the reference electrostatics a good run for their money. Tonally they lean towards the bright side of neutral and emphasised cymbals slightly on the Prince track. However, the bottom end was not found lacking and bass extension was quite convincing. The lucid top end

really gave steel stringed guitar the jangly incisiveness that it deserves. There is also a triangle on this track which sounded extremely realistic, indeed more persuasive than with the reference.

Orchestral music sounded nice and spacious with good clarity, plenty of information and enough subtlety to make a good job out of recordings. Lagging behind the reference in scale, depth and dynamic range, the 911 still made a fine job of transducing this particularly complex music source.

I wouldn't recommend the 911 to people with larger than average ears, or for use with systems that have a ragged top end. But they should work very well under most circumstances and so deserve a *Choice Recommendation*.

GENERAL DATA

Type	circumaural, open-backed, dynamic
Mass	210g
Size rating	large
Length of cord	3m
Comfort rating	very good
Sound quality rating	very good
Price	£75

AKG

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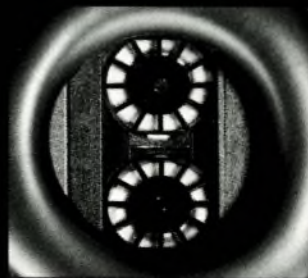
Phase 3

Said headphones shall be very comfortable, light, and cost efficient.

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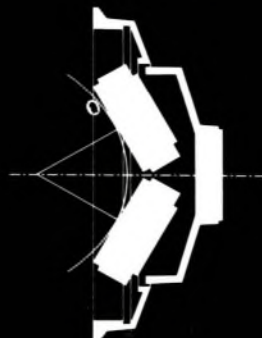


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BEYER DT325

BEYER DYNAMIC, UNIT 14, CLIFFE IND. EST., LEWES,
SUSSEX BN8 6JL. TEL: (0273) 479411.

RECOMMENDED



The £30 *DT325* is Beyer's bid for the sound quality conscious personal stereo market. Sales of relatively low priced 'hi-fi' headphone accessories have certainly risen as a result of the Walkman boom that has been going on for the best part of seven or eight years now. During the last *Choice* review of such devices I noticed that the more expensive examples were more than good enough to benefit considerably from better headphones than those supplied. And of course CD portables most definitely warrant something more capable than turbo earplugs!

The open backed *DT325s* are a very light 100 gram and come fitted with a dual sized jack on the end of a Walkman-oriented 1.5m cord, the shortest on this test. This levity combined with well padded headband and earpads make these headphones initially very comfortable but in the long run I found the ear pressure was significant enough to mark them down a grade.

Although the *DT325s* are similar to Sennheiser's *HD450s* in many respects, when it comes to sonic character they are quite different. The first test track gave an initial impression of reasonable neutrality, but comparison soon made it obvious that the *325s* unduly favour higher frequencies. They sound signifi-

cantly brighter than the reference and considerably less extended in the bass, but are nevertheless quite open and unveiled for a budget headphone.

The jangly sound of steel guitar strings comes over quite realistically, but this is tempered by a slightly 'edgy' impression which suggests that the volume level shouldn't be increased too much. Classical material manages to sound clear and even refined, although comparisons with the reference showed up the lack of spaciousness and air that one might expect from an inexpensive dynamic phone. Nevertheless the sound is essentially very listenable and devoid of any nasties even when the gain is increased.

These competitively priced headphones from Beyer offer a slightly bright presentation that may well suit certain systems, and quite a few inexpensive tape decks; in this respect they deserve Recommendation.

GENERAL DATA

Type	supra-aural, open-backed, dynamic
Mass	100g
Size rating	large
Length of cord	1.5m, dual jack
Comfort rating	very good
Sound quality rating	fair
Price	£30

BEYER DT880

BEYER DYNAMIC, UNIT 14, CLIFFE IND. EST., LEWES,
SUSSEX BN8 6JL. TEL: (0273) 479411.



Last February we reviewed, and enjoyed, Beyer's top dynamic *DT990* headphones. This month we are having a listen to the next model down the line, the £90 *DT880*. These German 'phones look superficially very much like the rest of the range, with the same wide headstrap and adjustment system, and large circumaural earpads.

The adjustment system seems intelligently designed and one can tailor it to choice whilst the phones are in use. The earpads are upholstered in a reasonably soft matt plastic material; although not as appealing as the almost furry material on the *990s* this is reasonably comfortable.

I found the ear pressure a little high, but one might expect a degree of give with use, so this shouldn't be a problem. Discerning left from right earpiece takes a fairly observant eye – a red marker on one lead would have helped – but it's again something one would become accustomed to.

The *DT880* is a semi-open-backed design that theoretically enjoys some of the advantages (and disadvantages) of both open and closed back designs. That is they will keep out external noise to a degree whilst still having the breathability that gives some depth and openness to the sound.

In practice the *880s* deliver a warm, slightly bass heavy response. Lower frequencies are well controlled with an attractive solidity, but bass extension is not as good as other similarly priced models. Musical presentation has a somewhat busy feel to it – not exactly congested but perhaps a little coarsened. Simple guitar music sounds warm and clean with slightly attenuated high frequencies, but the sound in general is essentially fluent and listenable. Lacking the freedom and relaxation of the best electrostatics, they still sound very pleasant and are reasonably informative.

Classical material reveals a good sense of tempo despite a rather 'soup-like' presentation that fails to reveal the full dynamic range of the disc (something which none of the so-called dynamic models achieved!)

On the whole the *880s* are very pleasant headphones to use, but not really illuminating enough for formal commendation.

GENERAL DATA

Type	circumaural, semi-open, dynamic
Mass	195g
Size rating	large
Length of cord	3m, coiled
Comfort rating	good
Sound quality rating	good
Price	£90

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RECOMMENDED



In our last headphones round up we included two models from this Swiss company, the least expensive *Model One* and the excellent upmarket electrostatics. This time around we have space for the missing link between them, the £100 *Model Two*. Like the *One* these are dynamic headphones housed in the characteristic – some might say Darth Vaderesque – Jecklin shell.

The purpose of this rather large and unusual design is long term comfort, which is achieved by exerting the bare minimum of pressure on the side of the head and allowing a relatively free flow of air between ears and 'phones. Despite a complete lack of adjustability the Jecklins do seem to be very comfortable on most male heads. Although initially they seem a bit insecure, confidence in their ability to stay on grows with use.

The large and fairly rigid plastic shell also provides a good frame for the square open backed speaker panels, each of which contains a single dynamic driver. This shell was initially designed for the electrostatic model which uses large square drivers, but it seems to work just as well with conventional drivers attached to a perforated aluminium baffle.

The *Twos* reproduce bass in a meaty and solid fashion leaving no misconceptions about the

tempo of the beat. At the opposite frequency extreme the treble comes across with an open and clean character. The tonal balance seems reasonably neutral if slightly rolled off at the extremes, and could well be flatter than the reference. On comparison the midrange is a little veiled with some muddling.

The Jecklins created an enticing sense of spaciousness on simpler acoustic music. Although slightly lacking in clarity by comparison, steel guitar strings sound refreshingly 'jangly'. Again there seemed to be a slight loss of information, which made the track seem a bit fiddly, but the apparent lack of distortion made listening an enjoyable experience. Reproduction of orchestral music was most difficult of all to criticise, the *Twos* revealing a remarkable dynamic range.

The *Model Two* is a very comfortable and musically satisfying headphone that will fit in well with most systems, and definitely deserves Recommendation.

GENERAL DATA

Type	circumaural-ish, open-backed, dynamic
Mass	480g including lead
Size rating	very large
Length of cord	3m
Comfort rating	good
Sound quality rating	very good
Price	£99

KOSS K/6X PLUS

HW INTERNATIONAL, 3-5 EDEN GROVE, LONDON N7 8EQ.

TEL: (01) 607 2717.



Koss claim original invention of the stereo headphone concept, and make a massive range of headphones which includes cordless infra-red models. But the *K/6X Plus* is a fairly modest £30 model that is distinctly different to the European alternatives available at this price.

And I'm not just talking about the sound. The styling, to put it bluntly, is tacky and looks like it was conceived some time during the sixties. Although advertised as lightweight on the carton, their 178 grams makes them more of a middleweight by current standards.

The ear pads are an unusual combination of circumaural shape and supra-aural scale. They seem to be air filled and work reasonably well. The earpieces sit in swivelling yokes that attach to the headband via flat section aluminium sliders which are difficult to adjust in situ. The lead is of the flat coiled variety and terminates in a good quality jack plug.

Designed by Koss as a pressure type design, the *K/6X* are closed-back 'phones that use a slotted plastic cover but no cloth over the drivers. They seemed considerably more sensitive than other 'phones, sounding quite loud even at minimum volume.

Listening tests revealed a very odd and uneven frequency

response, with a distinct preference for the lower midrange. All the tracks sounded completely different not only from the reference but the other models as well. Rock music sounded slightly veiled and a bit shut in, but reasonably informative and with a nice solidity to kick drums. Acoustic guitar was perhaps the most obviously disjointed, the track concerned sounding like a completely different mix. It didn't sound bad as such, but was very 'up front' and could have been coming from a totally different system.

Because of the sensitivity problem I tried them direct from a Michael Hedges CD; again the balance of the piece seemed altered, bringing the guitar up and the voice down! Lack of basic tonal accuracy will rule this model out for many listeners, but I can imagine them appealing to some ears. The high sensitivity could be a boon with personal stereos, but an adaptor will have to be found.

GENERAL DATA

Type	supra-aural, closed-back, dynamic
Mass	178g
Size rating	medium
Length of cord	3m, coiled
Comfort rating	fair
Sound quality rating	poor
Price	£30

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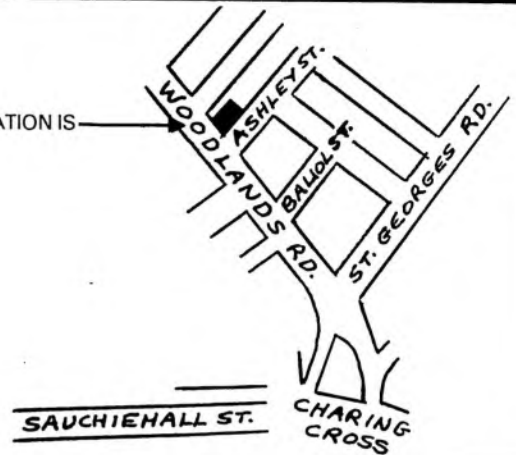
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QUART PHONE 30

SOUNDTEC MARKETING, UNIT 9, BELFONTRADING EST.,

MUCKLOW HILL, HALESOWEN B62 8DR. TEL: (021) 550 7387.



Since our last headphone reviews the Quart range has been undergoing a change of name, dropping the previous *PMB* prefix in favour of the more informative *Phone*. This *Phone 30* model is a cosmetically updated version of the *FMB 25 II* that did quite well in our February review. Apparently the only technical change is the addition of a swivel joint between the headband and earpiece, an innocent and sensible little mod one might have thought. But something has changed these 'phones, and it's a pity I don't have the old ones around for comparison.

The headstrap is a fairly conventional two part affair that is quite easy to adjust in situ. The 'phones' suspension itself is somewhat different. The headstrap attaches to a plastic ring which holds the earpiece at four points using elasticated cord. The idea is to allow full freedom of movement so that the 'phone sits at a comfortable angle on your ear, which in my case it managed quite well.

Subjectively, the *30s* seem to have lost the charm that *25 IIs* had (mind you, charm in this instance has only tenuous links with accuracy). Rock music has a slightly dull, bass lifted sound that was somewhat mediocre and uninspiring. There are no other obvious pitfalls, and only on

direct comparison does the sound seem a little fatiguing and flat.

Acoustic guitar seems mildly 'clouded', though essentially all was there and came across in an even and unhurried way. The notes seem a little rolled off at the top end, while pushing the volume up above average results in a rather unpleasant sound. However, the *30s* do seem to resist muddling and remain coherent. Orchestral music works best, sounding smooth if a little unrevealing. Comparison to reference 'phones reveals a lack of subtlety and involvement, but the *30s* never offend even if they are a trifle bland.

The *Phone 30's* predecessor had a pleasant 'mid forward' coloration that must have empathised with the (transistor) amplifier I was using at the time. Unfortunately this model is less seductive, though it still improves on some of the competition.

GENERAL DATA

Type	circumaural, semi-open, dynamic
Mass	240g
Size rating	large
Length of cord	3m
Comfort rating	good
Sound quality rating	fair
Price	£40

QUART PHONE 70

SOUNDTEC MARKETING, UNIT 9, BELFONTRADING EST.,

MUCKLOW HILL, HALESOWEN B62 8DR. TEL: (021) 550 7387.



The *Quart Phone 70* is essentially a tarted up *FMB 65* – a worthwhile touch up job as the original didn't display the Quart name at all as I recollect. Like the *Phone 30*, the one mechanical change that comes with the new badge is a new swivel joint between headstrap and earpiece.

Retailing for ten pence under £70, the *70* uses the same earpiece suspension system as the *30*. Suspending the 'phones on elasticated cords from a surrounding plastic ring gives it the three dimensional freedom to sit optimally on the side of the head. This worked quite well on my head, and the properly circumaural earpads – larger than those on the *30* – don't interfere with the shape of one's ear, giving a fair chance of long term comfort.

These closed-back 'phones reproduce orchestral music with a good sense of depth and a fair amount of information. Although quite relaxed and clean there is also a certain lack of clarity; comparison with electrostatics reveals a slight hardness which doesn't encourage listening at higher levels. Acoustic guitar maintains the clear sense of attack and incisiveness that fits the instrument. However, a bit more bass extension would have given notes more substance, and the *70s* couldn't quite keep up with the faster playing, but the

rendition was quite competent overall. The last track, *No*, sounded quite well balanced with good clarity and a fair amount of detail, but failed to sound as dynamic as it can, the music tending to sound a bit jaded.

When we reviewed the '65 last February we felt it was worthy of Recommendation and as far as I can tell the basics have not changed. But in the light of some of the alternatives that have turned up in this review the *Phone 70* doesn't seem quite as competitive as it did. It's still a comfortable and enjoyable phone, however, and devoid of any obvious flaws.

GENERAL DATA

Type	circumaural, closed-back, dynamic
Mass	245g
Size rating	large
Length of cord	3m, coiled
Comfort rating	good
Sound quality rating	good
Price	£70

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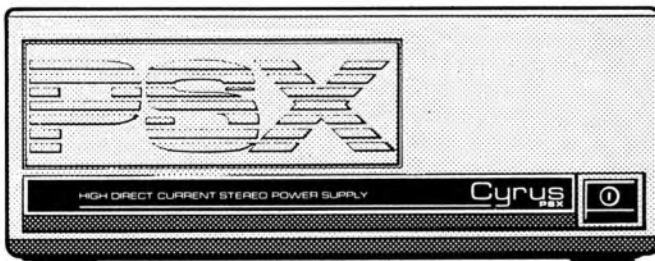
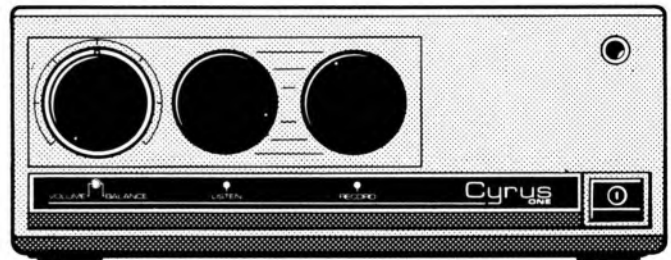
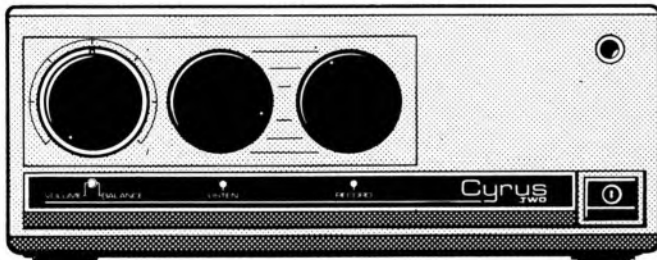
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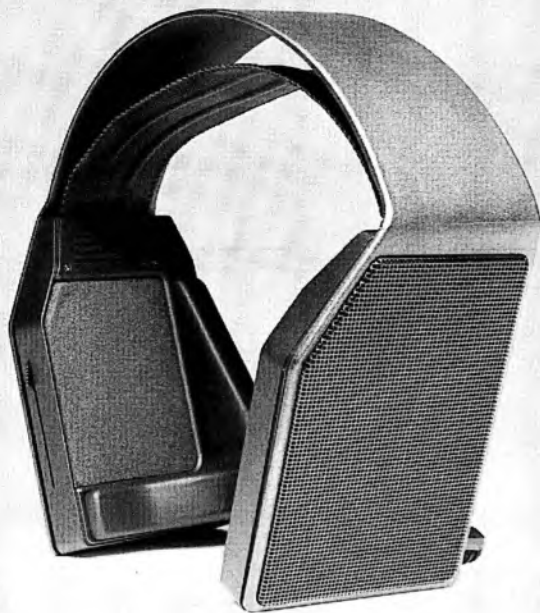
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QUART PMB 85

SOUNDTEC MARKETING, UNIT 9, BELFONTRADING EST.,

MUCKLOW HILL, HALESOWEN B62 8DR. TEL: (021) 550 7387.



Just when I thought Jecklin had the monopoly on huge headphones, Quart came up with these – or to be more accurate Soundtec sent them down for appraisal. At close on £90 the *FMB 85s* are the only other 'phones I know that adopt the Jecklin approach of spacing the drivers to allow free flow of air around the ear, and this itself inevitably gives a far better chance of long term comfort. Unlike the Swiss design, these German phones have pads which press below and behind the ear, making them more secure but less comfortable.

The *85s* share with AKG the supposed merit of having two drivers per side. These don't use a dividing network, but instead each is simply connected for full range operation, and is glued onto a perforated aluminium sheet.

The initial sonic impression is of an open and powerful character with a rather pronounced bottom end. They seemed to work nicely at higher volume levels and I ended up listening for longer than intended. On rock music the Quarts seemed more solid than the reference, but lacked its coherence and integration.

The steel strings on Adrian Legg's acoustic guitar didn't really retain their 'zing', and this

particular instrument in fact sounded more like its electric counterpart. The rendition was definitely not as natural as some, but bass definition and clarity was quite good. The effect on classical music was similar; the sound was smooth and somewhat lacking in dynamic range, but the lack of subtle distortion made listening a pleasant and encouraging experience.

The *85s* seem to have been designed with rock music and the average audio system in mind; this is a logical approach as the majority come into that category. But whether it makes the grade as a hi-fi product is more debatable; it is perhaps too dependent on taste and ancillaries to be generally acceptable.

Shortly after completing this review Soundtec informed us that when this model undergoes an imminent name change from *FMB 85* to *Phone 85* it will also lose two of its four drivers and become a more conventional (more Jecklin-like) beast.

GENERAL DATA

Type	circumaural, open-backed, dynamic
Mass	330g
Size rating	very large
Length of cord	3m, coiled
Comfort rating	fair
Sound quality rating	very good
Price	£90

ROSS RE-2760

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Not only is the Ross *RE-2760* the only British headphones in this test, it is also one of – if not the – most up to date designs from an aesthetic point of view. Looking decidedly post modernist (which roughly translates as contemporary) Ross has been pursuing a design-led policy for some years now, and with considerable success. There is nothing quite like making a product potentially fashionable in order to improve sales – note the boom in personal stereos and mountain bikes.

A wide range of design parameters have been considered in creating the *2760s*, including channel identification (with brail markings), ease of manufacture and robustness. But one of the important ones, comfort, seems to have suffered in consequence. The shape of the supra-aural earpads is reasonably practical, but the way that the plastic strap holds them against the ears is fundamentally uncomfortable, and the 'padding', in the form of a rubbery plastic covering on the headband is really a bit too hard. On the positive side they don't exert too much pressure on the ear, but this is definitely a try-before-you-buy design.

The sound quality produced by the mylar dome drive units is a little 'thick' with a bass heavy balance. The closed back design

tends to give the sound a rather shut in feel and there is an obvious lack of transparency. But to be fair there was little in the way of distortion or graininess.

Acoustic guitar seems a little bit crude and distant, with the balance still on the heavy side, but a fair amount of information was getting through nonetheless.

On orchestral music cellos take stage centre, emphasised by the warm presentation, and soundstages are generally a bit confined. However, even at high-ish levels the sound stays most polite and free of any raggedness.

The combination of a warm clean sonic presentation, a dual sized combination jack plug and the closed backs make this a suitable partner for the average personal stereo. Use with a reasonably neutral domestic system is harder to advocate.

GENERAL DATA

Type	supra-aural, closed-back, dynamic
Mass	150g
Size rating	medium
Length of cord	2m, dual jack
Comfort rating	poor
Sound quality rating	fair
Price	£35

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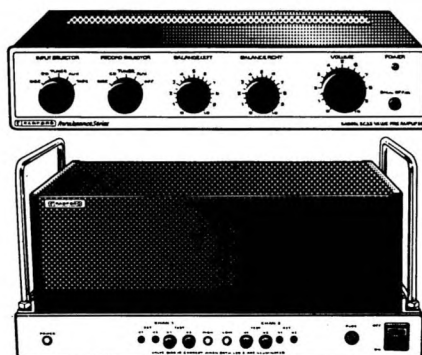
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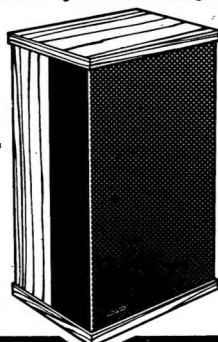
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SENNHEISER HD-450

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

RECOMMENDED



The *HD 450* is one of the latest models from German headphone giant Sennheiser. At 135grams it's amongst the lightest medium sized models in this test, due to the remarkably simple modular design adopted. As with other Sennheiser 'phones this can be almost completely dismantled so that individual pieces can be replaced if need be. However, the *450* must also be amongst the most robust headphone around and the least likely to need this sort of backup – a bit of a belt and braces job, but an admirable one in this age of consumer disposables.

The low weight and intelligent design makes these supra-aural 'phones particularly comfortable to wear, if maybe a little on the warm side. Discerning which way round to wear them isn't that easy – there are some small indented letters at the bottom of the strap, but a red marker on one cable would have helped here. In many ways suitable for use with portable music sources, they aren't too garish to wear in public and come fitted with a dual adaptable plug. But being a semi-open design they might let too much external noise in (or internal noise out) for some.

The *450s* turned in a relaxed if weighty subjective performance, with a slightly bass heavy tonal character on rock material. Not

particularly revealing, the rhythmic accuracy of the turntable nevertheless came across in a convincing and smooth manner. The far less 'engineered' sound of acoustic guitar is rather more revealing of a veiled and somewhat muddled nature. Though still quite informative the sound has a rather dead and 'shut in' feeling when compared to the reference electrostatics (which admittedly cost more than ten times as much).

Classical music is presented as a warm, slightly flat picture – smooth and enjoyable if a bit lacking in clarity. Despite a certain lack of subtlety and depth, melodic and pleasant music is nevertheless created from the signal.

The *HD-450s* are sensibly made, comfortable headphones that are equally at home in domestic and portable circumstances. If they were a bit more revealing a Best Buy would be warranted, but as it is Recommendation is more realistic.

GENERAL DATA

Type	supra-aural, semi-open, dynamic
Mass	135g
Size rating	medium
Length of cord	3m, dual jack
Comfort rating	good
Sound quality rating	fair
Price	£27

SENNHEISER HD-480

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



The £36.99 Sennheiser *HD 480s* are exactly ten pounds more expensive than the *HD 450s*. They look nearly the same, though the silver colour here makes them look more like robot ears than the others. And by specification are, with one exception, exactly alike. That exception is an extra 2002Hz of bandwidth – two at the bottom of the range and the rest at the top.

So where d'ya go from there? The headband is made of the same indestructible poly-whatever-ene, and the detachable cord uses steel wire to make it all the better for garroting people with (a very dangerous trick not to be attempted with or without an adult present).

From a comfort and ease of use point of view the *480s* are pretty good, though some might find the earpad pressure a bit wearing in the long run, and locating the R and L channel indicators takes practice. For personal stereo users and owners of the latest Mission *Cyrus* amplifiers the jack plug is of the dual fit variety.

Sonically the *HD 480s* do vary from their cheaper siblings. The first run reveals a very warm tonal balance which softens the edges of notes and takes away any crispness in the music. Synthesiser bass becomes almost squelchy. Generally rock music sounds less dynamic than it

should, and basically a bit too smooth. The usually incisive acoustic guitar strings were blurred, and fast picking was easily muddled by this lack of clarity. Essentially easy going and enjoyable, there was also a definite loss of information.

Classical music came over rather better, instruments gaining some depth and body despite – or possibly because of – the rather bass heavy balance.

Being fairly sensitive, these headphones are more susceptible than most to any amplifier hum, so I tried them directly into a CD player. The overall effect was fundamentally the same, the music again being couched in a cosy ambience that denied full range and dynamics.

Despite the extra bandwidth accredited to these cans, they don't really make the grade and can only be commended for use with ragged and overbright sources. Mind you there are plenty of those around!

GENERAL DATA

Type	supra-aural, semi-open, dynamic
Mass	135g
Size rating	medium
Length of cord	3m, dual jack
Comfort rating	good
Sound quality rating	fair
Price	£37



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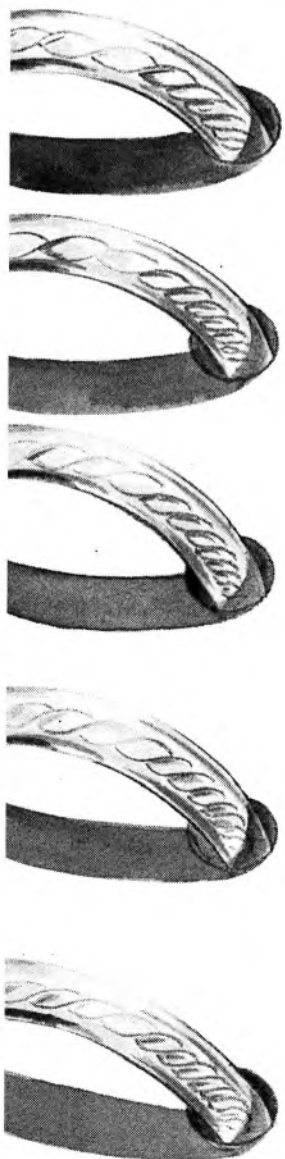
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SONY MDR-V3

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MIDDLESEX TW18 4PF. TEL: (0784) 67000.

BEST BUY



The £30 Sony *MDR-V3* is the least expensive, ostensibly domestic, Sony headphone to have been reviewed by *Choice* for quite some time. Fundamentally a scaled down version of the *V7*, the *V3* is neat and slickly finished with the slogan 'digital monitor' printed in gold on the imitation leather headstrap. I say imitation but it takes a reasonable examination to assess as much, and the *V3* probably has the highest perceived value of all the budget headphones in this test.

Ergonomically these supra-aurals are quite well designed. Easily adjusted whilst worn, the earpads tend to exert rather too much pressure for long term comfort. I find that cans which bend any part of the ear, even only slightly, can be wearing after a while. The *V3*s don't feel all that secure on the head, but neither can they be dislodged without frantic movement and would be fine as walkphones.

Like the *V7* this is a closed-back design, using slightly smaller (30mm) dynamic drivers. The cord is an OFC litz wire type, feeding the earpieces in the standard 'Y' configuration and terminating in your original gold plated uni-match plug.

What really marks the *V3* out from the rest of the budget cans is sound quality. Rock material gives an impression of remark-

able clarity and lack of distortion coupled with a fairly even frequency response that is only noticeably down in the lower octaves. The basic character of the 'phones seems to be slightly bright and shiny, but informative at the same time.

The steel strings on Adrian Legg's guitar were given an appropriately jangly and bright sound that was more lively than that of the reference. The Mozart piece was reproduced with a good sense of space that allowed some of the dynamic subtlety to be heard. Comparatively some slight hardness was noticeable, but unlike many renditions this one didn't become overly smooth and bland but retained some bite and flavour.

All in all the *MDR-V3* is a quite exceptional little headphone at the price. Perhaps a bit forthright for more ragged sources, it is obvious Best Buy material nonetheless.

GENERAL DATA

Type	supra-aural, closed-back, dynamic
Mass	150g
Size rating	small
Length of cord	3m, dual jack
Comfort rating	fair
Sound quality rating	good
Price	£30

SONY MDR-V7

SONY UK LTD., SONY HOUSE, SOUTH STREET, STAINES,
MIDDLESEX TW18 4PF. TEL: (0784) 67000.

RECOMMENDED



Our last headphone review took a look at two Sony *V* models, the *4* and *6*. This time we have the models immediately above and below those two. The £70 *MDR-V7* is one of the most expensive closed-back designs in this test group and bears the motif 'studio monitor' proudly on its headband. Like many Japanese models the *V7* is keen to let you know of its digital readiness, which is no doubt a profitable if meaningless bandwagon on which to jump.

In a similar vein to the Aiva *Excelsis* the *V7* has oval earpieces that are angled to suit the backwards slant of the ear when the weight bearing headstrap is resting on the top of the head - a sensible idea that seems to work quite well. Although deemed circumaural by Sony, the earpieces themselves are only a little over medium sized and therefore fail to work in a circumaural fashion. Consequently they are not particularly comfortable, but neither are they unpleasant to wear.

The audio oriented ingredients include an oxygen free copper litz cord that terminates in a gold plated dual sized jack plug. (One might question the benefit of this given the limited availability of gold plated jack sockets as yet.)

More important is whether any of these novelties make the *V7* a

good transducer. My impression is that they do. Rock material delivers a very classy sound with plenty of muscle. The frequency response doesn't appear to have any obvious lumps, and various electronic instruments each fit coherently into the mix.

The acoustic guitar sound is also impressive with plenty of vitality and depth. Next to the reference a lack of transparency and low frequency extension was noted, but the *V7* did very well for a closed back design.

Only on orchestral music was the *V7*'s subordination to the reference obvious, as it couldn't match the electrostatic's remarkable ability to pick up on every nuance in the music. However, the textured and fairly dynamic presentation was hard not to enjoy.

Sony has produced a closed-back headphone that seems to work well even if it's not as subtle as its peers. Recommendation is most definitely in order.

GENERAL DATA

Type	circumaural, closed-back, dynamic
Mass	230g
Size rating	medium
Length of cord	3m, dual jack
Comfort rating	very good
Sound quality rating	very good
Price	£70

RECOMMENDED

STAX SR84

PATH GROUP PLC, UNIT 2, DESBOROUGH IND. PARK,
HIGH WYCOMBE, BUCKS HP12 3BG. TEL: (0494) 459981.



The Stax *SR84*, or *Lambda Junior* as it's sold, is made up of the *SR-80* headphones and the *SRD-4* adaptor. The *SR-80* uses electret drivers – electrets are the electrostatic equivalent of permanent magnets, and therefore hold a constant electric charge and don't require a DC voltage to operate. Although very popular in microphones, headphone applications are less common; to my knowledge Audio Technica are the only other company to market such models in the UK.

A major drawback with using an adaptor is that it has to sit in the loudspeaker signal path. The adaptor's own very basic copper cables attach to the amplifier's outputs and the loudspeaker cables are then connected to the adaptor's spring clips. This is obviously no problem if you're a headphone junky, but represents a bit of a compromise for normal loudspeaker use. No doubt a dedicated tweak could replace the adaptor's cables and connectors, but I don't suppose that would do the guarantee any good.

The *SR-80* 'earspeakers' (as Stax call them) are fairly light and comfortable supra-aural affairs, with properly open backs and a flat lead that terminates in a Stax five pin plug. Finish is exemplary but construction doesn't look all that robust, so

keep them away from the kids.

This combo managed to make a much more coherent and detailed job of rock material than most of the dynamic 'phones. The sound still isn't as open as the reference and doesn't have the bass extension, but is still extremely clean and revealing.

Acoustic guitar music has good neutrality and notes seem far more deliberate and organised than usual. A bit harder and flatter than the reference at times, the *84* almost equalled it on information.

Most impressive of all was performance with orchestral music, which had much more of its full acoustic than usual, while the dynamic range was allowed to shine through with plenty of drama.

The 'stats' are still ahead on absolute naturalness, but these electrets turned in an elegant performance that would embarrass many loudspeakers at twice the price. Recommendation is the only, obvious conclusion.

GENERAL DATA

Type	supra-aural, open-backed, electret
Mass	250g
Size rating	medium
Length of cord	2.5m
Comfort rating	very good
Sound quality rating	very good
Price	£210

RECOMMENDED

STAX GAMMA PRO/SRD-X

PATH GROUP PLC, UNIT 2, DESBOROUGH IND. PARK,
HIGH WYCOMBE, BUCKS HP12 3BG. TEL: (0494) 459981.



Used as the reference throughout this review, the Stax *SR-Gamma Pro* electrostatic earspeakers and *SRD-X Pro* drive unit are priced at £295.95 and £229.95 respectively. Our last headphone review looked at the standard version of the *Gamma*, used with one of their conventional energisers. This time around we're examining the 'professional' version, and using the *SRD-X* driver. The primary advantages that the *Pro* models have over their less expensive siblings are thinner diaphragms – 1.5 rather than 2 microns – and a wider gap between the electrodes for the diaphragm to move in. This in turn requires a higher polarising voltage of 580volts.

The *Gamma* has large oval circumaural ear pieces that combine with medium weight and a wide headstrap to make an extremely comfortable headphone.

A major drawback with electrostatic headphones used to be that the energiser units needed to be connected in line with the loudspeaker signal, but Stax have come up with a series of drive boxes which can be plugged into any line output. The *SRD-X Pro* is the least expensive such example available in the UK and runs off the mains via a 12 volt transformer (or alternatively uses batteries). It is essentially an energiser with a built in amplifier

and has its own volume control.

The sound quality of the *Pros* is in a class of its own compared to the other units in this test. Certain models are able to compete in certain respects but the *Pro* is most impressive overall. On all material a natural, relaxed character doesn't seem to miss a thing. Retrieval of subtle information is the essential strength, and I would challenge conventional loudspeakers costing two or three times as much to come up with the nuances that the *Gamma* finds in recordings. Classic Decca *SXL* recordings really lived up to their reputation when listened to with these; the dynamic range is quite staggering.

But I've run out of space before I've started. In a nutshell the *Gamma Pro/SRD-X Pro* combination is one which can tempt me away from loudspeakers at times; there are few higher Recommendations for a headphone.

GENERAL DATA

Type	circumaural, open-backed, electrostatic
Mass	250g
Size rating	large
Length of cord	2.5m
Comfort rating	very good
Sound quality rating	excellent
Price	Gamma Pro/SRD-X Pro £296/£230



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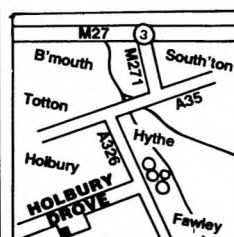
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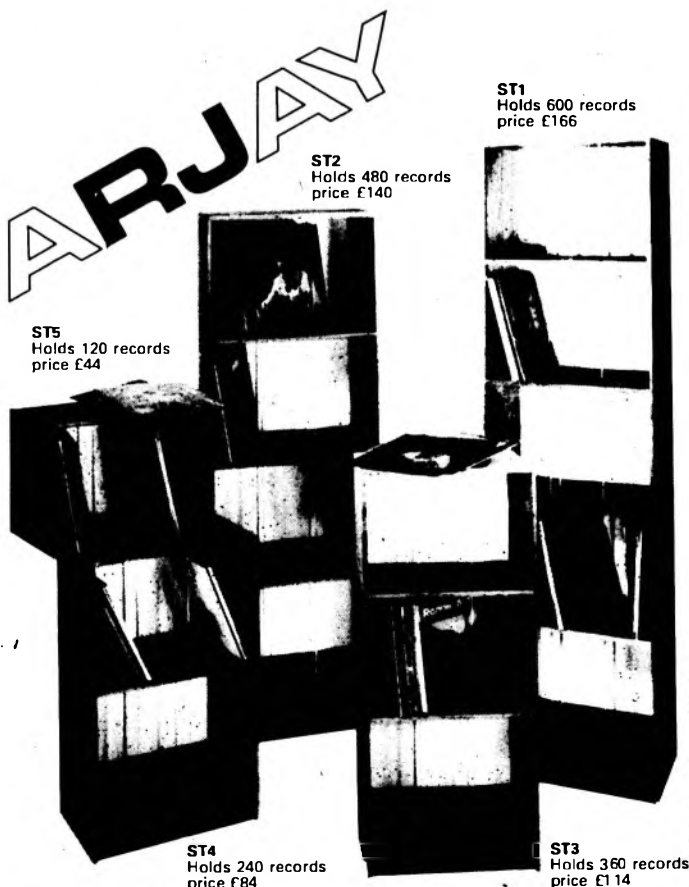
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THE DIRECTORY

The *Hi-Fi Choice Directory* was conceived as a reference guide to all the audio products reviewed by *Choice* that are currently available. At present this runs to some 700 plus products split into suitable categories, each with its own introduction containing information about the product type and its applications. They are particularly relevant to the uninitiated first time buyer and help sort out the order of priorities when buying a piece of equipment.

Each product along with its retail price is placed in its respective category in alphabetical order. For instance the Acoustic Research *EB101* is presently at the beginning of the Turntables and Tonearms section; however, the Ariston *RDS0 Superior* heads the Motor Units section as it is solid and was reviewed as a separate component – requiring a separate arm. Where there are several products with the same name but different model numbers these are in price ascending order.

Then come the ratings for the standard achieved in laboratory and listening tests, with the exception of certain product groups where lab tests were not carried out. One important point to remember is that they cannot be used to compare products from different categories – i.e. a cassette deck rated 'excellent' in sound quality will not usually offer

the same standard of fidelity as a similarly rated turntable or CD player (unless you can get hold of first generation copies of the master tape!).

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

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

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

Perhaps the most influential letters in the Directory are those found in the Value column, the *RS* and *BS* denoting the Recommended and Best Buy ratings that are appended to products we consider meritworthy. The Best Buy tag means that a product not only offers good sound quality but is reasonably priced as well. With source components a price

limit of approximately £300 is usually used as a guide. Recommended means that either the performance of a product is particularly good irrespective of price or, alternatively that a good value standard is achieved but overall attainment falls short of Best Buy classification. An ideal situation would be to choose suitably priced Best Buy or Recommended products from relevant categories and create a Best Buy system, but, due to the variety in tonal balance that exists in much audio equipment (especially the electromechanical elements – i.e. cartridge and speaker) system building is not quite that simple. These ratings make a useful guideline for shortlisting components, but only experiencing the actual combination will tell you whether it works for you.

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

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

SYSTEM BUILDING

Pre-packaged one-make systems have been commercially very successful, with advantages like cosmetic consistency, competitive pricing, and (assumed) technical compatibility. However, despite the mass market clout of the consumer electronics giants, the hi-fi tradition of specialised separate components seems as strong as ever, and certainly represents the route taken by those who place sound quality ahead of other criteria.

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

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

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

Cassette has never really challenged vinyl's superior quality, but it is a multiple role format, offering 'go anywhere' flexibility, a uniquely useful recording capability, plus a broad catalogue of pre-recorded music cassette material. As a hi-fi medium cassette suffers from pre-recorded material which has been improving but is still patchy in quality, and can usually be bettered by a home recording. There is also the worry that a tape made on a specific machine usually replays best on that machine, which may cause aggravation when upgrading a few years hence. It is worth remembering that though such opportunities are rarely possible or practical, a live recording onto cassette using good quality microphones can be the hi-fi equal of any other source.

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

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

For many years the 'weakest link' theory proposed that the loudspeakers needed the most attention, that amplifiers merely had to have sufficient power, and that turntables were pretty well perfect. However, this perspective has become steadily discredited by an alternative 'theory of precedence', which stresses that no subsequent component can make up for the inadequacies of its predecessors – all it can do is supply its own additional degradations. In such a context it is not uncommon to find more than half the system budget allocated to the record player, with scrimping and saving made on amplifiers and loudspeakers, even though these are used all the time whatever the source.

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

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

The loudspeakers are most critical of placement, because it is their job to create the stereo image, and it will be impossible to do this if the sound from each is not roughly similar at the listening position. Each loudspeaker should operate in a similar immediate acoustic environment, unnumbered by other furnishings and structure, and a similar distance from listener, nearby walls, and corners. Some loudspeakers are designed to operate close to a rear wall, others a metre or so out into the room, but all loudspeakers benefit from being closely mechanically coupled via proper stands to the floor.

There is some debate about the best form of fixing, however, adjustable spikes through to the

floor proper or seated into the tops of cross-head screws are generally regarded as the best solution in most circumstances. There is no need for paranoia about using spikes through normal pile carpets because the holes will be almost impossible to find when the stands are removed.

Most decent quality turntables are fairly immune to feedback from loudspeakers, so it should not matter too much if these items are sited fairly close to each other. Indeed it is debatable whether any advantages gained from keeping the turntable well away are not lost through the need to use longer connecting cables.

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

The key to getting the best results from a separates system lies in finding an experienced and skilled dealer in the first place, one who takes the trouble to find out what you really want and then demonstrate some likely alternatives, without trying to cram his own particular prejudices down your throat. To some extent the customer's task must be to discover for himself whether the dealer in question is competent or not. Membership of trade organisations like BADA can be a worthwhile pointer to a degree of professionalism, but the bottom line is whether the dealer in question can create a good sound in his own shop. If he can't, there is precious little chance of him doing so in your home. The best dealers should lay on demonstrations so you can hear the differences between components for yourself, and hear the sort of improvements which can be had at different price strata. You can then establish the sort of performance you are prepared to accept within whatever budgetary constraints you have set.

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

THE DIRECTORY

TURNTABLES & TONEARMS

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

Specialist turntables offer big sound quality

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

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

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

INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research EB101 £230	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Alphason Sonata/HR-100S-MCS £695/£412	Excellent Very Good	Highly capable audiophile system with real resolution and control. Bass is powerful and dynamic ability unbridled	Manual, subchassis, belt drive, 10g	R	60
Ariston Q-Deck £140	Good Average+	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid	BB	55
Ariston RD60 £219	Good Good	With the Enigma arm, this balanced and communicative turntable falls only slightly short of the RD90 on sound quality	Manual, belt drive, subchassis, 11.5g	BB	48
Ariston RD40 Q/Enigma £388	Average+ Good	Worth considering for stylish appearance and decent performance, but undermined by RD60 in value for money terms	Man/electronic, belt drive, subchassis, 11.5g		48
Bang and Olufsen TX2 £288	Average+ Average+	Fully automatic, it can interface to B&O's remote control system, is attractively styled and even sounds respectable!	Automatic, belt drive, subchassis, (B&O carts only)		48 (Summary)
Dual CS503-1 £125	Poor Average	Slated as a replacement for the CS505, the 503-1 needs careful system matching to mask rumble and microphony, but is good enough to benefit from a better cartridge	Semi auto, belt drive, low mass arm	R	55
Dual CS5000 £200	Average Average+	The rare 78 facility may give grandma's collection a new lease of life but the player did not merit recommendation on price vs sound	Electronic, belt drive, subchassis, 10g		48
Goldmund ST4 £4,000	Very Good Excellent	The Studio turntable takes on a cheaper tonearm than the T3F, yet provides a similar reference standard objective and subjective performance at £2,000 less, in a neatly integrated though bulky package	Solid subchassis, direct drive, parallel arm, detachable headshell	R	60
Heybrook TT2 turntable & arm £279/£249	Average Good+	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, belt drive, 14g	R	55
Kuzma Stabi/Stogi £575/£349	Average+ Stabi: Good; Stogi: Excellent	Stabi is powerful, spacious but not sufficiently subtle. Stogi is an excellent all rounder with even spread of abilities	Manual, belt drive, subchassis, 12.5g	Stogi: R	60
Linn Axis £345	Good+ Good+	Setting new performance-for-price standards this cleverly engineered and competent deck has many of the qualities of the Sondek LP12	Electronic, belt drive, semi subchassis, 13g	BB	48/Coil
Linn Sondek/Ittok (Troika) £509/£429 (£625)	Excellent Excellent	Superb sound – the best LP12 combination yet. The Troika gives the system real solidity and strength, stretching the deck and arm qualities to the full	Manual subchassis player, belt drive, 14g	R	60
Manicore Mantra £300/£330 (Arm)	Good+ Good+	Fitted with a Rega RB250 arm variant and AT95E cartridge the Mantra fared very well indeed with a fine midrange and good focus	Subchassis, 12g, manual	BB	48/Coil
NAD 5120 £90	Average Average—	Offering near hi-fi quality on a suspended sub-chassis deck fitted with an Ortofon OM10 cartridge can't be bad at this price	Semi-automatic, subchassis, 9g	BB	48
Omega Point Silver/Black £895/£295	Good Good+	An awfully stripped down turntable that lacks even an on/off switch, the Omega Point Silver offers fine midrange clarity and good stereo, but some HF compression and a lack of 'wellie'	Manual, solid, belt drive, unipivot, 11g		55
Rega Planar 2 £135	Average+ Good	A remarkable product at the price, surprisingly articulate and confident	Integrated turntable, manual, 11.5g	BB	48
Rega Planar 3 £188	Good Good	A long time leader in its price category, the '3' (with its excellent RB300 arm) sounded nicely 'musical' in a balanced and coherent manner	Integrated turntable, manual, 11.5g	BB	48
Revox B291 £759	Average— Average—	Sound quality ranks as below average. Subjective bandwidth is narrow and the music lacks grace and energy. Ease of use however is unrivalled	Automatic, remote controllable, direct drive parallel arm, prefitted cartridge		55
Rotel RP-830 £160	Average Average	Reasonable sound, but nothing to get excited about. Bass quality not well integrated, but control OK; mid/top are fine	Manual, integrated, belt drive, solid, inc cartridge	R	55
Source/Odyssey RP1 From £1,908	Very Good	Mixed. The turntable has tremendous power and authority, but as tested suffered pitch imprecision. The arm is rather ill controlled and lacks resolution and focus	Manual, belt drive, subchassis, motor, outboard PSU, 15g		55
Systemdek II £199	Good+ Good	Rating above average for its price the II sounded open and clear, if a bit soft in the bass	Manual/electronic, belt drive, subchassis, 15g	BB	48
Systemdek IIX £199	Good+ Good	The more conventional appearance of the IIX has made it popular, performing competently, but essentially sounding similar to the II	Manual/electronic, subchassis, 15g	BB	48
Technics SLBD-22 £90	Average— Average—	Not bad for the price and a great improvement on the L20, it performs reasonably when not stretched	Semi automatic, solid plinth, electronic, P-mount	R	48
Technics SL-DD33 £110	Average Average	As with the DD33 though better value	Automatic, direct drive, solid plinth, 7.5g, P-mount	BB	48
Technics SL-L20 £115	Poor Average—	A rather lightweight parallel tracker achieving a poor overall rating, with little to recommend it unless facilities	Electronic, solid plinth, 5g, P-mount		48
Technics SL-QD33 £140	Average Average	The quartz speed controlled version of the DD is short on sound quality but not features. But it did have fair focus and some depth	Automatic, Quartz, direct drive, solid plinth, 7.5g, P-mount	R	48
Thorens TD280 £159	Average Average	Not impressive in the context of other Thorens models. The sound was considered lively if somewhat coarse and brash	Electronic, solid plinth, 12.5g		48
Thorens TD166III £179	Good Good	Old turntables never die, this revised 166 yet again takes its place near the top of its class	Auto lift, subchassis, 7g	BB	48
Thorens TD316 £219	Good Good	A competent, well built if not dynamic sounding machine, ably holding its own in its price category	Electronic, subchassis, 4.5g	R	48
Thorens TD320 £319	Good+ Good	The top of the range and a solid performer providing a stable focused sound, and not critical of siting	Electronic, subchassis, 7g (available without arm)	R	48

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The clinic will be held for 5 days from the 17th to the 21st of October as with previous years we shall be very busy and estimate only 150 appointments available so **PLEASE BOOK EARLY**.

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THE DIRECTORY

MOTOR UNITS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ariston RD90 Superior £900	Good + Good	Good but slightly damped sound quality, with powerful and stable bass. The pro quo is a certain lack of pace, energy and resolution	Belt drive, subchassis, electronic		55
Audio Labor Konstant £2,560	Good + + Very Good	The space-station-like solid alloy frame needs a substantial shell, but absolute stability renders a confident, neutral sound	Belt drive, subchassis	R	48/Coll
Goldmund Studio £2,350	Very Good Excellent	A reference point for high end audio, only exceeded by the even more extravagant Reference. Currently being reworked into a more competitive (!) package	Electronic, direct drive, solid subchassis	R	60
Michell Synchro £235	Good Good	A particularly happy blend of qualities endows the Synchro with a blend of subtlety and force – the mailed fist in the velvet glove. Easy on the ear in the best sense.	Manual, belt drive, suspended motor unit	R	55
Michell Gyrodec £595	Good Good	Sweet and natural sounding player, well exploited by the Rega RB300 arm. Aesthetics, and the acres of acrylic, are unique	Manual, belt drive, suspended motor unit		55
NVA Turntable £499	Average Good	A surprisingly fast and assured performer, but with lightweight bass and a little aggressive. Easy to set the price (necessarily includes stand)	Manual, belt drive subchassis, stand, 33 $\frac{1}{3}$ rpm		60
Oracle Delphi III £1500	Very Good Very Good	Stable imaging, good bass and refined detail, it's well made and consistent in service – but very expensive	Manual, belt drive, subchassis	R	60
Oxford Acoustics Crystal Reference £1955	Very Good Excellent	This big, open and powerful sounding turntable works beautifully with Airtangent arm to give superb 3-D imagery	Manual, belt drive, subchassis, stand	R	60
Pink Triangle PT 100 £539	Very Good Very Good	A substantial improvement on its predecessor, the 100's new outboard power supply and motor gave a neutral sound with fine depth and detail	Electronic, subchassis	R	48/Coll
Roksan Xerxes £595	Excellent Excellent	This unique design cuts a swathe through the conventions of turntable design, providing superb resolution and stereo. Setting is critical, and for experts only	Manual, belt drive, solid/decoupled	R	60
SEE Revolver £127	Average Average	Nicely balanced, but unimpressive timing and lightweight bass made this deck rather average for the price. Manufacturer has since made several changes, but not re-submitted for review	Manual, belt drive, solid plinth		48
Systemdek IV £448	Good + Good +	Clarity and definition in the midrange and treble were outstanding. It was better for firm support; less happy on floor tables	Electronic, belt drive subchassis	R	43
Thorens TD160S Mk IV £225	Average Average +	Good value suspended sub-chassis turntable which doesn't need specialist setting up, and which performs consistently and well. Bass is a little over-warm	Manual, belt drive, subchassis motor unit	R	55
Thorens TD521 £625	Average Average +	Nice product. Unexciting, rather undynamic and insubstantial sound quality, but facilities such as ability to accommodate 12 inch arm compensate	Manual, belt, suspended motor unit, 78rpm, pitch control,		55
Townshend Rock £450	Good Good	Tight, tidy sounding player which works with a wide variety of (non-tangential) arms, giving almost CD like precision and clarity. Good bass depth, but dry balance	Manual, belt drive, solid, arm damping, various optional extras	R	55

TONEARMS

NAME PRICE	LAB SOUND	COMMENTS	ARM EFF. MAS	VALUE	BACK ISSUE FULL REVIEW
Airtangent II £1998	n/a Excellent	A complex but superbly built arm for high quality systems, giving excellent stereo and resolution	7.5g (vertical)	R	60
Alphason Opal £110	Good Average	This is a straightforward adequate sounding low cost arm, priced just above where it rightly belongs	10g		55
Alphason Delta £165	Good Average +	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason Xenon £210	Good Good +	A trimmed down HR100S, the Xenon has inferior bearings and a simpler finish, but sounds crisp and coherent. Fits any Linn cutout	12.75g	R	55
Alphason HR100S £395	Good + + Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	48/Coll
Ariston Enigma £99	Average Average +	Good but not the best in its class: mid-band sounds a little uneven, treble a trifle "brash"	11.5g		48
Audio Technica AT1120 £132	Good Average +	This low effective mass (5g) arm suits fairly high compliance MM cartridges, gives pleasant tonal balance with good stereo imagery	5g		35
Decca International £49	Average + Average +	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48/Summary
Eminent Technology £960	Good + Good + +	One of the best sounding tonearms around, the linear tracking Eminent delivers impressive stereo imagery, focus and transparent sound	9g (vertical)	R	48/Coll
Goldmund T3F arm £3850	Excellent Excellent	This complex parallel tracker created an "ear-opening" experience when tested with a (since updated) Goldmund Studio turntable	16.5g	R	Coll 2
Grace G707 £299	Good Good +	This venerable is still capable, if not competitive with modern alternatives	7g		48
Helios Orion 2 £490	Very Good Very Good	Very expensive but with a performance that merits recommendation	12g	R	48
Linn LV Plus £129	Good + Good	The fixed headshell provides an improvement over the LVX resulting in better clarity, detail and punch	13g	BB	48
Linn Ittok LVII £429	Very Good Very Good	Suitable for many turntables this top-quality arm performs best with the LP12, the combination exceeding the sum of both parts	13.5g	R	48/Coll
Manticore (Logic) Datum 2 £140	Very Good Good + +	Rated sonically very good with fine depth focus and transparency, good air and life, albeit slightly 'untidy'	15g	R	48/Coll
Mission Mechanic £700	Good Good +	Nearly right, but inconsistency with level and vague imagery spoil what is otherwise a firm, powerful advocate for black vinyl	11g		55
Moth Arm £65	Good Good +	The ultimate budget arm? Refined, detailed, sweet and natural – performance improves in line with the rest of the system	12g	BB	60
Rega RB300 £90	Good + + Good + +	Despite its modest price this sets exceptional performance standards and could be used on a number of high-quality turntables	10-11g	BB	60
SME 3009 Series IIIS £156	Good Average +	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009 Series III £216	Good Average +	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009R £272	Average + Average +	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME Series IV £675	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	60
SME Series V £1138	Excellent Very Good	Excellent in terms of design engineering and sound quality, this arm arguably sets a new reference standard regardless of price	10.5g	R	60
Souther Tri-Quartz £850	Average Good	A unique parallel tracking arm that makes up for what it lacks sonically in its unusual appearance	3-4g		48
Well Tempered Arm £545	Good + + Good + +	The overall performance of this arm "grows" on the listener, justifying the possible mounting complications and radical styling	6.8g	R	48/Coll

THE DIRECTORY

CARTRIDGES

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

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

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

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
A&R C77 £20	Average+ Average+	A sensible moving magnet package with good bounce at a competitive price	6-16g Normal, MM	BB	48
A&R E77Mg £47	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laid back sound, with good 'scale'	3-8g Normal, MM	R	48
A&R P77Mg £57	Average+ Average+	Cautiously recommended, the P77Mg was preferred to its cheaper partner by virtue of a better tip. Channel balance could have been better	4-9g Normal, MM	R	48
ADC TRX1 £49.90	Average Average	Sounding bright and "tinkly" but with a rich bass this model may endear itself to those who like canaries and gongs. Now quite competitively priced	6-15g Normal, MM		38
ADC TRX II £69.60	Average Average+	Comments like "fiercely exciting" treble and "plummy" bass made this cartridge seem overpriced, though price reductions now make it more competitive	6-15g Normal, MM		38 (Summary)
Audionote I02VDH £795	Good Very Good	One of the best, giving "an extraordinarily relaxing midrange clarity" But it picked up a bit of surface noise and dust and needs a transformer	8-18g Very low (transformer), MC		43
Audioquest MC5 £200	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal, MC		54
Audio Technica AT 105 £13.95	Average Average	Tight budget people may enjoy this cartridge whose "overall performance was very good for the price"	6-16g Normal, MM		43
Audio Technica AT95E £14.95	Average- Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48
Audio Technica AT 115E £27.95	Average Average	Clear and detailed sound quality although a bit on the "heavy" side. Sonically lagged the cheaper 110E!	5-16g Normal, MM		43
Audio Technica AT3200XEI £42.95	Average+ Average	This high output MC sounds better than it looks, with a decent 'laid back' sound quality	6-18g Normal, MC	R	43
Audio Technica ATF30CC £70	Good Good	Slight generator asymmetry but low overall distortion and broad arm matching, plus a lively balanced sound	8-18g Low, MC	BB	54
Audio Technica AT 140ML £99.95	Average Average	Pricey product this. Prefers low-medium mass arms and low capacitance loading, and is sonically unremarkable	6-12g Normal, MM		43
Audio Technica ATF50CC £100	Average+ Good	Decent output, good channel balance and a thoroughly refined sound sets the standard at £100	9-20g Low, MC	BB	54
Audio Technica AT33ML £238.95	Average+ Good	A little expensive but technically competent, and sonically pretty good; low output MC with rather garish gilt finish	6-16g Low, MC		43
Audio Technica ATOC7 £245	Good+ Good+	Technically and subjectively this cartridge represents a new dawn for AT, in the twilight of analogue audio	6-13g Low, MC	R	54
Audio Technica ATOC9 £400	Average+ Very Good	Tonal contours were reproduced faithfully while stereo images were clearly isolated and focused despite contributing to a thoroughly integrated whole. Slightly less transparent than more costly MCs	6-14g Low, MC	R	60
Azden YMT0VE £12.50	Average Average-	A good tracker. Sounds rather bunched-up but not totally incoherent – for very basic systems only	5-15g Normal, MM		54
Azden GM1E £30	Average- Average-	Of academic interest only, this high o/p MC is seriously flawed in sonic terms	8-18g Low/normal, MC		54
Azden GMP5L £99	Average+ Average+	Although no P-mount system will do this cartridge justice, it can still be enjoyed in its universal mode. The subtle balance may prove irresistible to some	4-10g Low, MC	R	54
B&O MMC5 £21	Average+ Average	Cheapest in the family – smooth treble and good focus, but the bass was left in the wings	5-15g Normal, MM		38 (Summary)
B&O MMC4 £33	Good Average+	Solid and well balanced in the midrange, the '4 lacks bass impact	5-15g Normal, MM		48
B&O MMC3 £50	Good Average	Slightly "laid back" sound quality but a good performer for the price. Best suited to B&O equipment	5-15g Normal, MM		48
B&O MMC2 £75	Good Average+	Only a modest improvement on its cheaper brothers (and sisters)	5-15g Normal, MM		48
B&O MMC1 £97	Very Good Good	Great clarity and detail at high frequencies but a slightly plodding bass. It may appeal more to the classical enthusiast	5-13g Normal, MM		48
Cello Chorale £799	Good Very Good	Looking like a piece of NASA gadgetry the Chorale's transparent treble delicacy was without equal. A serious audiophile choice	4-10g Low o/p, MC	R	48/Coil
Clear Audio Gamma £285	Average Average+	Brimming over with enthusiasm, the unusual-looking Gamma is more than an audio oddity, but it lacks a little subtlety at times	4-11g Low, MC		54
Clear Audio Delta £450	Average+ Good	Midway between the Gamma and exotic Pradikat, the Delta sounds like neither! Nevertheless, it delivers the goods	6-17g Low, MC	R	54
Clear Audio Pradikat £1225	Average+ Very Good	Sounded absolutely glorious, creating a full sense of scale and a large well-focused soundstage – but watch for record wear	8-18g MC		Coil
Clear Audio Accurate £2,000	Good Excellent	A remarkable cartridge, not only by virtue of its effortless and highly neutral sound quality but also because this has been achieved with the same basic design as Clearaudio's cheapest MCs	4-11g Low, MC	R	60
Denon DL110 £60	Good Good	Firmly recommended as a fine all-rounder, this high-output moving coil model is likely to perform well in nearly all circumstances	6-16g Normal, MC	BB	48
Denon DL160 £80	Average+ Good	Although listeners just preferred the 110 its brother here proved a twin in lab tests and is still "thoroughly competent"	6-16g Low, MC		43
Denon DL 103 £90	Average Good	This classic spherical stylus model gives a lively sound with powerful bass, and is popular in broadcast studios	6-16g Low, MC	R	48
Oynavector DV-50X £60	Good Average	A high-output MC model with impressive lab performance, but whose tip and sound quality both disappointed	6-14g Normal, MC		48

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

THE DIRECTORY

CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
Dynavector DV10X IV £60	Average Average+	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g Normal, MC	R	48
Dynavector DV23RS £150	Average+ Good	Sound quality was described as "shut-in", lacking energy and sparkle but with some "edginess" in high frequencies	10-22g Low, MC		28
Dynavector DV XX-1 £360	Good Good+	The XX-1 embodies a power and solidity rarely encountered amongst the breed, nevertheless it did exhibit a peculiarly suppressed character that will suit lively rather than wholly neutral systems	7-17g Normal, MC		60
Glanz MFG 110EX £24	Average Average	A little bright but giving detailed bass and clear treble this was competitive at the price	6-16g Normal, MM	R	Systems
Glanz GMC20E £129	Average Average	You could try haggling but we thought the makers of this number were demanding too much lucre for their product	3-6g Low, MC		48
Goldmund Clearaudio £1500	Average+	Something of a mixed bag overall, its sonic character bears a strong resemblance to the Pradikato though it shares some of the hallmarks of the more expensive Accurate	5-12g Low, MC		60
Goldring Epic £18	Average- Average	An unpretentious "punchy" partner to a budget system, giving decent dynamics and focus	6-14g Normal, MM	R	48
Goldring G1010 £34	Average Average	A bit fiddly to set-up but rewarding once accomplished. The big and bouncy sound belies its price. Sensitive to amp loading	10-20g Normal, MM	BB	54
Goldring G1020 £49.95	Average+ Average-	This one strutted finely onto stage but couldn't project to the "gods"	8-16g Normal, MM		43
Goldring G1040 £74.95	Average+ Average-	High frequency extension was improved by the van den Hul tip, nice looking model - no great actress	8-16g Normal, MM		48
Goldring Eroica L £91	Average Average+	Open and relaxed sounding, the L version is just that bit more refined than its high output brother	7-18g Low, MC	R	54
Goldring Electro II £135 complete	Average Average+	A pretty decent allrounder that did not excel sufficiently to warrant recommendation	8-16g Normal, MC		43
Goldring Electro 11LZ Boron £199 complete	Average Average+	Well balanced sound but lacking low frequency authority, midrange focus and "punch"	12-20g Low, MC		38 (Summary)
Grace F9E II £240	Good Good	For lively presentation, excellent separation and generally satisfactory sonic delivery - consider this model	5-10g Normal, MM		48
Grado XTE +1 £20	Average- Average	Bass and treble are a trifle coloured but the midband proved highly enjoyable. Ideal for budget systems	6-13g (damping) Normal, MM	R	54
Grado XF3E+ £45	Average- Average	Downtilting balance disguises the brightness of this cartridge, bit of a mixed bag at this price	9-20g (damping) Normal, MM		54
Highphonic MCA3 £360	Very Good Good+	Exquisitely crafted by a group of ex-Denon engineers, this superb tracker had a sweet and seductive (if rather bright) treble	5-12g Low, MC		43
Kiseki Blue Silver Spot £395	Average+ Good	Solid performance from a very solid cartridge but lacks some of the magic of other Kisekis. Compliance too high	5-12g Low, MC		54
Kiseki Purpleheart Sapphire £695	Good+ Good+	Rare, beautiful to look at and sweet to listen to, our review of this high-flyer conjured up images of Japanese art	5-14g Low, MC		Collection
Kiseki Blackheart £1595	Good Good	This cartridge demonstrated refined poise and a delicate but at once potent security, however, the price did seem a little on the high side compared to other Kisekis	6-16g Low, MC		60
Kiseki Lapis Lazuli £3500	Good Very Good	Combining very sensible design concepts at a silly price, the Lapis Lazuli is best thought of as combining the detail of the MC3000 and the fluid of the Clearaudios	4-12g Low, MC		60
Koetsu Black K £550	Good+ Good+	Impressive in scale and dynamics but with some criticism of bass muddling and high treble fizz. Listen before deciding	6-18g Low, MC	R	48/Coll
Koetsu Red £896	Good+ Very Good	Named like a rare, and perhaps dangerous, little oriental fish this famous cartridge sounded "almost larger than life"	10-25g Low, MC	R	48/Coll
Koetsu Red Signature £1300	Good Excellent	Technically this cartridge suffers no faults whilst on a subjective level it offers rare musical insight	10-21g Low, MC	R	60
Linn Basik £19.50	Average- Average	This goes much further in delivering the goods than its price tag might indicate	6-14g Normal, MM	BB	48/Systems
Linn K9 £69	Average Good	Linn threw this model into the leading pack by beefing up the Basik's bodywork, adding a super stylus, and keeping the price fair	6-15g Normal, MM	BB	48/Coll
Linn Asaka £279	Good+ Good+	Disciples of Linn who are trying to realise their true "Karma" may find that saving money is not a short cut to heaven	9-18g Low, MC	R	48/Coll
Linn Karma £435	Very Good Very Good	A specialist which is strongly recommended for Linn-based systems, results may be less predictable in more general application	9-18g Low, MC	R	48/Coll
Linn Troika £625	N/A Very Good	Ex-Karma users have been seen with glazed expressions indicating smug self-indulgence the morning after titting a Troika	8-18g Low, MC		Coll
London Maroon £109	Poor Average+	Utterly different from other cartridges, the Maroon combines Heaven and Hell with good bass and midband but poor top-end control	8-16g + damping Normal, MM		48
London Super Gold £248	Average- Good+	Sometimes a bit fierce in emphasising record surface faults, it is perhaps best at revealing the excitement and tension in music	8-20g + damping Normal, MM	R	48/Coll
Madrigal Carnegie One £685	Average+ Good	Looks like a duck but sounds much better, certainly worth auditioning. Compliance too high	5-11g Low, MC		54
Milltek Aurora £198	Good+ Good+	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	48/Coll
Milltek Olympia £298	Average+ Good+	Warm and detailed sound - packs the punch of the best MCs with high output as a bonus	12-20g (damping) Normal, MC	R	54
Mission 773HC £150	Good Good	A sufficiently well-balanced and competitively priced "old-timer" which still warrants recommendation	6-16g Low, MC	R	38
Monster Alpha 2 £479	Good Good+	In the final analysis this fine allrounder is insufficiently exceptional in any specific respect to justify fully its high price	6-14g Low, MC		Collection
NAD 9100 £12	Average- Average	Clearly a Best Buy model for rock music fans, opera and choral music lovers might do better to avoid its tracking (in)abilities	10-20g Normal, MM	BB	38
NAD 9200 £26	Average- Average-	Although competent in many respects, overall the 9200 must be considered an undistinguished contender	6-19g Normal, MM		28
Nagaoka MM4 £8	Average- Average-	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal, MM	R	54
Nagaoka MP10 £17	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal, MM	R	48

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SOUNDSTYLE

AND



RA820A INTEGRATED STEREO AMPLIFIER

Latest in the famous 820 series amplifiers from Rotel, offering dynamic power far in excess of its conservative 30 watt rating. The RA820A has benefited substantially from Rotel's UK product development programme with significant improvements to sound quality, useful features and improved appearance design to match Rotel's new product line. First choice for many on the road to serious sound reproduction.



RT830AL LW, MW, FM STEREO TUNER

The thinking man's affordable tuner; where its modest looks and operating simplicity belie the sophisticated circuitry employed to produce an unusually open and musical sound. In its latest guise, the new appearance design RT830AL takes over from the critically acclaimed RT830L. Also available is the RT850AL offering digital tuning with 16 preset stations.



RCD820B DIGITAL STEREO COMPACT DISC PLAYER

The very latest 16 bit 4 times oversampling technology combine with Rotel's own UK product development expertise to provide a C.D. signal source of fine resolution, definition and musical performance. With full numeric remote control, programming and full feature display the RCD820B offers fine value and is easy to use. For the more adventurous the RCD820BX2 provides the music lover and enthusiast alike, with stunning performance whilst remaining eminently affordable.

RL850/II LOUDSPEAKERS

These modestly sized loudspeakers offer an unusually high musical performance for their cost. In its latest form, the RL850/II benefits from an improved tweeter and crossover which have further refined its performance. With black ash finish and complete with black cloth grills (shown here without grills) they blend into any room environment. Possibly the most acclaimed loudspeaker in the UK today. (Recipient of Hi-Fi Choice's Best Buy Award for the last four years, as part of Rotel's Best system Award from What Hi-Fi? for the past four years, and now winner of What Hi-Fi?'s prestigious award for Best Loudspeaker of the Year for 1988.)



These fine components are but a small selection from Rotel's award winning range of real Hi-Fi products which offer very high standards of technical performance and musical enjoyment. All are based upon Rotel's UK balanced design concept which ensures that within the resources available, each aspect of the products design has been optimised. To find out why Rotel has now received What Hi-Fi?'s prestigious awards for 1988 for Best Turntable, Best Radio Tuner, Best Loudspeaker and Best Hi-Fi System (amplifier - Tuner - C.D. Player - Loudspeakers) call Rotel for details of your nearest dealer.

UK DESIGN & DEVELOPMENT

ROTEL *hi-fi*

THE DIRECTORY

CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/TYPE	VALUE	BACK ISSUE FULL REVIEW
Nagaoka MP11 Boron £38	Average Average+	Responding well overall in PM's equipment and listening room, this model was mildly criticised for low level and dynamic limitations	5-13g Normal, MM	BB	48
Nagaoka MP10SB £40	Average Average+	Stilton's mods have improved the fine detail resolution of this popular budget model	5-15g Normal, MM	R	54
Nagaoka MP11 Gold £45	Average— Average+	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal, MM	R	48
Nagaoka MP11 Gold SB £70	Average— Average	Excessive price loading for a blob of aluminium	2-6g Normal, MM		54
Ortofon OM5E £12	Average— Average—	The OM10 is a hi-fi cartridge — the OM5E is not	5-16g Normal, MM		43
Ortofon VMS5E II £14	Average Average	Sound quality was thought fair for the price, though a little 'untidy'	8-18g Normal, MM		38 (Summary)
Ortofon OM10 £15	Average Average	One of the leading "cheapies", this gives a fine level of sound quality for the price, with good matching compatibility	5-15g Normal, MM	BB	48
Ortofon VMS10E II £21	Average— Average—	Some of its stablemates fared rather better, and showed less evidence of tracking problems to boot	Normal, MM		38
Ortofon VMS20E II £35	Average Average	One of the most popular cartridges ever, sound quality was a bit laid-back and tracking could have been better	3-10g Normal, MM		48
Ortofon OM20 £45	Average Average+	This turned out to be the listening panel's favourite among Ortofon's moving magnet models	5-16g Normal, MM	R	48
Ortofon X1 £50	Average Average	The cheaper X1 scored higher marks with our listening panel than the X3, but both were a disappointment	6-15g Normal, MC		48
Ortofon VMS30E II £52	Average+ Average	Rather an old soldier in relation to turntable technology, it will perform undemandingly in demanding circumstances	5-13g Normal, MM		38
Ortofon MC10 Super £65	Average Good	"What a delightfully sweet-sounding cartridge this is..." we said	5-15g Low, MC	BB	48
Ortofon OM40 £75	Average Average+	Highly competent engineering, secure tracking and decent sound quality are major strengths. But it's a little cold, a little polite	3-8g Normal, MM		48
Ortofon X3 £75	Average Average	A lack of bass power, definition and a "zitty" top end makes this competent but uninvolving	5-15g Normal, MC		48
Ortofon MC20 Super £139	Average+ Good+	An "inviting" sound quality, polite rather than exciting it approaches much more expensive models, but does not better them	6-15g Low, MC	R	48/Coil
Ortofon MC30 Super £139	Very Good Good+	Beautifully engineered and well-balanced, it was slightly criticised as bland, though some may appreciate the lack of rough edges	5-14g Low, MC		Coil
Ortofon MC300J £800	Good Excellent	Quite simply, the most accurate transcription device yet created — not one for the faint hearted	6-16g V. Low, MC	R	60
RATA RP20 £22	Average— Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g Normal, MM	R	48
RATA RP40 £44	Average Average+	The '40 did a good job of sorting out the layers and complexity of the mix, with good focus, excellent stereo spread and fine scale	6-15g Normal, MM	R	48
RATA RP70 £77*	Average Average+	Clearer and sweeter than the '40 this also seemed heavier and less lively. For £99 you can have a van den Hul stylus	6-14g Normal, MM		43
Rega RB100 £38	Average Average+	Remarkable mechanical performance in the right system context, but "try before you buy"	5-12g Normal, MM	R	48
Shure M92E £15	Average— Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal, MM		43
Shure M99E £26	Average— Average—	Sister to the 92E this is a solid but not particularly exciting cartridge	5-10g Normal, MM		38 (Summary)
Shure ME75ED £24	Average Average—	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal, MM		38
Shure M104E £32	Average— Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal, MM		38
Shure ME97HE £44	Average Average+	It won't turn a sow's ear of a turntable into a silk purse, but will at least keep going and produce an acceptable result	8-20g Normal, MM	R	48
Shure M105E £45	Average Average—	A slightly 'spitty' sound lacking deep bass and dynamic contrast, but can be used in virtually every system where it will perform "unobtrusively"	5-12g Normal, MM		38 (Summary)
Shure M110HE £55	Average Average	Sound quality was thought eminently presentable, but not exciting; smooth clear high frequencies, but a loss of bass definition	5-10g Normal, MM		38 (Summary)
Shure M111HE £67	Average Average	Early reviews of this cartridge complained principally of the price — which has since come down	5-10g Normal, MM		38 (Summary)
Shure ML120HE £95	Average+ Average+	Quite decent sound quality and a generally fine, balanced performance	6-18g Normal, MM		48
Shure ML140HE £120	Average+ Good	Qualitatively the treble of this well-balanced moving magnet model was a match for many moving coil cartridges	6-16g Normal, MM		43
Shure V15 VMR £195	Good Average+	Initial listening gave promising results, but extended familiarity gave the feeling of a lack of energy and a "shut-in" sound	5-12g Normal, MM		38
Shure Ultra 500 £452	Good Good	There was no doubting the accomplishments of what could well be the finest moving magnet cartridge around	6-14g Normal, MM		48
Supex SM100E £115	Average Average+	Delivers as much musical information as many moving coils — the bass in particular having an attractive bounce	6-15g Normal, MM		38
Supex SD900IV £350	Average+ Good+	The 900 is an inherently fine cartridge, but despite a recent update it is beginning to show its age	10-18g Low, MC		48/Coil
Supex SD901IV £375	Average+ Good+	This high output model delivered sufficient subjective and objective performance, plus good compatibility, to justify its price	8-18g Normal, MC	R	48
Supex SDK2000 £651 L, £721 H	Good Good+	The high-o/p 2000 was preferred on listening tests to the low-o/p model, which even so has a unique place among the designs	6-16g Either, MC		48
Van den Hul MC10 £699	Good Good+	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass Gosh!	5-10g Low, MC	R	60
Van den Hul MC One £799	Good Very Good	This extended all the positive qualities of the '10 but added greater authority and scale — worth it for the extra money	6-12g Low, MC	R	60

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AMPLIFIERS

The amplifier sits at the heart of the system, processing the outputs from all the various music sources as necessary and then driving the loudspeakers. These two (quite separate) functions are integrated into a single box at the low-to-middle price points, separated pre- and power amplifiers become increasingly common as one moves upmarket. At the upper end of the specialist market, valve amplifiers provide a popular alternative to the transistor types amongst enthusiasts.

There is a substantial difference between specialist (sound quality oriented) amplifiers and the consumer electronics style models. The former

are bleakly simple, avoiding all unnecessary features to provide the most direct signal path in the interests of best sound quality. The latter range from models with just basic tone controls and tape recorder switching, to those with elaborate facilities such as graphic equalisers, remote control (including volume), surround sound options etc. etc.

Lab measurement provides some useful data, particularly in regard to an amplifier's ability to drive a wide range of different types of loudspeakers, but this is only obliquely related to sound quality. We also include our measured power output (RMS, 8ohm load, 1 channel driven) – but

again, paradoxically, this doesn't necessarily correspond to the loudness capability of the amplifier, which has as much to do with the elegance of the overload characteristics within a given system (valve amplifiers invariably sound more powerful than their rating would suggest). The listing of features provides some indication to the complexity of an amplifier: many users prefer to retain the option of tone controls to 'shape' the overall sound according to taste; many others have found living without tone controls surprisingly easy, with additional benefits in terms of transparency.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research AR-D4 £160	Very Good Good	A powerful, well equipped model precisely tailored to UK standards. Performance is close to the class winners.	40W, MM/MC, 5 inputs, hdph, tone controls	BB	62
A&R Arcam Alpha £150	Average+ Fair	This good all-rounder sounds musical if slightly softened. Good build and presentation.	5 inputs hdph MM/MC tone controls 30W		50
A&R Arcam Delta 60 £250	Very Good Fair	Our first pre-production sample was not up to expectations but better ones are promised soon. It gave a solid technical performance.	55W, MM/MC, 5 inputs, hdph		62
A&R Arcam Delta 90 £330	Good Fair	Well balanced and sweet-natured in any given system with MC capability, but pricey.	70W MM/MC 5 inputs tone controls		50
Albarr M408 II £649	Good+ Good+	Unusually styled transistor monoblok power amplifiers reintroduced with improved performance and sound quality. Needs good warm-up for best sweetness and clarity.	40W Power amp only	R	56
Albarr M1008 II £899	Very Good Good	A larger version of the similarly styled M408II, fairly good all round but only of average quality for the price.	80W, monoblok		62
Audio Research SP9 £1700	Very Good Very Good	This new high performance valve FET hybrid preamplifier sets a high standard for versatility, build quality and sound.	5 inputs, MM/MC	R	60
Audio Research SP8 £1998	Very Good Good+	The sound from this valve preamp was good enough to do justice to the finest ancillaries.	5 inputs MM		39
Audio Research M100 £2850 each	Good+ Excellent	These high end valve monoblok power amps justify their cost by providing near state of the art sound quality. Our reviewer was so excited he bought them.	100W	R	60
Audio Research SP11 II £5350	Very Good Excellent	Current state of the valve preamp art. A reference point.	Straight line MM/MC Disc + phase invert	R	60
Audiolab 8000C £325	Excellent Good	A well established preamp with a highly controlled sound, though it could do with more life and depth.	MM/MC, 5 inputs, hdph, tone controls	R	62
Audiolab 8000A £350	Very Good Good	A long running and high dependable classic, versatile and consistent via all inputs.	50W, MM/MC, 5 inputs, hdph, tone controls	R	62
Audiolab 8000P £495	Excellent Very Good	A dynamic powerhouse, load tolerant and sonically reliable.	100W	R	62
Beard 506 £1195	Good+ Good+	A versatile valve preamp – the bass sounded lively if a touch softened while the treble was detailed but lacked a little sparkle and air.	4 inputs MM/MC		50
Beard M70 £1995 pair	Good Good+	A substantial British monoblok power amplifier, but not a great deal more impressive than the P35 at half the price.	70W		50
Burmester 838 £1490	Very Good Good	A disc-only minimalist preamp, strong points include excellent build, extreme neutrality, dry clean bass and notably sharp stereo focusing.	MC only, MM option		Collection
Burmester 846 £1599	Very Good Good+	Usually coupled with the 838 this high-level preamp provides many and versatile input facilities.	6 inputs		Collection
Burmester 850 £3995	Good+ Good	Each of these mono power amplifiers contains separate high current 25W amps giving a refined coherent sound over most of the frequency range.	100W		Collection
Cambridge Audio P40 £200	Good Good+	A very fine sounding integrated amplifier with simple facilities and MC cartridge capability.	5 inputs 40W MM/MC straight line	BB	50
Cambridge Audio C75 £279	Good+ Good+	Whilst not quite on par with its A75 companion this preamp provided excellent stereo imagery but was a touch "heavy" in character.	MM/MC disc	R	50
Cambridge Audio P55 £290	Very Good Very Good	A grown up P40, the P55 suffers slight noise on the moving coil input but offers great sound for the money.	55W, MM/MC, 5 inputs, hdph	BB	62
Cambridge Audio A75 £299	Very Good Very Good	This strong power amplifier sounded open and effortless, with fine bass drive and dynamics, albeit a touch grainy and harsh at high frequencies.	100W	R	50
Cello Audio Suite £5280	Excellent V Good/Excellent	Cello's preamp represents a whole new ball game in flexibility and sound quality (or war of attrition on your wallet).	Optional inputs MC etc	R	50
Conrad Johnson PV7 £799	Very Good Good	This beautifully finished quality preamplifier performed well, delivering a musically relaxed sound though not offering especial value for money.	5 inputs, MM disc		57
Conrad Johnson MV50 £1795	Good+ Good+	Coupled with the PV5, this CJ power amp performed well on audition.	50W		Collection
Conrad Johnson PV5 £2010	Good+ Good+	The PV5 is a classy sounding valve preamp, and natural partner to the MV50.	5 inputs MM		Collection
Conrad Johnson Motif MC-8 £2500	Very Good Very Good	A cheaper alternative to the '7, this preamp is an undoubted success in maintaining the Motif sound but does not compare on sound quality.	MM/MC	R	50
Conrad Johnson Premier Three £3775	Good+ Very Good	The Three is a musically accurate and graceful preamp which proved versatile on a wide range of inputs.	5 inputs MM/MC	R	Collection
Conrad Johnson Premier Four £3900	Good+ Very Good	Ambience was the Four's forte – this power amp proved exceptionally revealing of instrumental locations.	100W		Collection
Copland Pre and power amps £649 each	Good+ Fair	At £649 each this simple Danish valve pre/power combination is expensive, though the power amplifier sounds very easy on the ear.	3 inputs MM, 12W		50
Counterpoint SA7 £747	Average+ Good	Simple valve Californian preamp offering inspiring transparency for the price.	4 inputs straight line MM/MC		Collection
Counterpoint SA12 £1250	Good+ Good+	A real power-house power amp, beefy and load-tolerant although like the SA7 a trifle untidy at frequency extremes.	100W		Collection
Creek 4040 £145	Average+ Fair	This simple integrated model had a controversial sound, liked by some, plus an acceptable lab performance.	4 inputs MM 12W	R	50
Creek CAS 4040 II £160	Good Good	The Mk II has no problems and is a fine all rounder.	30W MM, 4 inputs, tone controls	BB	62

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 25

THE DIRECTORY

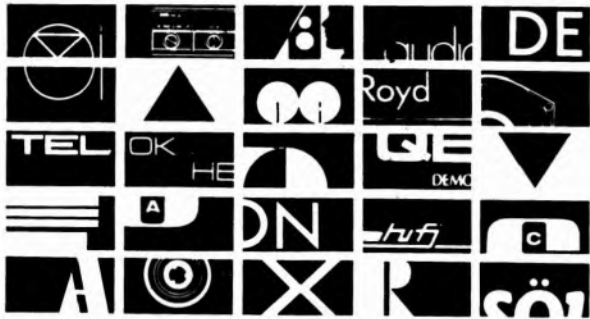
NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Creek CAS 4140 £219	Good+ Good	Redesigned for '88, this is a fine allrounder with good moving coil input, plain presentation	40W MM/MC 3 line inputs	BB	62
Croft Micro £150	Average+ Good	A real upsetter, this excellent valve preamp put the cat among the pigeons proving good sounds can be made at budget price levels	4 inputs MM straight line	R	Collection
Croft Super Micro A £500	Average+ Very Good	The looks are somewhat improved, while this 'hot rod' version with tuned components performed very well indeed. There is still no gain on the line inputs	4 inputs, MM, straight line	R	57
Croft Series IV(S) £730	Good Good	The original IV is still available now supplemented by the higher price and power (S), both are fine performers	40(60)W channel	R	57
Croft Series IVSA £1000	Good Very Good	Featuring tuned components chosen for their sound quality, the 'A' variant is an impressive example of Croft's technique in valve design	60W special supply regulation	R	57
DBX CX3/OX3 £1500	Good Fairly Good	Versatile separates majoring on 4-channel surround sound and high power. Garish presentation and unexceptional sound	125W MM/MC 7 inputs, tone, 4-channel surround		56
Deltec OPA 100S £2200	Very Good Very Good	A top-quality transistor power amp, sounding fast, articulate and well controlled, though maybe a touch clinical for some tastes	80W	R	50
Denon PMA 250 II £125	Good Fair	Despite a claimed increase in power this competent model now slips behind the competition on sound quality grounds	30W, MM, hdph, tone controls		62
Denon POA-6600 £1,000/pair	Excellent Excellent	Delivers abundant high quality sound, solid engineering expertise and content clearly compensating for compromising of purist audiophile principles	250W monoblok, remote power	R	60
DNM 3 £1000	Good+ Very Good	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art preamp	5 inputs MM/MC twin vol controls	R	44
E.A.R. £3,000/pair	Very Good Very Good	A valve monoblok that measures like a solid state amp is itself an achievement, but exceptional power delivery and bass 'slam' is not fully matched delicacy and transparency elsewhere	200W monoblok, bias setting		60
Exposure VII/VIII £360/£340	Very Good Good	Supplied as a combination without the separate preamp power supply, this pre power combination performed satisfactorily especially on the moving coil input	50W, MM/MC, 3 inputs, straight line		62
Goldmund Mimesis 6 £2,500	Very Good Very Good	Small and discrete for those who'd rather not flaunt it, this is no powerhouse but sounds subtle, delicate and refined	80W stereo power amp		60
Grant G60AMS £948 pr.	Good Very Good	This neat and compact 60W valve monoblok gave good sound on the 8ohm tap, better still on 4ohms. The midrange was particularly natural	60W monobloks 41 8ohms	R	57
Hafner OH120 kit form £295	Fair	We didn't build one, see below	60W		44
Hafner OH120 assembled £360	Very Good Fair	Sound quality results were decent enough, but this power amp won't set the world on fire at this price	60W		44
Harman Kardon 640 Vxi £225	Good+ + Good	Moderately priced but built to HK's high standards, good value and good load tolerance	50W MM, 5 line inputs tone controls		56
Harman Kardon PM645Vxi £300	Very Good Good	Fits in well with the Harman Kardon series, giving a competent all round performance at a fair price	75W, MM/MC, 5 inputs, hdph, tone controls		62
Harman Kardon 655 Vxi £449	Very Good Good	Plenty of well built integrated amplifier for the money, with lots of power to drive almost anything, plus versatile inputs	100W MM/MC 6 line inputs tone controls		56
Harman Kardon PM665Vxi £699	Good Good	A versatile and meaty amplifier with high current capability, but sound quality lags behind certain home grown alternatives	150W MM/MC tone controls (switchable)		60
Hitachi HA-006 £120	Very Good Fair	Despite reasonable lab test results this did not make the grade on sound quality	55W, MM, 4 inputs, hdph, tone controls		62
Hitachi HA007 £150	Good+ Fair	Decent but unexceptional performance and sound quality, plus good facilities; represents a worthwhile improvement from Hitachi	75W MM 6 line inputs tone controls		56
Inca Tech Dirk £215	Good+ Good+	This tiny, minimalist model is effectively a power amplifier with volume control, providing inputs for CD player and tape recorder but not tuner!	50W, 2 line inputs, straight line		56
Inca Tech Claymore £345	Good+ Good+	Limited facilities but a strong, clear, well-focused sound results in auspicious Choice debut for this relatively young company	50W MM/MC 3 line inputs straight line	R	56
ITL MA-80 £150	Good Good	A promising start for this young company, the MA-80 gave a fine sound with CD but was less wonderful on the moving coil input	30W, MM/MC, 5 inputs	R	62
Jadis JP30/JA30 £6,790	Fair Excellent	Two-box preamp plus monoblok power amps, classic valve design gives stereotype valve sound. Beautiful build, nostalgic styling and delightful sounding midrange transcend limitations at frequency extremes, in lab, and re cartridge matching	30W 2-box pre-, monoblok power, MM-only, 4 line inputs	R	60
JVC AX-222 £110	Good Fair	Not very impressive, JVC need to pull their socks up if their budget amplifiers are to score	35W, MM, 4 inputs, hdph, tone controls		62
Kelvin Labs Junior/130 £295/£295	Good Good	Their heart is in the right place but the class A Junior combination is a bit expensive for what you get	20W, MM/MC, 5 inputs		62
Kenwood KA-550D £130	Very Good Fair	Having dropped its moving coil input, this latest version has British style dynamics and rhythm but is not first grade	35W, MM, 4 inputs, hdph, tone controls	R	62
Krell PAM5 £1589	Very Good Good	Superbly built, the Pam 5 preamp gave good definition throughout the frequency range with a good measure of excitement	MM/MC		50
Krell KSA50 Mk2 £2540	Very Good Good+	This power amp still holds its own with good depth and ambience and excellent stereo focus	50W		50
Le Tube £585	Good+ Good	If moving coil sensitivity is not required then this preamplifier will offer a clean view with very good stereo	3 inputs MM	R	44
LFD £2,995+	Very Good Excellent	Can set the subjective standards that others merely aspire to, but this outstanding if unconventional multi-box preamp needs careful matching to ancillary components (cartridge, power amp)	MC (with care), passive line extra	R	60
Linn LK2 £440	Good+ Fair	A durable tolerant power amp, setting a respectable standard on both lab test and audition. Latest version, the LK2 75, not tested	5 inputs MM/MC	*	50
Linn LK1 £459	Good+ Fair	This preamp was marginally less successful than the LK2 but the pair (of Linn's) worked well together and are well worth considering. Recent modifications as unchecked	60W	*	50
Linx Stratos £999	Good+ Good	Facing strong competition in the UK this New Zealand pre/power combination gives good sound quality but not exceptional at the price	120W MM/MC straight line		50
Luxman LV100 £205	Good Fair	Nicely finished modern integrated amplifier, generally competent though not exceptional	45W MM 4 line inputs tone controls		56
Luxman LV-105 £599	Very Good Fair	Superbly finished and built, in a sense this model managed to capture the "valve" sound with an easy musical quality and good bass register	85W MM/MC		44
Luxman LV105u £685	Very Good Good	This very well equipped and beautifully finished Japanese integrated amplifier has two valves in the early section of the power amplifier. Pleasant and musical it sets no value for money record here	9 inputs 80W, MM/MC tone controls		57

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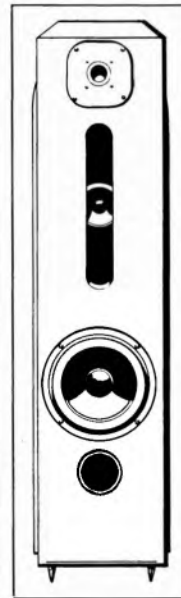
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AUDIO RESEARCH D115 MKII NEW VALVES	£331	2250
DRIADE SPEAKERS NEW	£865	£695
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THE DIRECTORY

AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Magnum A100 £1,995 pair	Good + Good+	Given their massive power rating a pair of A100's make a fine stereo power amp; ideal for high levels and with a wide dynamic range for digital programme	320W		50
Marantz PM25 £125	Good Fair	Soft and sweet like the rest of the range, the PM25 is inoffensive and undemanding	25W, MM, 5 inputs, hdph, tone controls		62
Marantz PM35 £170	Very Good Good	This new generation Marantz is a good allrounder, and shows that extra care is being taken over sound quality; well equipped and versatile	45W MM/MC 3 line inputs tone controls		56
Marantz PM45 £200	Good+ Fair	Generally pleasant and polite with above average clarity; there was some softening in the bass, restricting dynamic output somewhat	40W MM/MC tone controls		50
Marantz PM94 £1,000	Very Good Good	At 23kg the PM94 is no lightweight in either physical or sonic respects. A very powerful and comprehensively equipped amplifier	140W MM/MC tone controls (switchable)		60
Meridian 201/205 £550/£395 each	Very Good Good+	A fine preamp with additional luxury option of full system remote, plus competent and attractive monoblok power amplifiers with generally good performance	100W MM/MC 6 line inputs remote capable straight line	R/—	62
Mission Cyrus One £180	Very Good Good	A red hot class winner, which caused the whole issue to be re-rated! It's even well built – however, the headphone socket will only take a 3.5mm jack	30W, MM/MC, 5 inputs, hdph, straight line	BB	62
Mission Cyrus PSX £200	Very Good Very Good	The PSX does make the Cyrus Two sound better, and also improves the PCM II CD player giving more wallop and clarity	Auxiliary power supply	R	62
Mission Cyrus Two £300	Very Good Very Good	Also a top performer in its group with fine moving coil and compact disc sound. Again, only 3.5mm headphone socket	50W, MM/MC, 5 inputs, hdph, straight line	R	62
Mordaunt Short MS-A5000 £350	Very Good Good	With a recognisable pedigree, Mordaunt Short engineers have made a good job of this one. A musical all rounder	50W, MM/MC, 6 inputs, hdph, tone controls	R	62
Musical Fidelity A1 £249	Good Good+	Fine-ranking in terms of overall sound quality for money, the excessive heat output could be hazardous to your vinyl if you're careless	20W MM/MC 4 inputs straight line	BB	56
Musical Fidelity B200 £299	Very Good Good+	Running cooler than other MF's, the B200 delivered fine musical and dynamic sounds with plenty of power	80W MM/MC 4 line inputs straight line	BB	62
Musical Fidelity Pre 3/P140 £299/£299	Very Good Very Good	Delivering true audiophile sound quality well ahead of their price, both components shine in their own right	70W MM/MC 4 line inputs straight line	R	56
Musical Fidelity A100 £439	Good+ Very Good	This is another one recommended for fine sound with which you could keep your Chinese carry-outs warm	50W MM/MC 5 inputs straight line	R	62
Musical Fidelity P170 £499	Very Good Very Good	Acquitted itself well, later samples showing steadily increasing refinements	85W	R	50
Musical Fidelity MA-50 £875 pair	Good Excellent	An audiophile bargain. One of the best sounding power amplifiers made	50W, monoblok	R	62
Musical Fidelity MVT Mk 3 £1,199	Very Good Very Good	The MVT preamp was "strong in its class", providing competition for £1500-plus amplifier systems, now rivalled the MF3B	MM/MC 5 inputs	R	50
Musical Fidelity P270 £1,199	Very Good Excellent	If the hot-box aspect is not a deterrent, this is something of a bargain. A big amplifier scale of sound which is just a little rough-edged	135W	R	50
Musical Fidelity MVX £2,000	Very Good Excellent	Soundwise this preamp puts Musical Fidelity on terms with much more expensive exotics, with class transparency, focus and dynamics	MM/MC, phase invert	R	60
Musical Fidelity A370 £2,199	Very Good Excellent	Arguably the finest sounding power-amplifier manufactured in the UK	185W	R	50
NAD 3020e £110	Good Fair	A little light in balance and "weight" but superior to run-of-the-mill budget amplifiers	20W MM/MC 4 inputs	R	50
NAD 3220PE £140	Good Fair	Like the 3020E but with more peak power and loudness thanks to the 'power envelope'	20W, MM, 5 inputs, hdph		62
NAD 2200 £339	Good + Fair	Not recommended on grounds of sound quality, but worth serious consideration for its exceptional power output	100W		44
Naim NAIT 2 £322	Average+ Fair	Well built with good load tolerance the NAIT delivered a fully competitive sound in spite of its modest measured power output. Recent modifications as yet unchecked	15W pc MM 3 inputs	R*	50
Naim Separates £560-£8,000	Very Good Good	A consistent and coherent series of 'building blocks' for conventional passive or active operation. Sound quality ignores conventional audiophile standards of presentation, but achieves fine musical communication	40-70W, MM/MC etc	R	60
Nakamichi CA-5E £750	Very Good Good	A fine job performance and high build quality but rather disappointing sound quality for a preamp of this price	MM/MC, 6 inputs, hdph, tone controls		62
Nakamichi PA-5E £1,150	Very Good Good	A strong sound in several respects but one which ultimately failed to satisfy	100W		62
Nakamichi CA7E/PA7E £2,500/£1,700	Very good Good/Good+	Exceptional build and finish, plus good general performance, remote control and versatility, but expensive	200W MM/MC 6 line inputs, remote, tone controls		56
Nikko NA700 £189	Good + Poor	Disappointing sound quality at an above budget price. Inescapably old fashioned	60W MM/MC 4 line inputs tone filters		56
Nuance £795	Very Good Good	A subtle civilised pre-amp though a little lacking in resolution and detail; suited to some tastes but not top-drawer	4 inputs MC		50
Orell SA-D40 £359	Good Good+	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/MC, 4 line inputs, straight line	R	56
Perreaux SA3 £690	Very Good Fair	This exotic New Zealand-built preamp did not really offer the sort of sound quality expected at the price	4 inputs MM/MC		44
Perreaux 1850 £990	Very Good Fair	This power amp's musical qualities were disappointing, though powerfully delivered. Build and finish were exemplary	180W		44
Pink Triangle PIP £2670	Excellent Excellent	This state-of-the-art preamp is one of the few truly high end products to come out of this country this year. It will most certainly worry the competition	MM/MC, 4 inputs, battery supply	R	62
Pioneer A333 £149	Very Good Fair	A rather average but nonetheless competent performer that is pleasant enough	55W, MM, 5 inputs, hdph, tone controls		62
Philips FA860 £249	Very Good Fair	Well balanced model from Philips' Japanese factory, with versatility, good build and finish	70W MM/MC 5 line inputs tone controls		56
Philips FA960 £299	Very Good Good	Japanese built high quality integrated model with versatile features and plenty of power	110W MM/MC 8 line inputs tone controls		56
Plenitude £795	Very Good Good+	Rating slightly higher than its Nuance partner, this power amp provided a tight, controlled sound, if somewhat lacking in scale and grace	80W	R	50
QED A240 CD II £169	Good+ Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	62
QED A240 SA II £219	Good + Good+	Redesigned 240SA represents a significant allround improvement over its predecessor, and provides a good moving-coil disc input in a competitive price	45W MM/MC 5 line inputs straight line	BB	62

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AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Quad 34 £269	Very Good Fair	This well-built durable preamp has useful filtering and above average tone controls but was found lacking in sound quality (viz: detail/dynamics)	4 inputs MM/MC tone controls		44
Quad 405 £329	Very Good Fair	Not an impressive power amp but easy on the ear if not pushed and very reliable	100W		44
Quicksilver Mono £1495	Good Good+	Moderately improved for '88 the Quicksilver still rates well despite up and coming competition	60W monoblok 4/8ohms		57
Radford SC25 £598	Very Good Very Good	A very fair price for a solid, well built valve preamp, combining good allround performance and a neutral sound	5 inputs, MM, straight line	R	57
Radford MA75 £776	Good Very Good	A fine quality valve monoblok with good load tolerance and a neutral accurate sound, offering significant gains in power and focus over the STA25	75W monobloks	R	57
Radford STA25 Renaissance £897	Good Good+	Offering superb midrange performance if not quite as good at the extremes, the Renaissance valve power amp is a genuine audiophile product	25W	R	50
Revox B250 £1128	Very Good Good	With much improved sound over its predecessors plus amazing remote control facilities, this could form the heart of a round-the-dream-house system	150W MM/MC system/house remote tone controls		56
Robertson Forty Ten £987	Very Good Good	Here is a neat little power amp (60W) you can fit and forget; it proved most satisfying over long listening sessions	60W		Collection
Rotel RA810A £100	Very Good Fair	As a cut price RA820A it this is a very successful little amp that loses little in sound quality to its predecessor. Excellent value	20W, MM, 5 inputs, hdph, tone controls	BB	62
Rotel RA820A £130	Good+ + Good	This a version of an established budget favourite delivers the goods sonically and is fine value for money	35W MM 4 line inputs tone controls	BB	56
Rotel RB/RC850 £140/£119	Good+ + Good+	Quality separate pre and power amplifiers at near budget integrated amplifier prices. A notable achievement	60W MM/MC 4 line inputs tone controls	BB	62
Rotel RA820BX3 £160	Very Good Good	The latest upgrade is not that impressive, but the BX remains a fine amplifier and now has a moving coil disc input	30W, MM/MC, 5 inputs, hdph, straight line	BB	62
Rotel RA870BX £325	Very Good Good+	A powerful blockbuster with solid and well focused sound, good versatility and fine load tolerance	85W MM/MC 7 line inputs tone controls	R	56
Sansui AU-G11X £139	Good+ Fair	Tightly controlled if somewhat congested and lightweight, but a reasonable compromise between features and sound quality	25W MM hdph 4 inputs, tone controls		50
Sansui AU-G30X £199	Good+ + Fair	A very competent amp with no glaring faults, performing well with phono and compact disc inputs	4-inputs MM 45W tone controls hdph		50
Sansui B2301 £1880	Very Good Good+	Rating better than the preamp and providing generous power output, this amp could not be considered competitive in its price bracket	300W		Collection
Sansui C2301 £2306	Excellent Good	Sansui's flagship preamp did not really rate well given its price, but is not short on features	All facilities		Collection
Sony TAF 500ES £349	Good+ Fair	Not too hot at the price, lacking in bass action, rating poorly on vinyl, and only marginally improving on CD	75W hdph tone controls MM/MC		50
Sony TAF 700ES £500	Good+ + Fair	Scoring higher than the 500 but still not offering the sort of standards set by the competition. But many buttons to push	100W MM/MC tone controls		50
Sumo Nine + £1200	Very Good Excellent	Macho styling of this class A stereo power amp conceals a sonic subtlety that is exceptional for the price, limited by lots of waste heat and a noisy fan on our sample (being improved)	65W	R	60
Tannoy SR-840 £1713	Very Good Good	A "muscle" power amp, capable of impressive levels into difficult loads while remaining quite subtle and revealing	250W		50
Vacuum State FVP £999	Good Very Good	This well thought out valve preamplifier is designed for optimum musicality and transparency, a goal which is handsomely achieved	5 inputs, MM, straight line	R	57
Yamaha AX-300 £120	Good Fair	A lively and dynamic performer, offering a credible if bright sound at a competitive price	30W hdph tone controls (MM)		50
Yamaha AX500 £200	Very Good Good	A well built versatile performer with generous power, decent sound	90W MM/MC 5 line inputs tone, var loudness		56
YBA 2 pre & pwr £1395/£1695	Good+ + V Good/Excellent	Superbly finished French audiophile separates, with very good space and transparency, slightly softened bass. Needs extra transformer (£300) for MC cartridges	70W MM (MC extra) straight line	R	56
YBA 1 preamp £2895	Very Good Excellent	A front line French audiophile product. Great stereo and a fine Krell style finish	MM/MC, 3 inputs, straight line	R	62
YBA 1 power amp £2995	Good Excellent	This equally well finished power amp offers front rank steric staging and transparency, and is capable of driving the most difficult loads	85W	R	62

LOUDSPEAKERS

Last item in the hi-fi chain, to some extent the loudspeaker is merely the slave of what has gone before, capable only of reproducing a signal as good as it is fed. Nevertheless the distortions (colorations and stereo effects) introduced by loudspeakers (and rooms) tend to be more immediately obvious than those anywhere else in the chain, so careful choosing according to taste is very important.

The average loudspeaker consists of a smallish enclosure, much of which may have begun life as

part of a tree, plus a couple of drive units hidden behind a removable grille. Inside the box lurks a simple electrical circuit known as a crossover, which divides the incoming (full range) signal into the right bits for the drivers to handle. Variations on the above formula are specifically identified in the entries. The designer's primary task is to balance the sensitivity of the loudspeaker (how loud it goes for a given electrical input) against the bass extension (how low does it go) for the given box size. After that such subtleties as coloration and

dispersion come into the equation.

Careful placement of the loudspeakers within the room is as important as the initial choice of model. For good stereo they need to be more or less the same distance from nearby walls, and preferably on similar rigid stands. The listener should be about the same distance from and listening angle to each loudspeaker. The ideal placement depends on the way a particular model has been balanced (not to mention a number of other factors), and our recommendation is given in the entries.

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Acoustic Energy AE1 £700	Good Very Good	To the author's knowledge, the most awesomely dynamic and articulate miniature ever made	29.5 x 18 x 25cm semi-open space	88dB/W 60Hz	R	59
Acoustic Research 8BX £100	Average Average—	Spacious and informative sound quality with bass well under control. Not that there was much bass to control	40 x 25 x 19cm shelf or 50cm stand near wall	88.5dB/W 70Hz		53
Acoustic Research 22BX £170	Average Average	Basically well-engineered with sound "nicely out of the box". Some of our "ears" were less enthusiastic	47 x 29 x 22cm shelf or 50cm stand near wall	89.5dB/W 55Hz	R	59
Acoustic Research 35BX £200	Average Average—	This is quite loud, with some boom and tizz, making it suitable for supine strummers of imaginary guitars perhaps	58 x 26 x 27cm free space on 40cm stands	91.5dB/W 55Hz		53
Apogee Caliper £2550	n/a Very Good	Near state of the art performance, not materially worse than bigger Apogees, just less bass. Rich, subtle and slightly dull, with a clear, articulate midband, but uncommonly system fussy	122.5 x 71 x 10cm ex rear foot, free standing, away from walls	n/a n/a	R	60
Apogee Scintilla £4990	Good Very Good	These take-me-to-your-leader speakers gave exceptional transparency and can achieve excellent results in a true audiophile system	145 x 88 x 9cm free space on floor	79dB/W 20Hz	R	46/Col

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
A&R Arcam Three £150	Average + Average—	Arcam's baby speaker did not delight our listeners, but it might do better in less expensive systems	34 x 18 x 23cm close to wall at head height	88.5dB/W 95Hz		53
A&R Arcam Two £250	Good Average	Most things to most men this compact is unlikely to disappoint with its lively "balsy" character though lacking weight... a bit	38 x 23 x 28cm near wall shelf or 40cm stands	88dB/W 55Hz		59
A&R Arcam One Plus £359	Good Average	Provides a solid, weighty and rich sound, but is a little raw in the treble and indefinite in the midband	22.3 x 28.1 x 37.8cm open space, on stands	88.5dB/W 60Hz		59
Ariston QLN1 £350	Very Good Good +	This very sophisticated loudspeaker has much of the euphony of a LS3/5A but with rather more 'oomph'. A little 'romantic' for some tastes - Schubert and String rather than Stockhausen or the Stones perhaps?	35 x 25 x 26.5cm free space, 24 inch stands	84.5dB/W 65Hz	R	59
Audiostatic ES200 £1495	Average Average +	Sounding forward and unbalanced with limited bass power, these excelled in transparency and detail, and might suit some tastes	150 x 53 x 23cm low stands, free space	79dB/W 45Hz		46
Audiostatic ES300 £1995	Average + Good	Marred by similar problems to its cheaper ES200 stablemate, this line source electrostatic was superb in the upper-mid and treble but lumpy in the bass	44 x 5 x 93cm free standing	82.5dB/W 30Hz		46
Avance 120 £279	Average + Average +	This unusual "after eighties" looking speaker has the recipe for success, but not quite the right seasoning yet!	42 x 30 x 30cm 30cm from wall on 40cm stands	86.5dB/W 60Hz		53
Avance Concrete 2000 £970	Below Average Below Average	Very low cabinet talk, but the system sounds terminally uneven - lumpy bass and over-forward midband dominate	86.5 x 29.2 x 43cm clear of walls	94dB/W 40Hz		60
B&W DM10ci £120	Good Average	Not universally liked on test, but the consensus view was positive, the best feature being a sharp, clear midband.	37 x 22 x 22.6cm free space or near wall, on stand	88.5dB/W 30Hz	R	59
B&W DM110i £159	Very Good Average	On the hard and aggressive side of neutral, this is a tactile and detailed transducer that remains musically adequate, if slightly intrusive	48.7 x 26 x 27cm open space, on high stands	88dB/W 60Hz		59
B&W LMI Mk II £249	Average + Average	Probably one of the best 'micros' ever made, worth considering for special applications (boats or vehicles). Upgraded since our review	24 x 15.5 x 20cm shelf or flush mount	86.5dB/W 80Hz	*	31
B&W DM1600 £399	Good Good	Crisp, dynamic loudspeaker with tight but not especially deep bass and a tweeter that sometimes sounds overcooked	49 x 23.6 x 30cm free space, open stands	87.5dB/W 60Hz	R	59
B&W Matrix 1E £595	Very Good Good +	There was enthusiastic and consistent praise for these speakers with their "revealing and seductive" midrange	41 x 23 x 32cm free space on 35cm stands	85.5dB/W 50Hz	R	53
BBC LS3/5A £265	Good + Average +	As a working tool it does its job but as a piece of value engineering this old-timer is beginning to look a bit grey-haired (recent revisions not checked)	30 x 18.5 x 16cm open stands, free space	81.5dB/W 57Hz	R*	Coll
BLQ Q2 £275	Average— Average	Nearly a good loudspeaker, the basic balance is good, but the midband is very uneven and there are severe losses of resolution, "space" and dynamics	43 x 25.1 x 24.5 semi open on stands	87.5dB/W 70Hz		59
Bose 6.2 £570	Average— Average—	Wishy-washy (but not unpleasant) sound and vague imagery are the hallmarks of this unusual design	25.4 x 50.8 x 24.4cm free space, on stands	87.5dB/W 55Hz		59
Boston A4011 £110	Average Average—	Competent performance for size and price but below average relative to the UK competition	34 x 21 x 20cm on stands near wall	88.5dB/W 63Hz		41
Castle Clyde £139	Average + Average	A tidy little performer packing punch, but beginning to show its age in the light of new competition	37 x 21.5 x 22cm open space on stands	89.5dB/W 64Hz	R	46
Castle Durham £189	Average + Average	Listening results were encouraging, well engineered and finished, but lean on treble and a bit weak on bass; still recommended	41 x 21.5 x 25cm near rear wall	89dB/W 67Hz	R	46
Castle Pembroke £289	Good Average +	Comfortably recommended, a sweet smooth sound with good overall balance of engineering-based performance	55 x 37.5 x 30.5cm open space on stands	88dB/W 46Hz	R	31
Celestion DL6 Series Two £149	Good Average	Good tonal colouring and plenty of bass for the enclosure size, the metal dome tweeter is excellent, but bass and mid lack clarity and 'bite'	45.4 x 24.5 x 26.2cm near wall, on stands	87dB/W 65Hz		59
Celestion DL8 Series Two £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open, stands	87.5dB/W 60Hz	R	59
Celestion SL6S £350	Good Good +	A luxury compact speaker that gives a sweet treble sound with fine musical detail	37.5 x 20 x 27cm free space on 40cm stands	84dB/W 50Hz	R	46
Celestion SL600 £700	Good Good + +	Clearly an exceptional device in terms of design and transparent sound quality. An audiophile miniature	37 x 20 x 25.5cm open space on stands	83dB/W 55Hz	R	46
Celestion SL700 £1220 inc stands	Good Good	Very sophisticated, mostly smooth and accurate transducer, with fast but not very deep bass and a rather bright treble	37.5 x 20 x 23.5cm free air on tall stands	83dB/W 45Hz		60
Celestion 6000 £1470	Very Good Very Good	A genuine fullrange audiophile quality speaker system - with Star Wars styling to suit a high tech environment	Complex, on floor in free space	82.5dB/W	R	60
Chameleon 500 £349	Average— Average—	Sounding badly coloured, dull and compressed, it is also amateurishly constructed, despite using good quality materials	38 x 25.3 x 31.3cm free, stands	89.5dB/W 75Hz		59
dbx 1000 £450	Average— Average—	This system sounds soft and woolly, with an effusive bass, an occasionally sharp treble, and a recessed midband. Stereo positioning is poor	78.7 x 35.6 x 27.9cm against rear wall	91dB/W 60Hz		59
Gale 301 £279	Average Average +	Of unusual, distinctive appearance this produced a mixed response, being lively but lacking depth	44 x 23.5 x 22cm on stands quite near wall	86.5dB/W 63Hz		46
Gale GS402 £699	Average + Average +	Clean but rich and powerful bass; stereo focus was not a strong point, but it is worth considering (Recent revisions not checked)	61 x 35.5 x 28cm on matching stands near wall	88dB/W 48Hz	*	46
Goodmans Maxim Two £80	Average + Average	More wham-bam-thankyou-mam sound that imitates much bigger speakers when you let these babies yell. (A well-controlled yell)	26 x 17 x 19cm near wall on shelf or stand	86dB/W 85Hz	BB	59
Goodmans Point 3 £90	Average + Average—	Recommended as good value for money, but our listeners' differing opinions mean your ears should judge for themselves	47 x 25 x 20cm shelf/high stand near wall	90dB/W 80Hz	R	53
Goodmans Point 7 £170	Average + Average	Basically competent performance-mix and a lot of speaker for the money, but a certain lack of refinement nonetheless	69 x 33 x 26cm free space on 35cm stand	89dB/W 47Hz		53
Harbeth HL Compact From £455	Very Good Average	The clean and neutral sound lacks resolution and gives rather unobtrusive though well differentiated stereo. Can be bi-wired to advantage	52 x 27.2 x 28.1cm open space, on high stands	87.5dB/W 65Hz		59
Harbeth HL Mk 4 £525	Good + Good +	Recommended for the good results at its price, and only mildly criticised for heavy bass and a mild 'chestiness'	64 x 33 x 30cm free space on 46cm stand	89dB/W 40Hz	R	53
Heybrook Point Five £139	Average Average	Disappointingly prosaic performance on listening tests; wooden and hollow, with restricted dynamics and "space". Earlier samples sounded better	37.5 x 23 x 23cm near wall, on matching stands	86dB/W 65Hz		59
Heybrook HB1 £189	Good Average +	No longer an over-bright character, a strikingly clear sound and fine transient performance now merits recommendation	47 x 29 x 23cm on stands near wall	88dB/W 61Hz	R	46
Infinity RS2000 £130	Good Good +	Fast, detailed and assured miniature with quick but not very deep bass. The top end is detailed but sometimes jangly	36.2 x 22.5 x 20cm near rear wall, high stands	91.5dB/W 70Hz	BB	59
JBL TLX-3 Ci £130	Average Average—	Lively and punchy but also untidy this little speaker may have deviated from the Hi-Fi standard but cannot be summarily dismissed	38 x 25.5 x 22cm free space on stands	87dB/W 55Hz		46

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
JBL L 60T £399	Good + Good	Well balanced and offering realistic value for money, the fine treble and extended bass make it suitable for larger rooms	78 x 30.5 x 26.5cm low stands or floor	88dB/W 40Hz	R	46
JBL L80T £549	Good Average	Large scale, dynamic if rather unwieldy sounding, this is a performer of integrity, if not much subtlety	85.1 x 35.6 x 30.3cm floorstanding, open space	89.5dB/W 55Hz		59
JBL 18Ti £599	Good + Good	Beautifully engineered, well finished miniature with many good points, but unexceptional overall. the cheaper L20T	34 x 24 x 22.5cm 50cm from wall on rigid stands	85.5dB/W 53Hz		46
JBL 250Ti £3599	Good + Good +	In general this speaker did not show the required level of dynamic presentation transparency and stereo depth expected of a pricey flagship model	132 x 57 x 36cm free space on floor	89dB/W 53Hz		46
JPW P1 £125	Good Average +	Honest and basically articulate if not very sophisticated, resolution is good but it can sound a little wearing in bright systems or with rough sounding material	44 x 25.9 x 26.1cm free space on stands	89dB/W 60Hz	R	59
JPW AP2 £145	Good Average +	Few grounds for criticism but purchasers should check out the treble qualities to avoid hammering the ear anvils	46 x 26 x 25cm 40cm from wall on 45cm stands	89dB/W 65Hz	R	53
JPW AP3 £210	Good Average +	Pretty good stereo and well balanced overall it had its own character which is well suited to vinyl replay	52 x 25 x 29.5cm near wall on stands	90dB/W 57Hz	R	46
KEF C10 £94	Good Average -	Listening panelists gave this a poor reception	30 x 20.5 x 17.5cm stand near wall	87.5dB/W 75Hz		46
KEF C40 £209	Average + Average -	Criticisms were made of a lack of fine detail and loss of depth and transparency, but it could handle power well	65 x 24.5 x 26.5cm free space on stands	90dB/W 55Hz		46
KEF R102 £335	Very Good Very Good	High class near-miniature with expressive, articulate midband and clean, accurate bass and top. The sound quality of the Kube circuitry, however, is suspect, what would an audiophile Kube sound like?	33 x 20.7 x 26.3cm near wall or open on stands	89.5dB/W 60Hz	R	59
KEF 103/3 £630	Good + Good	Technically impressive, excellent bass/power handling for size, but not for the audiophile system. Better among cheaper components, and good in a large room	56 x 27 x 30cm supplied stands free space	90-95dB/W 35Hz		53
KEF 104/2 (inc KUBE equaliser) £806 (£905)	Very Good Good + +	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound levels	90 x 28 x 41.5cm floor standing in free space	92dB/W 50Hz	R	60
KEF 107 £1890	Very Good Good +	A welcome sense of ease and lack of strain at most normal levels. Minor criticisms included a dulling in the extreme treble. Excellent bass extension	116.5 x 33 x 45cm on floor in free space	87.5dB/W 20Hz	R	60
Linn Nexus £350	Good Average	Good features include a solid, meaty bass plus good imagery and tonal balance. The catch is that Nexus lacks resolution and timing	49 x 23.5 x 30.4cm near rear wall supplied stands	89dB/W 60Hz		59
Linn Sara £729	Good Very Good	The new Sara is now much smoother and sweeter, with much better imaging. Bass power and dynamics are as good as ever, and the system is no longer as fussy as before	43 x 34.4 x 26.5cm stand mounting, near wall	88dB/W 50Hz	R	60
Linn Isobarik £1695	Good Good + +	Exceptional capabilities in the dynamic range and bass performance, demands serious consideration as a state of the art contender, but odd stereo	76 x 33 x 41.5cm low stands against rear wall		R*	Coll II
Magneplanar SMGa £697	Average - Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB/W 56Hz		46
Magneplanar MG2.5R £1897		Offers the low coloration and profound musical insight of better electrostatic loudspeakers but without loss of low frequency extension	183 x 56 x 4.5cm Open space	83-85dB/W 35Hz		60
Magneplanar MGIIa £2650	Good Very Good	Another excellent true-audiophile loudspeaker this American panel speaker helps to convey much of the original character of the music	180 x 62 x 38cm well clear of walls	84-86dB/W 35Hz		46
Marantz LD20 DMS £150	Average Average	Recommended more for CD users than vinyl keepers, soundly engineered and built but should be heard before bought	36 x 23 x 24cm free space on 45cm stands	86.5dB/W 55Hz		53
MB Quart 390 £499	Below Average Poor	An aggressive, messy sounding design whose uncouthness undermines the positive level of detail	52 x 31 x 30.5cm open space, on stands	59.5dB/W 60Hz		59
Meridian M30 £725	Average + Average	Pricy but easy on the ears and worth considering especially where space is at a premium	38.5 x 18 x 32cm free space on stands	Active 40Hz		46
Mission 70 II £110	Good Average	Lively and transparent, the 70 II was favoured for its speed, though the sound had a mildly 'thin' tonal balance	35 x 21 x 21cm on stands or shelf near wall	89dB/W 68Hz	BB	46
Mission 700LE £140	Good Average	Mission re-submitted this popular model and again got a positive review - which proclaims their (and our) consistency	38 x 21 x 21cm straight ahead stand near wall	89dB/W 66Hz	R	59
Mission R737 Renaissance £250	Average Average	Effusive, over-the-top bass and obtrusive treble get in the way of a marvellously lucid and transparent midband. Inconsistent on audition - wonderful piano, bloated orchestras etc	54 x 25 x 27cm near wall on dedicated low stands	88.5dB/W 60Hz		59
Mission Argonaut £700	Good Good	Perhaps not the most subtle or sweet these were recommended for their excitement, drama, power handling and good looks	95 x 23 x 31cm floor-standing near wall	91dB/W 40Hz	R	60
Monitor Audio R100 £139	Average + Average -	Tonally quite neutral, but with small box character, negligible low bass and a rather 'hard' midrange	40.5 x 25 x 21cm free space on stands	87.5dB/W 70Hz		46
Monitor Audio R252 £159	Average + Average	Rating well for its price this model displayed a rather rough top end and a generally dry character helped by good detail and focus	47 x 25 x 24cm stands quite near rear wall	89dB/W 62Hz	R	46
Monitor Audio R352 £250	Good Average	Well-built and finished, 'sensitive' speaker which is easy to drive and capable of extracting good results from any good amplifier	64 x 25 x 32cm on stands in free space	90dB/W 50Hz	R	46
Monitor Audio R700 MD £269	Average + Average +	Lively and involving with good, punchy, if rolled off bass. The metal dome speaker gives a clean and open treble	32 x 21.5 x 25cm on stands 0.4m from wall	87.5dB/W 62Hz	R	46
Monitor Audio R352 MD £299	Good Average +	Better suited to CD than vinyl perhaps, this is clearly good value for money. But some found it coarse while others praised its cleanliness	64 x 25 x 32cm 25cm stands in free space	89dB/W 42Hz	BB	53
Monitor Audio R452/MD £350	Average Average	This big, efficient, dynamic sounding loudspeaker has a clean, open treble but a pinched, two-dimensional midband. Can be tiring in the long run	64 x 25 x 31.8cm open space, low stands	89dB/W 55Hz		59
Monitor Audio R652 MD £369	Average Average +	Mild bass and crossover weaknesses were criticised, but the sound was quite well liked and it is decently built	51 x 20 x 26cm free space on 40cm stands	86.5dB/W 45Hz		53
Monitor Audio R852/MD £380	Good + Good	This finely crafted design has a sharp and clear if occasionally rather rough sound quality. Bass is light but qualitatively very good - an intriguing performer	45 x 25 x 27.5cm open space or near rear wall, high stands	89dB/W 68Hz	R	59
Mordaunt Short MS10 II £90	Average Average -	One of the best miniatures around. A borderline Best Buy because of the bass limitations, which may depend on your taste	29 x 20 x 17cm wall bracket	86dB/W 75Hz	R	53
Mordaunt Short MS100 £189	Average + Average +	A 'mid forward' tonal balance is its main drawback but other aspects such as ambience, transparency and stereo depth compensate	32.5 x 22.5 x 21.5cm stands near wall	85dB/W 80Hz	R	46
Mordaunt Short 45Ti £230	Good Average	A sensitive tandem-bass number that can be driven loud but loses its balance a bit and can be unsubtle	63 x 26 x 30cm low (20cm) stand near wall	90.5dB/W 52Hz		53
Mordaunt Short MS300 £319	Average + Average +	Not considered particularly competitive in its class, though it has good power handling and stereo focus	54 x 22.5 x 25cm on stands near wall	89dB/W 65Hz		46

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

THE DIRECTORY

LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Mordaunt Short 442 £1150	Good+ Good++	A resounding success with the listening panels. Make sure your room can accommodate the bass.	95 x 26 x 38cm floor standing in free space	87.5dB/W 40Hz	R	60
Musical Fidelity MC-2 £300	Very Good Very Good	This exceptionally clean and clear design offers real subtlety and finesse. Bass quality is light but exceptionally clear; the treble is smooth if slightly shallow.	48.5 x 25.5 x 16.5cm open space and stands	87.5dB/W 65Hz	BB	59
Musical Fidelity MC-4 £499	Very Good+ Very Good	Achieving a very high standard, the MC-4 sounds detailed and coherent like the MC-2, but with more bass depth and solidity, and large image scale.	56.5 x 26.9 x 29cm open space on stands	87.5dB/W 60Hz	R	59
Quad ESL-63 £1459	Good+ Good++	With its unusual but subtle characteristics this classic electrostatic may not be punchy in the bass, but has strengths that some cannot live without.	92 x 66 x 27cm open stand well clear of wall	84dB/W 34Hz	R	60
Rogers LS2 £170	Good Average+	A coherent and polite speaker considered more suited to classical music. Tonally well balanced, neutral and with good power handling.	36 x 23 x 22cm on stands near wall	86.5dB/W 51Hz	R	46
Rogers LS6 £240	Good+ Good	Sonically fitting in between the LS2 and 7, the 6 was a consistent success on audition – well balanced with an open and informative nature.	51 x 27 x 28cm open stands, free space	87.5dB/W 50Hz	BB	46
Rogers LS71 £360	Good+ Good+	A fine combination of classic qualities at reasonable price produces the "R" tag, but try to get a pair home on approval to check for bass 'heaviness'.	56 x 27 x 28cm free space on 40cm stands	88.5dB/W 48Hz	R	59
Roksan Darius £1285 inc. stands	Average Poor/Very Good	A controversial speaker which when set up right can deliver impressive performance, but with a far from neutral balance.	98 x 31 x 51cm integral stands near side walls	88dB/W 50Hz		53
Rotel RL850 II £120	Average+ Average+	Strongly recommended. Well-balanced, clear, with decent focus and fine stereo, but tendency to 'heaviness' needs decent stands and space.	44 x 25 x 24cm free space on 40cm stands	86.5dB/W 50Hz	BB	59
Royd A7 Series 11 £99	Average+ Average	Lively clear sound; good upper bass and dynamics, but treble "ramp" made vocals sound shut in before.	31 x 20 x 17cm shelf or 50cm stands near wall	86dB/W 75Hz	R	53
Royd A25 £100	Average+ Average-	Receiving mixed reactions on audition, the A25 is flawed but offers a lot of speaker for the money.	51 x 29.5 x 24cm, stands near wall	87dB/W 52Hz	R	46
SO Acoustics SD1 £1050	Average Good	A large scale, airy and unusually detailed system with excellent dynamics. Balance is light and bright, and can upset some systems/listeners.	123.5 x 38.2 x 31.9cm free standing, away from walls	90dB/W 50Hz	R	60
Sony APM 10ES £100	— Average	An obvious Best Buy at its highly competitive price point, it can do justice to a good hi-fi system of Sony or specialist origins.	40 x 25 x 20cm, 40cm stands 40cm from wall	87dB/W 55Hz	BB	59
Sony APM 22ES £249	Good+ Good	Sounding notably clear, the 22ES scored well on listening tests. Was easy to drive and achieved high sound levels.	51.5 x 29 x 30cm free space on 40cm stands	88.5dB/W 46Hz	R	46
Sony APM 66ES £700	Average+ Average+	Powerful heavyweight sound with a brilliant midband – clear articulate and transparent. But the bass is on the boomy side and the treble can sound grainy.	66 x 38 x 36.5cm open space, low stands	89dB/W 60Hz		59
Spendor Prelude II £350	Good+ Good	Good clarity and detail were evident everywhere in this speaker. Though a little boxy or muddy in the midrange it is strongly recommended.	50 x 26 x 28cm open stands in free space	88dB/W 52Hz	R*	46
Spendor SP2 £450	Very Good Good+	Conceding little to the SP1, this 30 litre model displayed good tonal balance with a highly articulate midrange, only slightly marred at frequency extremes.	50 x 25 x 30cm free space, stands	87dB/W 45Hz	R	59
Spendor SP1 £680	Very Good Good	A very subtle and musical performer that works particularly well with digital material. An exceptional allrounder.	63.5 x 29.5 x 30.5cm stands in open space	87dB/W 41Hz	R	60
Spendor SA3 Passive £1400	— Good+	Same as Spendor SA3 active.	85 x 38 x 46cm low	89dB/W 32Hz	R	46
Spendor SA3 Active £2708	Good+ Very Good	Substantial speakers designed to deliver high sound levels and killer bass. Suited to larger rooms and power hungry ears.	85 x 38 x 46cm low rigid stands in free space	89dB/W 32Hz	R	46
Spica TC-50 £595	Average+ Good	These American wedge-shaped-cabinet speakers just merit recommendation at their price and were detailed and clear.	40 x 33 x 28cm free space on 50-60cm stands	85dB/W 48Hz	R	59
Spica Angelus £1195	Good Average	A little bass shy and soft in the bass and lower mid, the Angelus is otherwise tidy, extremely lively and fluid, if uneven overall.	116.8 x 53.3 x 26cm free standing away from walls	86.5dB/W 50Hz		60
Tannoy Eclipse £120	Average+ Good	Although a little bright, the essentials are right: hear-through clarity at all frequencies, good dynamics, firm bass.	38.8 x 22.6 x 21cm semi open on stands	87dB/W 65Hz	BB	59
Tannoy Mercury II £160	Good Average+	This genuine allrounder represents an exceptionally accurate free-space system for the money. Recent modifications as unchecked.	50 x 25 x 23.5cm open space 45cm stands	88dB/W 55Hz	BB*	53
Tannoy Westminster £3500	n/a Good+	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few pockets and rooms.	Huge, flat against rear wall, away from corners	96dB/W (manuf.)	R	Coll
Technics SBC 250 £130	Average+ Average-	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character.	36.5 x 23.5 x 20.5cm free space, stands	86dB/W 60Hz		46
Technics SB-RX50 £500	Very Good Average+	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass.	48 x 30 x 26cm free space on 40cm stands	86dB/W 40Hz	R	46
Wharfedale Delta 30 £80	Good Average	Very clear and surprisingly neutral for the price, with good dynamics and stereo within limited volume ceiling.	37.9 x 20 x 16.9cm near wall on high stands	88.5dB/W 80Hz	BB	59
Wharfedale Delta 50 £99	Average+ Average-	"There's nothing obviously wrong, but it seems a bit mundane," is what we said when the Delta 50 was £129. But since then the price has dropped by 30 per cent, making it great value.	48 x 27 x 19cm near wall on 40cm stands	88dB/W 55Hz		53
Wharfedale Diamond 111 £100	Below Average Average-	This latest version of the long running Diamond sports a better tweeter, but bass, though deep, is soft, and the midband is indistinct and uneven.	24 x 18.5 x 20.5cm near wall, stands	86.5dB/W 75Hz		59
Wharfedale 504 £139	Average+ Average	Acquitting itself well on audition, the 504 produced a clear, reasonably balanced sound with above average treble.	21 x 18.5 x 20cm stands, near wall	85dB/W 75Hz	R	46
Wharfedale Super Diamond £140	Average Average-	Although there are improvements on the basic "legendary" model, listening panelists did not get airborne about this upgrade.	24 x 19 x 19cm close to wall at head height	88dB/W 57Hz		53
Wharfedale 510.2 £299	Average Average-	Even in its latest guise, this loudspeaker still sounds hard, cluttered and lacking innate clarity. The bass is uneven and midband coloured.	61.5 x 28 x 29.6cm near wall, high stands	89dB/W 50Hz		59
Yamaha NS 1000M £900	Good Good+	Living up to its monitor label, and tonally well suited to digital material, the NS 1000M is superbly crafted and capable of high levels.	67.5 x 37.5 x 32.5cm 30cm from wall, stands	90dB/W 40Hz	R	46

* rating refers to original, tested model.

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THE DIRECTORY

CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal – at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes.)

There is no problem in connecting a cassette deck to any normal amplifier, but some care needs

to be taken in choosing the best tapes for a specific machine. (Trial and error is one effective technique, but many decks have manual bias adjustment and some match up to the tape automatically.) Lab performance and sound quality often go hand in hand, and are frequently somewhat dependent upon factory alignment. The mechanical integrity of the mechanism itself is another crucial factor, that is often reflected in the asking price.

All modern hi-fi decks have Dolby B and the majority have Dolby C besides, the very worthwhile

HX Pro system is becoming steadily more widespread. Remote control remains rare, though sometimes it is available as a system option. Three-head recorders allow simultaneous checking of the recording being made. Auto-reverse is a useful convenience feature, but usually with some mechanical compromise, while double-mechanism 'dubbing' decks of dubious quality are fashionable at the bottom end of the market. The welter of different 'music search' systems available is some indication of their frequent ineffectiveness.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa AD-F370 £130	Average Average	Adequate but uninspiring recorder with detail shortcomings but good control layout and successful sounding with recorded musicassettes	Dolby B, C, HX Pro, bias adjust		This
Aiwa AD-WX707 £180	Poor Average	Net bad value for a twin deck, but marginal from the high fidelity viewpoint. The review sample was poorly set up.	Dual deck, auto-reverse, Dolby B & C, bias adjust		57
Aiwa XK-007 Excelia £400	Good Good	Downmarket version of XK-009 with simplified bias/equalisation adjustment section and more forgiving but less informative sound. Still good, but less exciting than XK-009	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment		This
Aiwa AD-WX909 £400	Good Good	Convenience meets sound quality, and both win. An essentially clean, positive recorder which works alongside an auto-reverse player of lower standard – a sensible compromise	Dual deck, auto-reverse, track search, Dolby B/C/HX Pro, bias adjust, 3 Head	R	57
Aiwa XK-009 Excelia £550	Very Good Very Good	Excellent detail, stable articulate midband and slightly obvious treble. The most interesting Aiwa for yonks	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment, CD direct	R	This
Akai GX-52 £249	Very Good Very Good	Well finished and a pleasure to use this well specified deck sounds clean and defined with all tape groups, with or without Dolby	Dolby B, C, HX Pro, track locate features	BB	57
Akai GX-6 £350	Good Good	There is a strong sense that someone has really thought this one through; it has an indefinable 'specialness'	Real-time counter, track search, Dolby B, C, bias adjust	R	52
Denon DR-M07 £125	Average+ Excellent	Despite minor operational and measured shortcomings, sound quality is excellent for the price	Dolby B, C, bias adjust	BB	52
Denon DR-M10HX £180	Good Good	Very well laid out, a sensible range of features and smooth cam-operated transport. Replay-only sound quality suspect, but the deck is successful as a recorder – clean, precise but slightly 'grainy'	Dolby B, C HX Pro, memory counter, bias adjust	R	This
Denon DR-M12HX £220	Good Good+	Well constructed and pleasant to use, a lack of true pitch constancy kept it from sounding superb	Track search, Dolby B, C, HX Pro, bias adjust	R	52
Denon DR-M24HX £290	Good Good+	This deck will slot into many high grade systems without disgracing itself – or the cassette medium. Very presentable high resolution sound with good stereo with or without Dolby	Dolby B, C, HX Pro, bias adjust, 3 Head	R	60
Denon DR-M34HR £320	Very Good Good+	Prerecorded cassettes sounded grey and dull, but this may have been a sample fault. As a recorder, the DR-M34 is refined and detailed – and good value	Dolby B, C, HX Pro, 3 Head, manual tape calibration, memory counter		This
Denon DR-M44HX £400	Excellent Excellent	A well designed deck that also performed fine sonically, working very well with ferric and metal tapes	Real-time counter, Dolby B, C, HX Pro, tape alignment adjust, remote control, 3 Head	R	60
Dual CC8010 £110	Average Average+	The only limitation worth noting is a slight opaqueness, the Dual otherwise sounds stable and effective. An excellent low-cost design	Dolby B & C, microphone input	BB	This
Harman Kardon CD491 £695	Good Good+	Excellent audio engineering and tremendous flexibility make this an audiophile cassette deck 'par excellence'	Real-time counter, auto reverse, track search, Dolby B, C, HX Pro, bias adjust	R	52
Hitachi D-003 £130	Average – Average –	Dry, slightly 'wobbly' sound quality but suitable for many non-critical applications. The manual tape direction switch is poorly designed	Dual deck, auto reverse, Dolby B		57
Hitachi D-007 £180	Average – Poor	This double 'dubbing' deck proved a mixed bag – good in parts but disappointing overall	Dual deck, auto reverse, track search, Dolby B & C		52
JVC TD-V711 £380	Very Good Excellent	This is a complex recorder which is built on the back of some important ideas with audiophile roots. It has a (mostly) superb technical performance and is very capable, if not always strictly accurate	Dolby B, C, HX Pro, 3 Head, variable bias, track search, 3 line inputs	R	This
JVC TD-W222 £150	Below Average Below Average	Well endowed but somewhat user-hostile twin deck. Sound quality is very tape dependent, but offers tolerable stability with considerable loss of resolution and scrappy musical presentation	Dual deck, auto reverse, Dolby B/C		This
Kenwood KX-440HX £140	Average+ Poor	Uneven, unstable sounding player with limited resolving power, but good control layout and finish	Dolby B, C, HX Pro, intro scan		This
Kenwood KX-660HX £170	Good Good	Well designed control system with useful search aids. Sound quality is positive and detailed	Dolby B, C, HX Pro, track & blank search, intro-scan, bias adjust	R	This
Luxman K-105 £349	Average Average	Rating quite well for an auto reverse deck, and featuring complex track search facilities, it was not sonically competitive on price	Auto reverse, track search, Dolby B & C, remote control		52
Luxman K-112 £349	Average Average	Build quality is not truly consistent with the price. Nor is sound, which veers on the warm, lossy side of neutral	Dolby B, C, HX Pro, bias adjust, 3 Head		57
Marantz SD-35 £160	Good Good+	Rock steady tape transport gives very competitive sound quality for the price, but the slightly bright replay may not appeal to some	Dolby B & C, bias adjust	R	52
Marantz SD-45II £200	Good+ Good+	Well built and dynamic sounding player, working better as a recorder than with musicassettes	Dolby B & C, bias adjust Auto selection	R	52
Marantz CP230 £300	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52
Marantz SD-55 £349	Good Very Good	Slightly tacky feel and restricted signal/noise performance are the main shortcomings of an excellent sounding piece of kit	Real-time counter, track search, Dolby B/C/HX Pro, bias adjust, 3 Head	R	57
NAD 6300 £649.95	Very Good Very Good	Solid and homogeneous sound quality and very good replay compatibility thanks to 'play trim'. Distinctive, musical – and costly	Dolby B, C, HX Pro, 3 Head, bias adjust	R	This
Nakamichi CR-1E £345	Very Good Good	Modestly equipped by any standards, the CR-1E stands or falls by its build quality, which is high, and sound which is highly competent	Dolby B & C		57
Nakamichi CR-2E £395	Very Good Good+	Ordinary to look at, in some respects rather awkward to use (tape switching especially), the CR-2E sounds very slightly better than the CR-1E, and therefore ranks well. But it doesn't come cheap	Dolby B & C, bias adjust, remote control	R	57
Nakamichi RX-20ZE £545	Good Very Good+	Fine, clear and articulate sounding player. Excellent with prerecorded material, but idiosyncratic and sometimes obstructive control system	Auto reverse, Dolby B, C, 2 Head	R	This
Nakamichi CR-3E £595	Very Good Very Good	The user interface is a little clumsy, though conceptually straightforward. Sound quality approaches the CR-4E, and is amongst the best at the price.	Dolby B & C, bias adjust, remote control	R	57
Nakamichi CR-4E £745	Very Good+ Very Good+	High class deck with a reasonably full range of features and superb sound at a slightly unlikely price	Dolby B & C, bias adjust, remote control, 3 Head	R	57

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

THE DIRECTORY

CASSETTE DECKS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Nakamichi CR-7E £1500	Excellent Excellent	Remarkably this deck is not only ergonomically but also sonically superior to the Dragon, particularly on record/replay	Real-time counter, track search, Dolby B & C, tape alignment adjust, bias adjust, remote control, 3 Head	R	60
Nakamichi Dragon £1750	Excellent Excellent	Previous to the birth of the CR-7E, this machine stood head and shoulders above the rest. It is still the ultimate for musicassette replay	Auto reverse, Dolby B & C, tape alignment adjust, bias adjust, remote		60
Nikko D-80II £309	Average Average	Easy and rewarding to use (apart from the mannered aesthetics), but sound quality is below for the price, especially with dbx	Real-time counter, auto reverse, track search, Dol B, C and dbx, bias adjust		57
Onkyo TA-2120 £120	Average+ Good	Clear, vivid sound with good timing and resolution when using Type II tapes without Dolby. The controls are less inspiring – the meters in particular are plainly inadequate	Dolby B/C, auto tape sensing, block/side repeat	R	This
Onkyo TA 2130 £140	Average+ Average+	Rating fairly well on both pre-recorded and record/playback, ergonomics were a little poor but overall performance was generally consistent	Track search, Dolby B & C, bias adjust		52
Philips FC566 £179	Average+ Average+	Mostly well equipped, though some tape search facilities fail to exploit the auto-reverse capability. Sounds clean and stable – with prerecorded tapes too	Auto reverse, track search, Dolby B & C		57
Philips FC567 £279	Average Poor	Well equipped but ergonomically substandard; sound quality is messy and lacking in clarity and dynamics	Dual deck, auto reverse, track search, Dolby B & C		57
Pioneer CT-443 £180	Average Good	Structurally sound and subtly musical recorder. Sophisticated, mildly damped sound quality	Dolby B & C, fine bias adjust, track search	R	This
Pioneer CT-737 £300	Average- Average-	Interesting design and a pleasure to use with rather too many rough edges to really work properly	Dolby B, C, HX Pro, 3 Head, bias adjust, memory counter		This
Proton AD-200 £140	Poor Poor	Sound quality is essentially on a par with many portables, and has nothing to do with high fidelity. The main problems are an unrelenting hardness and an almost total lack of detail	Dolby B & C		57
Proton AD-300 £200	Average- Poor	High levels of flutter give sound a roughness and coarseness that rules it out for high quality work. The record and replay electronics certainly deserve better	Auto reverse, Dolby B & C		57
Revox B215 £1461	Good Average+	Superb engineering and good sound, but lacking the subjective qualities that characterise the very best hi-fi equipment	Real-time counter, Dolby B & C, tape alignment adjust, remote control		52
SAE C102 £549	Average+ Good	Looking most unlike a cassette deck designed in the States and proving competitive in its price group. Not sonically that outstanding, however	Real-time counter, track search, Dol B & C		52
Sony TC-FX 150 £90	Average+ Average+	Recording and playing back on this deck itself gave acceptable results, whereas prerecorded stuff was a joke. But it's a good £90 worth	Dolby B & C		52
Sony TC-W300 £150	Poor Poor	Deeply unimpressive and messy sounding deck with bloated quality and poor pitch integrity. Dubbing performance substandard	Dual deck, Dolby B & C		This
Sony TC-RX50 £180	Average- Poor	Terminal inability to play at a steady pitch, or (on prerecorded material) in tune spoiled this simple but otherwise attractive design	Auto-reverse, Dolby B/C/HX Pro		This
Sony (WMD6C) ProWalkman £249	Good+ Excellent	"One of the finest sounding cassette decks on the market today. A mandatory Best Buy, which also fits in your pocket"	Dolby B, & C	BB	60
Sony TC-RX60ES £250	Average Average	For once a stable sounding auto-reverse deck but sound quality is rather 'dirty' and compressed, especially with Dolby C	Auto-reverse, Dolby B/C/HX Pro, auto tape recognition		This
Sony TC-RX80ES £350	Average+ Good	Clean, powerful and detailed sound, especially without Dolby C. Stable pitch – but prerecorded cassettes sounded disappointing	Auto reverse, Dolby B/C/HX Pro, bias/level adjust	R	This
Sony TC-K700ES £499	Excellent Excellent	Firmly in the esoteric league, this is easy both to operate and to listen to. Best points: first class imagery, focus and stability	Auto reverse, track search, Dolby B & C, tape alignment adjust	R	60
Tandberg 3014A £1650	Good Very Good	Very exactly engineered but excessively complex to use. Test sample had poor response for prerecorded tapes, but recordings were unusually stable and clean	Real-time counter, track search, Dolby B & C, bias adjust, remote control, 3 Head		57
Teac V-250 £89	Average Average	Ultra-basic design which works quite well. Lack of pitch integrity is the main shortcoming, but it wasn't always noticeable	Dolby B	R	This
Teac V-270C £109	Average- Average-	Not quite cheap enough to compete solely on price, the V-270C is a rather messy and unstable sounding deck	Dolby B & C, bias adjust		This
Teac R-515 £299	Average+ Average+	Expensive, this deck is basically a competent but pedestrian performer which will not fully satisfy the critical user	Real-time counter, auto reverse, Dolby B & C, bias adjust		57
Teac V-870 £399	Good+ Good	Cut-down V-970X for the proletariat. Expensive and carefully engineered with mostly very good but slightly cold sound quality	Dolby B, C, HX Pro, 3 Head, manual tape calibration	R	This
Teac V-970X £499	Very Good Very Good	An excellent sounding deck with useful features (tape calibration etc) that fully justifies the price	Real-time counter, track search, Dolby B/C/dbx & Dolby HX Pro, bias adjust, remote control, 3 Head	R	57
Technics RS-T230 £160	Average- Average	Satisfactory with prerecorded material but otherwise unexceptional, the main features of this deck are its excellent user interface and value for money	Dual deck, Dolby B/C		This
Technics RS-B355 £140	Good Good	Good sound let down by inadequate meters and poor prerecorded replay only sound quality	Dolby B, C, microphone inputs, cue and review	R	This
Technics RS-B505 £160	Average+ Average+	Neatly made recorder with Dolby HX Pro that sounds precise and stable, though sometimes a little processed and grainy too	Track search, Dolby B/C/HX Pro		57
Technics RS-B605 £180	Good Average+	Mixed but generally good sound. Weakest points are dbx and prerecorded sound, best are Type IV (metal) recordings which sound sharp and precise	Track search, Dolby B/C/HX Pro & dbx		57
Technics RS-T330R £200	Average+ Average+	One of the very few dual cassette decks with any real pretensions to audio quality, the RS-T330 is a considerable success musically as well as being a pleasure to use	Dual deck, Dolby B & C	R	This
Technics RS-B705 £250	Average Average-	3 heads for the price of two, but not the sound quality to go with them	Track search, Dolby B, C, HX Pro, bias adjust, 3 Head		52
Technics RS-B905 £350	Good Good	Good, well set up cassette deck with a clean, accurate sound but some compression. dbx circuit sounds poor	Dolby B, C, HX Pro, dbx, bias adjust, 3 Head		57
Technics RS-T80R £400	Poor Poor	Flexible and pleasant to use but poor transports led to poor sound on our latest sample	Dual deck, auto reverse, track search, Dolby B, C, dbx		52
Yamaha KX-200 £140	Good- Good	Cheap, well-equipped and workmanlike with the sound quality less obviously processed than most – the whole is more than the sum of the parts	Track search, Dolby B & C, remote control	R	52
Yamaha KX-300 £150	Average+ Average-	Uncommonly well equipped and adequately made and presented, this model turned out to be a disappointingly uncertain proposition on audition	Track search, Dolby B, C, HX Pro with 'play trim', bias adjust, remote control		57
Yamaha KX-400 £200	Good Good+	A highly commercial package with every widget under the sun. Happily it sounds good too	Auto reverse, track search, Dolby B, C, HX Pro, remote control	R	52
Yamaha KX-500 £210	Very Good Very Good	An accomplished performer, strongest in the areas of pitch and spatial stability, but slightly rough around the edges	Real-time counter, track search, Dolby B/C/HX Pro with play trim, bias adjust, remote control	R	57
Yamaha KX-800 £330	Good Average	The present Yamaha range seems oddly inconsistent. This sophisticated model sounds fine (almost) but came a clear second best to the KX-500	Real-time counter, track search, Dolby B, C, HX Pro with play trim, bias adjust, 3 Head		57

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 25

THE DIRECTORY

CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Yamaha KX-1200 £500	Excellent Average +	A veritable rats' nest of buttons and dials, albeit well laid-out. This is nearly a great recorder, but lacks simplicity of sound	Real-time counter, track search, Dolby B, C, dbx, HX Pro, bias adjust, remote control		52

DAT RECORDERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa Excelia XD-001 £1300	Very Good Very Good	Clear and very listenable recorder roughly comparable to but slightly sweeter sounding than the Sony DCT-1000ES – but with an inferior front panel design	Track ID and search, remote	R	This
Luxman KD-117 £1499	Good Good	Slightly soggy, earth-bound sound quality, this model trails the other DAT decks tested so far	Two analogue inputs, remote twin address		This
Pioneer D-1000 n/a	Excellent Excellent	Fine, clear, colourful and consistent sounding deck. The Pioneer is lavishly (uneconomically?) constructed and equipped. It shows what is possible, but will probably never be on sale	Many search and memory facilities	R	This
Sony DTC-M100 £799	Very Good Very Good	Clean, clear sounding 2nd generation model with most of the features and sound of the DTC-1000ES	Mid-width, alpha-numeric display, remote, optical interfaces	R	This
Sony DTC-1000ES £1299	Very Good Very Good	Fine, consistent performer with accomplished tape handling and good build quality	Standard track ID and search, remote	R	This

CD PLAYERS

This all-digital music source is well established, despite still high disc prices and the opposition of many hi-fi enthusiasts. Compact Disc's strengths over conventional vinyl are complete freedom from surface noise with automatic and programmable play, plus track skip and fast music scan – frequently under full remote control. However, many vinyl enthusiasts find CDs sound less involving

than top quality vinyl replay.

Introduced five years ago at around £500, CD players now average less than half that price, and for the main offer improved performance besides. Even cheaper players may have the latest decoding chips and the most useful play features; extra money can buy remote control, remote volume control, audio 'tweaks', plus improved build and component

quality control.

Compared with many hi-fi components, CD players give impressive lab performance, though there are differences between players nonetheless. **Sound quality** variations are even more marked, particularly in a good quality system. As it behaves very like a preamp, there are no problems connecting a player to a normal amplifier.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research CD-04 £290	Good Fair	Stylish but basic player, based on Philips 14-bit 4 x oversampling with respectable sound and remote control	Remote Control, headphones		51
ADC CD-250X £230	Good + Fair	Well made and engineered, and average soundwise; trumpets could sound 'thin' though violins were liked so it may prefer Stephan Grappelli to Miles Davis	Skip and search, manual, repeat and 16-track programming		58
Arcam Delta Black Box £249	n/a Very Good	This rich, powerful and articulate sounding DAC transforms the majority of medium price CD players	Needs D-out CD players	R	60
Arcam Delta 70 £500	Good Very Good	This solidly built British player has attractively understated presentation with straightforward, simple ergonomics. The very good sound quality shows a steady improvement over earlier samples.	Simple remote, headphone socket etc.	R	58
Aiwa CD-001 £300	Good Good	Pretty close to Recommendation, delivering a respectable sound quality and lab performance from an ergonomically attractive package, but ultimately failed to excel in any particular respect.	Track entry/volume remote, direct recorder connection etc.		58
Akai CD-73 £450	Good Average	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imagery. Worth auditioning	Track entry keypad remote, menu display (switchable)		62
Akai CD93 £700	Good Very Good	Undoubtedly a CD player of real class in build, presentation, lab performance and sound quality, but also a shade expensive for formal Recommendation – though that's not to dissuade lovers of black lacquer wood finish.	Track entry remote, menu display etc.		58
Cambridge Audio CD2 £600	Fair Very Good	The finest midrange in digital audio is sufficient grounds for Recommendation, though there remains a tinge of disappointment that the CD2 didn't get closer to big brother elsewhere, notably in the bass.	16x oversampling, remote control	R	58
Cambridge Audio COI £1500	Good + Excellent	Advanced design and circuitry give this top class two-box machine exceptional performance, so the intrinsic qualities of CD, silent surfaces, make themselves felt	No headphone socket, seven audio filters, skip and scan	R	Coll II
dbx DX5 £640	Good Poor	Sound quality proved a single disappointment, though it's refreshingly unique in providing semi-pro post-production facilities that some users will undoubtedly relish.	Track entry/volume remote, compression, impact recovery, ambience etc.		58
Denon DCD-600 £250	Below Average Average	Slightly raw sound which lacks resolution. Bass and dynamics are good however and the player sounds pleasant on audition, even if it isn't quite the obvious first choice at the price	Remote track entry, calendar display, headphone output (fixed)		61
Denon DCD-800 £300	Good Good	A generally good subjective and objective performance, a comprehensive range of remote controllable facilities, plus Denon's good reputation for build quality and field reliability.	Track entry remote, menu display etc.	R	58
Denon DCD-1500II £500	Very Good Very Good	The extra build quality over cheaper Denons is justified in terms of sound quality and lab performance, while the feature list is comprehensive and quite nicely presented.	Track entry/volume remote, menu display etc.	R	60
Denon DCD 1700 £650	Good + Very Good	The overall sound was strong and coherent approaching reference standards. Fine build quality and facilities make this a firm contender	Remote, skip, scan, headphone socket, programmable	R	58
Denon DCD-3300 £1200	Good + + Very Good	Sounding tight and coherent though not significantly better than the cheaper 1700. Very well built and comprehensively equipped	Remote control, with volume, keypad programme, scan, search, headphone		51
Goodmans GCD-500S £150	Average – Poor	User-friendly but flimsy build quality and second class sonics make this poor value even at the price	Audible scan and track skip, programming		51/45
Hitachi DA-7000 £180	Good Fair	Generally competent, especially considering the price, this was well built and styled if lacking in some facilities – a good budget starter	Memory and repeat, plus the basics	R	58
Hitachi DA7200 £200	Good Fair	Distinctly more competitive than the '009, the '7200 remains undistinguished in the current state of compact disc technology and sound quality.	Simple remote etc.		58
Hitachi DA007 £230	Average Fair	Unusually fitted with wooden end cheeks and comprehensively kitted out, but only average in sound quality	Full remote control, adjustable headphone output keypad programming		51
Hitachi 009 £300	Good Fair	Despite a pretty clean bill of technical health and an extensive range of facilities, the 009 failed to inspire the subjective enthusiasm needed for recommendation at its £300 price level.	Random, 'roulette' play, menu display, complex remote		58
Kenwood DP-660SG £180	Below Average Below Average	Build quality and ergonomics are good, and the range of features far exceeds the price norm. However, sound quality is messy with a soft bass, recessed mid and sometimes spiky top.	Remote control, calendar/menu display, keypad, 20 track memory		62
Kenwood DP-990SG £400	Very Good Good	Falling just short of the required subjective standard for Recommendation at this price level, this is a doughty player nonetheless, with a build quality and technical performance that arguably justifies its premium price.	Track entry remote, menu display, sprung feet etc.		58

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THE DIRECTORY

CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Kinergetics KCD-30 £1700	Very Good Very Good	Definitely a technical oddball with its distortion-cancelling circuits, the pricey KCD-30 nevertheless does sound very good, and also noticeably 'different' – not necessarily to our collective tastes, but possibly to your's	Favourite track selection, remote, high output (vol, bal)		60
Luxman D-90 £300	Fair Good	Despite technical ingredients that do not seem particularly inspiring, this is a nicely judged package that is ergonomically neater than most, with decent sound quality for the price and distinctive finish and presentation	Track entry remote, programming etc	R	58
Luxman D-100 £399	Average Poor	Sparsely equipped with a slightly old-fashioned sonic character, offering little but physical weight for a quite high price	Remote control, skip, scan, headphone socket (variable)		51
Marantz CD273 £170	Good Good	An ambitious machine at the price, offering pretty good sound quality but a slightly below average build standard	Skip, scan, programmable	BB	51
Marantz CD873 £200	Good Very Good	Putting many 'audiophile CDs' to shame in terms of sound quality this proved another winner, though there was slight criticism of control accessibility at times	No remote control, but the usual skip, scan etc	BB	53
Marantz CD-273SE £200	Good+ Very Good	The Euro-tweaked version of the standard 273, this model fulfils pretensions to audiophile standards at a budget price	Manual control, skip and scan (audible), 20 track programming, repeat	BB	51
Marantz CD873LE £250	Good Excellent	This was the outstanding sound quality bargain in its review group, with discreet if plasticky presentation and rather lightweight build.	Manual repeat, skip, scan, programming	BB	58
Marantz CD-75DX £300	Good Very Good	Attractively sharp, clear and articulate sounding player with tidy treble and powerful bass. Good tracking ability, ordinary build quality but pleasant to use	Remote volume, comprehensive display, R headphone socket, FTS, optical output	R	62
Marantz CD94 £800	Good++ Very Good	Clearly the best Marantz CD player, with high build quality and good objective and subjective performance	10 digit keypad, headphone socket, favourite track selection, remote	R	58
Marantz CD94/COA94 £1600	Very Good Excellent	Taking its logical place at the top of the Marantz CD hierarchy, this two-box combination delivers reference standard lab and listening test results, albeit at a price which seems a little steep. Very refined	Favourite track selection, remote, balanced output etc	R	60
Meridian 207 £950(+)	Very Good Excellent	Not only arguably the prettiest model around, but also one of the best sounding and most versatile – on-board preamp now accepts vinyl disc for an extra £100, and Meridian plans round-the-house future-readiness	On-board preamp, remote (inc volume)	R	60
Mission PCM7000 £400	Good Very Good	Stylish with a large informative LCD display this deserves recommendation on the basis of sound quality alone	Remote volume control, digital filtering	R	51/Coll
NAD 5220 £230	Average— Poor	Conforms sonically to a stereotype of the medium that most players have grown out of. Hard, thin and raw sound with poor stereo and resolution.	Time/track display, memory		62
Nakamichi OMS-1E £400	Good Good	This neat enough player doesn't really follow the Nakamichi tradition of providing exceptional sound quality while at the same time perpetuates that of selling at an above average price	Simple remote etc		58
Nakamichi OMS-3E £995	Good Good	Superbly built and presented this expensive machine was a bit of a "stuffed shirt" when it came to sound quality	Remote control, skip and scan, headphone socket		51
Nakamichi OMS-4E £1200	Very Good Very Good	Solidly controlled and comparatively simple this clearly represents one of the major benchmarks for CD sound quality, though the midrange sounded a touch thin	Skip and scan, headphone socket		51
Nakamichi OMS-5EII £1500	Good+ Very Good	... delivers near state of the art performance and build quality in a deliberately starkly functional package, but at a very high price ...	Skip and scan, simple track programming, manual control		51
Nakamichi OMS-7EII £2000	Good+ Good	The only serious criticism here is of the price. And in our not always humble opinion you can better sound quality for less elsewhere in Nakamichi's range	10 digit track entry keypad programming, headphones		51
NEC CD610 £250	Good Very Good	Although NEC's CD players may take a bit of hunting down, the sound/price/build equation comes down firmly in favour of the '610 despite unspectacular lab performance.	Track entry remote, menu display etc	BB	58
NEC CD810 £400	Very Good Very Good	While the lab performance might have been better still, sound quality, ergonomics and build quality all point towards Recommendation for this rare but attractive example of the CD player maker's art	Track entry remote, menu display etc	R	58
Nikko CD200R £250	Fair Fair	This player delivers fair overall performance at what is presumably a fair price, but is insufficiently distinguished to warrant Recommendation	Simple remote, skip, scan, programming etc		58
Onkyo DX-2500 £200	Average— Above Average	Attractive, easy on the ear sound quality at the cost of some loss of low level clarity and dynamics. Good tracking	Keypad remote, memory, headphone socket (variable)	R	61
Philips CD371 £150	Fair Good	Though the build and presentation may not be to every taste, this is a fundamentally honest basic player that delivers more than enough of the sonic goods to merit a Best rating	Skip, scan, programming	BB	58
Philips CD472 £200	Fair Good	Once again one cannot argue with the fine sound quality Philips make available at a modest price – with remote control and extensive facilities besides.	Simple remote, programming etc	BB	58
Philips CD373 £250	Average Good	Good, but slightly less so than CD371, which is better value for money. Musical architecture and dynamics are excellent, but some coarseness and 'smear' remain	Track entry/volume remote, headphone output, FTS	R	62
Philips CD473 £250	Good Good	In the forefront as regards sound quality, this is one of the best sounding Philips players yet; we were unable to catch it out on classical through jazz program	Favourite track selection, remote control with volume, headphones etc	BB	58
Philips CD880 £500	Very Good Very Good	The '880 is an impressive blend of luxury build quality and features at a far from extravagant price, and also delivers the subjective goods.	Volume remote, FTS, menu display etc.	R	60
Pioneer PD-91 £800	Excellent Excellent	Close to state of the art in nearly all areas – soundstaging, clarity and simple lack of artificiality. A well made and sophisticated player	Track entry remote, calendar display, index search, etc	R	61
Revox 8226 £756	Good+ Good	The traditional Revox house style is combined with the fine Philips 16 bit chip set, but this player doesn't really offer sound quality to match the price	Infra-red remote control, full search, scan, programming		51/Coll
Rotel RCD820BX2 £300	Good Very Good	Start with a good base and then make it sound better, the '820BX2 CD player maintains the reputation established by its namesakes, and comfortably deserves Recommendation	Direct track entry remote etc.	R	58
SAE D102 £700	Good Good	Considering the high price of this player, most of the innards seem fairly prosaic. Sound quality and lab performance are both respectable enough, but hardly justify the price premium involved, though styling is unusual	Remote (inc volume), skip, scan etc		58
Sanyo CP17 £200	Average— Poor	A no-frills mid-sized package, this was not up to the usual Sanyo sonic or technical standards but it was well built	Skip, search, repeat, 16-track memory programmable		53
Sanyo CP27 £220	Fair Fair	System remote apart, the CP27 offers no improvement over the cheaper CP17, and neither of these systems-oriented players really are the subjective musical	LCD display, skip, scan, programming		58
Sharp DX-R700H £225	Average— Poor	A workmanlike player that does not offer exemplary lab or sound quality but which is well-built with good facilities and should perform well in use	Remote control, track selection keypad, skip, scan repeat programming		53
Shure Ultra D6000 £495	Average+ Fair	Ergonomically well thought out with full function remote control, but not really scoring sonically considering its price	Remote control (full function inc volume)		51
Sonographe SD1 (by CJ) £799	Good Very Good	Distinctive with oak end-cheeks, using Philips based 14 bit x 4 oversampling, Conrad Johnson electronics make this a musically rewarding player	Full search programme and timing	R	51/Coll
Sony CDP-M35 £170	Fair Fair	There is no disguising the lightweight plastic construction of this player, but the technical performance, sound quality, aesthetics and ergonomics all deliver more than one has the right to expect for £170	Skip, scan, programming etc	R	58

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CD PLAYERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Sony CDP-M55 £190	Fair Fair	£20 buys a remote control handset to operate your M35. Sony call it an M55 (see CDP-M35 review).	Simple remote, skip, scan, programming etc.	R	58
Sony CDP-M75 £230	Good Good	This midi version of the 750 saves £20 on the price (see CDP-750 review)	Track entry remote, menu display ect.	BB	58
Sony CDP-310 £250	Average + + Fair	Fine build, facilities and healthy enough sound quality – recommended, but look around the range.	Remote control (+ usual)		51
Sony CDP-750 £250	Good Good	A seductive blend of fine presentation and solid performance, all at a very realistic price that should ensure its success.	Track entry remote, menu display etc.		58
Sony CDP-222ES £449	Good Fair	Exceptional build quality and presentation plus respectably good sound quality but some of its kin were preferred.	Remote control, 20 digit keypad, track access, programming.		51
Sony CDP-337ES0 £550	Good Very Good +	Well built, high grade player with excellent if undemonstrative sound. Excellent resolution, dynamics and bass weight, though arguably not control.	Random access remote, calendar display, FTS, memory.	R	61
Sony CDP-333ES0 £600	Excellent Excellent	Sony's new 333 represents a triumph for their development department, effectively bringing down the entry level price to 'high end' compact disc replay.	Track entry remote, menu display etc.	R	58
Sony CDP 555es £1000	Very Good Very Good	Extravagant build quality, sophisticated features and near state-of-the-art performance, it competes effectively with more expensive models.	Remote control, 20 digit keypad, track access, programming.	R	51
Tandberg 3015A £1250	Good Fair	Very classy presentation is not enough to compensate for subjectively and objectively faring no better than standard and modified Philips packages that cost a fraction of its price.	Simple remote, skip, scan, programming etc.		58
Teac PD135 £180	Fair Fair	Particularly easy to use, this lags a little behind the pack when it comes to sound quality, but it still represents a valid alternative for those who find the presentation attractive.	Skip, scan, programming, repeat.		58
Technics SL-XP5 £250	Average – Poor	A contender for the "World's smallest" title, this beautifully crafted miniature falls short in terms of sound quality.	Headphones, "high cut" filter, skip, search.		51
Technics SL-P770 £350	Excellent Good	Sophisticated, high resolution player, but inconsistent with level with some coarseness and compression during loud passages.	Remote, 18 bit, rotary cue wheel, comprehensive display.	R	61
Technics SL-P990 £450	Excellent Good	An obvious technical tour de force, with ample engineering and build quality to justify the price, but some subjective reservations nonetheless.	Track entry remote, menu display, search dial etc.		58
Technics SL-P1200 £800	Good + + Good	Looking more like a desk workstation than a stackable component, this will appeal to the creative recordist and semi pro user. Sounded pretty good.	Headphones, remote control, search dial cueing, etc.		51

TUNERS

The radio medium operates at a much lower profile than TV, but in areas outside pop music the BBC service is the envy of the world. Live Prom concerts can rival all other sources from a hi-fi perspective. Only the FM (VHF) bands give stereo hi-fi sound, though AM (MW & LW) are useful for receiving certain transmissions in the UK.

Something of a hi-fi afterthought, tuners are

often selected merely to match a chosen amplifier cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is usually well spent.

Tuners come in two basic types. Analogue models tune gradually (and usually manually) across the bands, and can have analogue or digital displays; they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
A&R Arcam Alpha £149	Good Average + +	Attractively classic British analogue tuner with sound quality comfortably better than most.	FM/AM Analogue	BB	50
A&R Arcam Delta £270	Very Good Very Good	Hi-fi sound on FM, good on AM, a dependable British all-rounder.	6AM, 6FM presets, FM/MW, LW display manual tune.	BB	55
Creek CAS3140 £150	Very Good Very Good	A true front-rank tuner, excellent ergonomics and audiophile sound quality albeit with the minor handicap of having FM only.	FM only	BB	50
Denon TU 450L £130	Average + Average +	Poor AM sound quality may be a deterrent but the FM performance fully merits recommendation.	FM/AM Digital	R	50
Harman Kardon TU920 £299	Good Average	Rather weak sound quality for the price despite good lab test results.	16 presets, AM/FM, digital auto scan, active tracking.		55
Harman Kardon Citation 23 £559	Good Very Good	Fine performance, interesting features and ease of use are this tuner's forte, and the sound quality is top notch.	FM/AM seek/manual adjustment muting, 16 presets remote control.	R	60
Hitachi FT-M0 5500 £200	Excellent Good + +	A powerful, good sounding tuner with versatile facilities.	16 presets, FM, AM, MW auto scan digital, signal meter.	BB	55
Hitachi FT5500 II £200	Very Good Good +	Soundwise highly rated on FM, and on AM basically satisfactory – a versatile all-rounder.	Auto and manual tuning, 16 presets.	R	44
Marantz ST35L £125	Good + Average –	It works well enough but the sound could be better for the money.	16 presets, AM/FM, digital auto scan, active tracking.		55
Meridian 204 £495	Good + Good	Pleasant sounding with a fine finish but does not make the grade at this price.	FM only, auto scan, digital, remote, clock timer.		55
Musical Fidelity T1 £300	Good + Very Good	Top class FM stereo sound on good signal strengths from this audiophile model. Watch out for local CBI.	FM only, analogue box dial, manual tune, signal meter.	R	55
NAD 4020B £139	Good Average +	Not the quietest or most sensitive tuner tested, it still provided good sound for the money, being "musical and ambient".	Analogue FM/AM	BB	50
Naim NAT 01 £1098	Very Good Very Good	There may be better sounding tuners in the world, but we have yet to hear one.	No presets. Two box, flywheel tuning FM only, Analogue.	R	50
Nakamichi ST-7E £750	Good + + Good +	Exceptionally good for weak-signal areas, and good all round.	16 AM/FM presets, Schottz enhanced sensitivity, auto time digital.		55
Nikko NT-540 £154	Good Average	Lab report was promising but the sound was rather dated.	8 presets, AM/FM, digital auto scan.		55
Onix B.W.O.1 £520	Good + + Good	Unexceptional sound despite the costly power supply option.	FM only, manual digital, variable bandwidth.		55
Pioneer F551L £100	Good + Good +	High value budget tuner, very little to argue about (includes long wave).	12 FM, 12 AM presets, auto scan, digital and signal strength meter.	BB	55
Pioneer F91 £350	Excellent Good + +	Easy to use, this model has excellent RF performance and scored very high ratings on the listening tests.	FM/AM 24 presets.	R	60
Quad FM4 £289	Very Good Good +	Fine sound, excellent ease of use, good build and finish and a more than satisfactory technical performance.	7 presets. Digital.	R	50
Revox B260 £918	Excellent Very Good	Sophisticated and expensive, the B260 is ideally suited to the rest of the Revox range and should also work well in other systems.	FM – virtually everything.	R	60
Rotel RT-830AL £110	Good + Good	Fine sounding budget audiophile material, no frills, no fuss.	Manual dial analogue, FM, MW, LW.	BB	55

THE DIRECTORY

TUNERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Rotel RT-850AL £160	Good + Good +	Scoring well on listening tests and one of the best sounding tuners at its price level, it was a bit let down on AM but RF performance was good	FM/AM, digital	BB	50
Sansui TU-D99XL £249	Very Good Good +	This slimline compact model gave good FM sound quality and strong RF performance. But the AM sounded unpleasant	FM/AM, 16 presets	R	50
Sony ST 500ES £200	Good + + Average -	Disappointing sound quality but good lab performance. (Includes long wave)	10 AM/FM presets, auto scan digital		55
Sony ST-S 700ES £299	Very Good Very Good	First class in every respect including FM sound quality. Even AM was well above average	FM/AM, 10 presets, digital scan	BB	60
Yamaha TX-L400 £130	Good + + Good +	Good FM sound, let down by poor AM but otherwise good value	16 presets, auto scan, digital, FM, MW, LW	BB	55
Yamaha TX-500 £150	Average + Average	Under a gaudy coat, this sensitive tuner gave reasonable stereo results. However, the AM had again been thrown down a well	20 presets (10 buttons) digital		50

CD MIDI SYSTEMS

So you want a hi-fi, but you don't want to make a fuss about it. A pre-packaged system with everything matching up and no aggravation may not rank with carefully chosen separates on **sound quality**, but there's no denying the attractiveness or popularity of this approach – the market for pre-packaged component hi-fi systems is at least as big as that for separate items, even ignoring the vast numbers of low-cost single unit stacker systems.

The arrival of compact disc led to a new fashion for shelf-standing compact systems, or 'midis' as

they are known in the trade, as a replacement for earlier floor-standing rack systems (themselves the upmarket development from music centres). Only some 330mm wide, midis can more or less match full-size (430mm) rack components for performance, and are certainly cheaper to make, ship, sell and buy.

Whereas specialist hi-fi is moving steadily towards ultra-simple 'no frills' components, midi systems tend to be sold on a feature count at a price point, usually with little opportunity for

demonstration and comparison. Our test programme includes extensive auditioning and lab testing, while making allowance for the different aspirations of designers and expectations of users. Key features valued highly by customers include system remote control, automatic switching, double 'dubbing' cassette decks, and elaborate equaliser tone controls. And the top end of the market is developing with surround sound audio/video-ready packages.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa V1500DX £999	Good Good	Remarkable features level even includes independent record feeds to each cassette. High class build, satisfying sound, but best without loudspeakers	Separates system, twin auto-reverse cassette, full remote, timer	R	54
Binatone Laser CD System 2000 £270	Bad Bad	A bit of a disaster even at the price. Built to extremely low standard with an appalling turntable. CD and loudspeakers OK, but let down by amp	Twin cassette		Systems
Ferguson HF03 £400	Average + Good	An all round success with British built speakers and all sources achieving a reasonable standard. Compact disc was weak compared to other units	Twin cassette	BB	Systems
Fidelity MS202 £340	Bad Bad -	Very cheap and poorly finished. Thin, raw sound to match appearance and build	Twin cassette, one-piece system		54
Fisher Midi System M46CD £500	Average Average	Somewhat overpriced, the M46 is let down by a poor amplifier and worse speakers. Other elements perform reasonably, CD being its strongest point	Twin transport		Systems
Fisher Midi System M56CD £580	Average Average	Fitted with a pretty good amp, but dire loudspeakers, otherwise a competent combination including a pretty fair cassette deck	Twin cassette, 5-band graphic equaliser		Systems
Goodmans 5200 £459	Average + Average +	Offering possibly the best speakers around in this midi system market, the Goodmans wins on a fair standard for the price, though the turntable was not too hot	12 Band Graphic Eq, Twin deck	BB	Systems
Goodmans Maxim-Midi System £520	Average Average +	De-luxe version of 5200 system – very good value for money and readily upgradeable. Sonics rough but OK and speakers good, CD crude	All separates with twin cassette	R	54
Marantz MX673CD System £900	Average + Average	Tremendously flexible audio/visual system. Sound quality is satisfactory at best and ergonomics a mess	Various A/V inputs, remote, speakers optional	R	54
Sanyo W40CO £380	Average Average	Low cost, no options package with attractive displays, cassette had high wow and flutter, but the rest worked OK	Semi auto T/T, auto record start, twin cassette	R	54
Sharp SA-CD800H £700	Average Average -	A superficially high grade, high spec system, the SA-CD800H actually sounds clean but a little 'synthetic'	One-piece, 6-disc CD, no T/T		54
Sony Compact 510 £599	Average + Average +	Very good control layout. Shabby loudspeakers not up to otherwise uniformly good system	Remote, twin cassette	R	54
Sony Compact 610 £700	Average Average -	Inconsistent. Same turntable used in much cheaper Sonys gave 'iffy' record reproduction. Cassette likewise	Remote, 'shuffle' play CD, twin cassette		54
Sony FH1215CD £800	Average Average +	Probably the ultimate miniature system. The CD player is particularly good. Best to chuck the speakers away though	Miniature, transportable (AC only) Single auto-reverse cassette	R	54
Sony Compact 710 £999	Good Good	Typically well built and presented but complicated to use except via remote. Record deck poor but remainder good, including speakers	Full remote, auto T/T, twin auto reverse cassette	R	54
Sony Compact Series 90 £1500	Good Good +	The best of a not too wonderful bunch, the excellent compact disc player and pretty good speakers make for reasonable sound quality, though the tuner wasn't of quite the same standard	Twin deck, auto reverse, timer, extra tape socket	BB	Systems
Toshiba V17CD £399	Average Average +	Loudspeakers are the weak link, with cassette and turntable also indifferent. Tuner and CD worked well though, so reasonable value for money	Twin cassette, semi-auto T/T	R	54

HEADPHONES

There are a variety of different approaches to headphone design, and examples of each turn up in this group. Amongst the more expensive esoteric models, electrostatic drivers are used in square open-backed phones such as the Jeklin and Stax models. The majority of these come with some form of transformer which takes the signal initially from the speaker terminals on the amplifier. The actual speaker cables then travel from this unit via a

bypass switch to the loudspeakers.

The more down to earth models feature dynamic drivers in circular open-backed designs. The advantage of open backs seems to be a correspondingly open sound and a less claustrophobic feel to the music. One can also of course hear external noises and irritate people on public transport.

The third category are closed-back designs,

which are useful in situations where it is necessary to block out background noise.

Another means of distinguishing different types is the way they sit on your head or ears. There are three styles: circumaural models enclose the ear and rest on the side of the head, supra-aural designs press on the outer ear (pinna), and intra-aural types rest inside the ear and are popular amongst users of personal stereos.

NAME PRICE	SOUND COMFORT	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
Aiwa HP-X8 £49	Good Very Good	Very slick Walkman oriented phones which are tonally well balanced and go loud without becoming painful	Supra-aural, closed-back, dynamic	R	This

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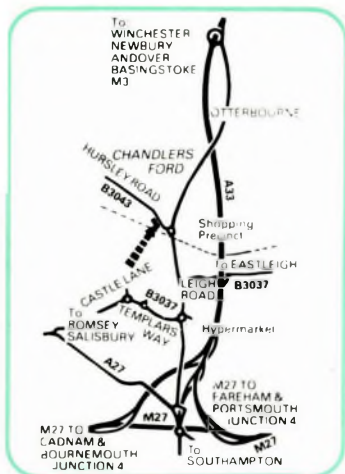
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THE DIRECTORY

HEADPHONES

NAME PRICE	SOUND COMFORT	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
Aiwa HPEX-200 £90	Good Good	Modern looking and well finished the Excelsias, as they are dubbed, had meaty bass and sounded reasonably open for the type	Circumaural, closed-back, dynamic		This
AKG K135 £35	Fair Poor	Despite a very appealing design the K135s don't live up to the usual AKG standards, though they do have the ability to reproduce rhythm well	Supra-aural, semi-open, dynamic		This
AKG K240 Monitor £60	Good Very Good	Something of a classic these AKGs are very user friendly in all respects, sonically on the warm side of neutral	Circumaural, semi-open, dynamic	R	This
AKG K280 Parabolic £110	Very Good Good	A very revealing and unusual twin driver design that uses the same principle as a satellite dish to beam sound into the ear	Circumaural, open-backed, dynamic	R	This
Audio Technica ATH 909 £55	Average Average	Quite impressive in the treble though a bit bass shy, the 909s worked well at highish levels	Circumaural, semi-open, dynamic		55
Audio Technica ATH 910 £65	Good Average	The closed-back 910s are an improvement on the 909s with a nice rhythmic quality rarely found with headphones	Circumaural, closed-back, dynamic	R	55
Audio Technica ATH-911 £75	Very Good Very Good	Nicely finished dynamic headphones with all the trimmings, plus a very clean and subtle sound	Circumaural, open-backed, dynamic	R	This
Beyer DT 325 £30	Fair Very Good	Lightweight in more ways than one, the 325s may be a little bright for some systems and tastes but will suit duller sources	Supra-aural, open-back, dynamic	R	This
Beyer DT330 Mk II £45	Poor Good	Not the most revealing 'phones encountered, the 330s were nevertheless enjoyable and rarely offended	Circumaural, semi-open, dynamic		55
Beyer DT550 £69	Good Good	On their own the 550s sound articulate with a slightly 'gritty' treble and 'keen' midrange, not suitable for headbangers!	Circumaural, semi-open, dynamic		55
Beyer OT880 £90	Good Good	Well made cans with a warmish sound but fairly solid midrange, though they're not that informative for the price	Circumaural, semi-open, dynamic		This
Beyer OT990 £119	Very Good Very Good	The 990s are definitely a significant pair of dynamic headphones, they have a smooth and yet revealing, neutral sound that is hard to criticise	Circumaural, open-back, dynamic	R	55
Jecklin Float Model One £79	Very Good Good	Whilst very unusual in appearance the Floats give remarkable sound quality and openness at a reasonable price	Circumaural-ish, open-back, dynamic	BB	55
Jecklin Float Model Two £99	Very Good Good	Helmet shaped and pretty unflattering but open sounding and comfortable in the long term. Note lack of adjustment means should before	Circumaural-ish, open-backed, dynamic	R	This
Jecklin Float Electrostatic £399	Excellent Good	One version of the state-of-the-art, these electrostatics have an openness of sound rarely found in the breed, with good dynamic range to boot	Circumaural-ish, open-back, electrostatic	R	55
Koss K/6X Plus £30	Poor Fair	'Sixties-style 'phones from the good ole US of A, their sonic style is unique and can make a system sound quite different	Supra-aural, closed-backed, dynamic		This
Quart Phone 30 £40	Fair Good	Whilst not as seductive as their PMB25 predecessor the 30s are reasonably neutral and do improve on some of the competition - though not stunning	Circumaural, semi-open, dynamic		This
Quart PMB 25II £40	Good Good	Despite a somewhat unconventional suspension system the 25s put in a convincing and enjoyable performance with warm yet lively balance	Circumaural, open-back, dynamic	BB	55
Quart Phone 70 £70	Good Good	Competent performers that were hard to criticise but lacked the life and sparkle of which some of the competition are capable	Circumaural, closed-back, dynamic		This
Quart PMB 65 £70	Good Good	Quite revealing and neutral albeit with the usual closed back sound, this competes well with more established models	Circumaural, closed-back, dynamic	R	55
Quart PMB 85 £90	Very Good Fair	These more expensive Quarts bear a striking resemblance to the Jecklin Float models and use two drivers per ear. Sound is a bit bass heavy but not bad overall!	Circumaural, open-backed, dynamic		This
Ross RE-2760 £35	Fair Poor	Stylish white cans from the only British firm in the business. Unfortunately sound quality is not to in this price range	Supra-aural, closed-back, dynamic		This
Sennheiser HD30 £13.50	Poor Good	Built specifically for the personal stereo market these small and light Sennheisers have a slightly synthetic sound, but are an upgrade on the average Walkphones	Supra-aural, semi-open back, dynamic		55
Sennheiser HD450 £27	Fair Good	Modern, simple and lightweight phones that are remarkably robust and which turned in a relaxed if weighty performance that was at worst pleasant	Supra-aural, semi-open, dynamic	R	This
Sennheiser HD480 £37	Fair Good	Using the same shell as the 450s, the 480s were a little softened and unrevealing by comparison with their competitors	Supra-aural, semi-open, dynamic		This
Sennheiser HD420SL £47	Good Good	The 420s gave a full and tangible quality to instruments and voices, whilst not the most revealing headphones around they would suit slightly brash sources	Supra-aural, open-back, dynamic		55
Sennheiser HD540 Ref Gold £160	Very Good Good	The 540 Golds prove that dynamic headphones can be subtle, informative and capable of creating a remarkable sense of space	Circumaural, open-back, dynamic	R	55
Sony MOR V3 £30	Good Fair	Portable stereo oriented phones that are very nicely made and combine clarity with a pleasant lack of distortion	Supra-aural, closed-back, dynamic	BB	This
Sony MOR V6 £70	Good Very Good	A lot more civilised and dynamic than the V4s, these were pretty good for their type and fold up to boot	Circumaural, closed-back, dynamic	R	55
Sony MOR V7 £70	Very Good Very Good	Classy sounding cans that are very slick and work well with all types of music, setting the standard in their price range	Circumaural, closed-back, dynamic	R	This
Stax SR34 £140	Very Good Fair	The least expensive Stax headphones around, the SR34s are lively and rhythmic with good tight bass and a sweet midrange	Supra-aural, open-back, electret		55
Stax SR84 £210	Very Good Very Good	The stepping stone between dynamics and full electrostatics, these electret phones are revealing, open and highly enjoyable	Supra-aural, open-backed, electret	R	This
Stax Gamma pro/SRO-X pro £296/£230	Excellent Very Good	The Gamma pros are like a stethoscope for your hi-fi, revealing subtleties that many loudspeakers fail to resolve	Circumaural, open-backed, electrostatic	R	This
Stax SR Gamma £299 (inc. SRO-6 Adaptor at £100)	Very Good Very Good	The next model down the Stax range from the Lambda, the Gamma is an excellent headphone with little to criticise but the price	Circumaural, open-back, electrostatic	R	55
Stax SR Lambda Pro £545 (inc. SRO-7SB Mk 2 Adaptor at £185)	Excellent Very Good	A bit of an industry reference the Pros are frighteningly revealing, bringing across more information than loudspeakers costing twice as much	Circumaural, open-back, electrostatic	R	55

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THE DIRECTORY

PERSONAL STEREO

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than CDs and LPs combined and as such should not be ignored. Since the introduction of the Sony *Walkman* in the early eighties, more and more people have adopted these diminutive machines and consequently the market has become saturated with a vast assortment of players. This is obviously good for competitive pricing but bewildering if one is trying to select a reasonable machine. Prices start incredibly low (around £10) and wind themselves up

to close on £300, although the sub-£50 sector is the most popular.

There seems to be almost no end to the features that appear on personals; some of them have specifications like a midi system! Graphic equalisers are very popular, for what they're worth, and Dolby is fairly common on the £40 plus models, though the quality of noise reduction systems seems to be pretty poor. You can expect more useful features such as autoreverse and ferric/chrome-metal tape type compatibility on many machines and

some even record, but usually only from a microphone or built in radio where it exists.

The sound quality available tends, not surprisingly, to increase with the price of the machines but even quite expensive players are prone to wow with critical material, so if classical piano music is your bag then steer clear of the cheaper (sub £50) players.

Note that our value judgements relate to the personals group as a whole, and are not comparable with separate hi-fi ratings.

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa HS-G35 MkII £30	Poor Fair	A reasonable player for the price but not well suited to classical material and let down by the headphones	Autoreverse, graphic EQ, types I & II		56
Aiwa HS-J36 £89	Good— Average	Comprehensive facilities and reasonable sound are no mean feat for the price.	Dolby, autoreverse, types I, II & IV, AM/FM, recorder	R	56
Aiwa HS-PX101 £149	Average— Good	A very slick little number with soft touch controls and remote control headphones	Dolby B, C, autoreverse, types I, II & IV	R	56
Ferguson 3T46 £35	Very Poor Poor	Not particularly subtle but having reasonable speed constancy, it's OK with most material but can get painful	Autoreverse, AM/FM		56
Philips D6658 £30	Very Poor Poor	The low price limits sound quality, and this is not a spectacular machine, but it does a reasonable nonetheless	Graphic EQ, AM/FM		56
Saisho PS90R £40	Poor Poor	A bit of a jumble of features and gadgets, the PS90R has on-board speakers, an extending aerial and even records, but sound quality is dubious	Graphic EQ, types I, II & IV, AM/FM, recorder		56
Sanyo MGR-77 £35	Very Poor Very Poor	Rather a basic machine with a raw edgy sound, not helped by poor speed stability	Graphic EQ, AM/FM		56
Sanyo MGR-87 £50	Very Poor Fair	The 87 came up with a slightly fast but rhythmic sound. Although lacking in finesse, it worked OK with pop material.	Autoreverse, graphic EQ, AM/FM		56
Sanyo MGP 600D £50	Average+ Average—	With styling aimed at the fairer sex the 600D sounded a little better than the similarly priced MGR-87. Lacking in clarity, it was still quite endurable.	Dolby, autoreverse, graphic EQ, types I, II & IV		56
Sanyo JJ-P4 £100	Poor Good	Claimed by its makers to be the world's smallest personal stereo the JJ-P4 is a tasty looking object that's capable of good sounds to boot.	Dolby, autoreverse, tape types I, II & IV, rechargeable		56
Sony WM-34 £40	Poor Average	This straightforward no frills Walkman makes pretty plausible sounds at a reasonable price and apart from the Walkman Pro was the only model to earn a Best Buy rating.	Dolby, types I, II & IV	BB	56
Sony WM-F63 £100	Average— Average—	This attractive Sports Walkman is nicely built but sonically flawed by rather hissy intra-aural headphones	Dolby, autoreverse, types I, II & IV		56
Sony Walkman Pro £249-£289	Good+ Excellent	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, it takes other personals to the cleaners (except on weight and power consumption).	Dolby B, C, types I, II & IV, record, line in/out, varispeed	BB	52/56
Toshiba KT-4027 £35	Very Poor Very Poor	Not a very wonderful machine, the 4027 sounded pretty appalling with all but the most unsubtle music.	Graphic EQ, AM/FM		56
Toshiba KT-4047 £60	Average Average	This model proved capable of making the most of better recordings, and sounds reasonably tuneful.	Dolby, autoreverse, graphic EQ, types I, & II, AM/FM	R	56

CD PORTABLES

CD Portables or Yuppie Blasters as we classified them are basically portable stereos gone digital, i.e. a compact disc player is included alongside the usual AM/FM radio and single or double cassette deck. Compact disc is a novelty that seems to add a fairly hefty premium onto the price of the standard ghetto blaster, but the improved sound quality over standard cassettes may justify this for some. In virtually every case a CD output socket is

fitted which means that it's possible to play silver discs through a domestic amplifier and loudspeakers, thus they are some sort of substitute for standalone mains machines (as are the personal CD players). One drawback with having a CD player on board is that batteries are gobbled up even quicker than usual, up to ten batteries being required in some cases. Neither are the units particularly light, the heaviest weighing eight kilos!

However they do all run off the mains too, and come with an appropriate lead for this purpose. Other useful features common to most are spare input sockets to record from an external line source such as a preamplified vinyl disc signal, and microphone sockets for recording live events (although the usual lack of record level adjustment is a nuisance).

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ferguson RCD02 £300	Poor	A large, slightly tinny midi system-esque unit with removable speakers and a slightly brash sounding CD player	Twin cassette, graphic equaliser, spare input (DIN)		53
Fisher PH-D473F £300	Average	The Fisher is quite a neat and compact player which is nice to use but doesn't offer particularly great sound quality	Autoreverse, AFC		53
Hitachi CX-W800 £300	Average+	This meaty Hitachi lives up to Blaster expectations, its super woofer bass speaker giving maximum street credibility	Twin cassette, graphic equaliser, phono input	R	53
Memorex CD-3300 £280	Average	A little bit tacky, the Memorex put in a plausible if unenthalling performance, and will work with external speakers	Spare input		53
Panasonic RX-FD80L £300	Average—	Shiny in a glitzy way, this Panasonic features a reasonable cassette deck but a below par CD player with tiny transport controls	Autoreverse, spare input		53
Sharp WQ-CD15 £250	Good	A reasonably compact machine with a quite impressive CD player and a novel twin cassette mechanism	Twin cassette, graphic equaliser, spare input	R	53
Sony CFD-66L £350	Good	A very attractive player in the true yuppie mould of white plastic with silver details, it even sounds OK	Spare input, shuffle play, AMS (tape search system)	R	53
Toshiba RT-7096 £250	Poor	Quite a large box for the money, the Toshiba isn't too special when it comes to sound quality but does have pally wooden detachable speakers	Twin cassette, graphic equaliser, spare input		53

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THE DIRECTORY

STANDS AND SUPPORTS

It's becoming more and more apparent that all the components in a hi-fi system benefit from being placed on the right kind of support. It is already acknowledged that performance of electro-mechanical transducers, such as turntables and loudspeakers, can be greatly improved by using highly rigid supports. This notion has been expanded to include electronics such as amplifiers and compact disc players, and inevitably a broad range of stands and supports have been produced to cater for this requirement.

With loudspeaker stands there seems to be two

broad schools of design. The most common is the open frame type which uses square section steel tubing (usually less than an inch square) made up to form a tripod or quadroped stand usually fitted with spikes top and bottom to ensure good coupling to both floor and cabinet. However, for reasons of domestic harmony this latter option is often not pursued as eagerly as perhaps it should be. The alternative approach is to use mass. Larger section (approximately 3 inch x 2 inch) tubing is welded between square top and bottom plates and filled with sand and/or lead shot. Again, this type uses

spikes at the base but Blu-tack or the like for coupling with the speaker cabinet.

Equipment supports generally place isolation quite high on the list of priorities and usually use a lightweight steel frame to support an MDF platform. Once again spikes are used to minimise contact with the platform and ensure good coupling to the floor. Minimising weight without compromising rigidity seems to be the aim with turntable supports but those designed for electronics often employ some form of damping to kill vibration, sometimes in the form of mass.

LOUDSPEAKER STANDS

MODEL PRICE	TYPE FINISH	COMMENTS	TOP PLATE SIZE HEIGHT	VALUE	BACK ISSUE FULL REVIEW
Appolo A820 £40	4 leg Fair	A light open-framed budget design slightly lacking in rigidity and subjectively superceded by other stands costing £10 more.	19 x 19cm 53cm		58
Appolo A10 £47.25	4 leg Fair	A robust and lightweight model, it would make an ideal upgrade for those still happy with the big boxes of old.	19 x 19cm 44cm	R	58
Foundation Fred £65	2 leg Average	With sand filling the Freds made speakers sound tight and coherent with a more even balance.	19 x 19cm 36/43/59cm		58
Foundation Maggi £159	Pair Very Good	Made for Magneplanar and other similar panel speakers they seem to have a healthy effect on the sound quality thereof.	50 x 2cm 2cm	R	58
Foundation Pi £250	2 leg Very Good	Overpriced in material terms the Pi nevertheless has a very positive effect on the low frequency performance of conventional speakers.	20 x 20cm 25/38/46/53cm	R	58
Heybrook Point 5 £50	3 leg Very Good	An unusual triangulated open frame stand that can help certain speakers sound more transparent and fluent - a good value stand.	23 x 21.5cm 47cm	BB	58
Heybrook HBS1 £75	4 leg Very Good	With its new aluminium base frame the HBS1 fared very well in the listening tests. It allowed much of the speakers own 'sound' to remain intact.	23 x 21cm 47cm	R	58
Linn Kan II £74	4 leg Very Good	Built to support Linn's Kan speaker this stand is well suited to the task, but is less successful with other loudspeakers.	19 x 16cm 59cm		58
Linn Sara £80	4 leg Very Good	The Sara exhibits some odd properties so its use other than with the Sara loudspeaker should be viewed with caution.	25 x 21cm 53cm		58
Monotrak Engineering M1 £58	1 leg Good	The M1 gave the mid and treble a commendably smooth and detailed presentation but bass sounded rather lacklustre and muddy.	19 x 18.5cm 48cm		58
Monotrak Engineering M4 £58	4 leg Very Good	Begging comparison with Heybrook's HBS1 the M4 maintained much of the openness and forthright detail of that model.	23 x 21.5cm 53cm	R	58
Monotrak Engineering M4S £58	4 leg Very Good	Its stature and stability would seem to mark it out as most suitable for smaller, lighter cabinets. The M4S possessed an open midband and clear treble.	20 x 17.5cm 53cm		58
Mordaunt-Short IS1 II £45	3 leg Good	Suited to low mass speakers, preferably using spikes to effect coupling, they sounded slightly jazzed but the overall sound was quite unclouded.	18 x 15cm 56cm	R	58
Origin Live £117	3 leg Good	An unusual tripod stand devoid of top plate and taking up more floor space than normal, subjective and technical performance was exemplary.	(support area) 22 x 17.5cm 52cm	R	58
Partington PP4 £50	1 leg Good	The PP4 offers a rather mixed performance, though when damped with sand infill it was less ready to embellish the overall sound and low frequencies became tauter and quicker.	18 x 16.5cm 48cm		58
Partington Dreadnought II £120 (filled)	1 leg Very Good	Ideal for systems on the light/bright side of neutral, the Dreadnought IIs nevertheless still need some careful re-examination by Partington.	17.5 x 16.5cm 63cm		58
QED TS22 Tristand £50	3 leg Very Good	Most tracks sounded uplifted or buoyant, never thick nor coloured. It worked well with most of the speakers tried and encouraged a fluid and revealing midband.	19 x 17cm 45/50/58cm	BB	58
RATA Torlyte £190	2 panel Excellent	Suited to low mass speakers, these unusual stands are hardly discreet but offer transparent and clean sound - much like the Torlyte table!	25 x 21cm 48cm	R	58
Target HS20 £53	1 leg Excellent	This monopod stand can be used either filled or unfilled and encourages different characteristics in the sound accordingly.	19 x 16.5cm 53cm		58
Target HJ15/3 £83	3 leg Very Good	Sound quality was basically very good though without the sand infill some loudspeakers may sound a little unbalanced as both bass and treble regions are subjectively exaggerated.	28 x 28cm 40cm	R	58

EQUIPMENT SUPPORTS

MODEL PRICE	TYPE FINISH	COMMENTS	SIZE (H x W x D)	VALUE	BACK ISSUE FULL REVIEW
Appolo CT2 £38	Shelf Fair	A sturdy 18 x 37mm rectangular section frame with four adjustable spikes supports a dual coloured board.	20 x 45.5 x 38cm		57
Appolo AT1 £50	Table Fair	This two-layer table didn't quite make the grade on sonic grounds and build quality could be improved.	46.3 x 45.5 x 38cm		57
Audioquest Sorbothane Feet £10 each	Feet Good	These large gumdrops are very useful for damping vibrations in amplifiers and especially CD players.	6.5 x 2.5cm (circular)	R	57
Cornflake TCS5 £50	Table Very Good	A little too close to the ground for comfort, perhaps, but this novel and stylish little table is certainly worth seeking out.	29 x 43 x 33cm	R	57
Cornflake TCS6 £50	Shelf Good	A squat and rigid frame supports a Medite top board with four adjustable spikes, better suited to suspended sub-chassis turntables.	43 x 23 x 33cm		57
Deltec Isolation Base £135	Platform Good	Designed for all CD players, amplifiers and separates, but not suspended sub-chassis turntables, the isolation is second to none.	50.5 x 40cm	R	57
RATA Model A £125	Table Very Good	A three-legged Torlyte turntable support that has become something of an industry reference.	46 x 46.5 x 38.5cm	R	57
RATA Amplat £40.25	Platform Very Good	A lightweight and rigid Torlyte slat with spikes for floor or shelf mounting, it works well in conjunction with the Target T12.	4 x 44.5 x 35cm		57
Sound Organisation Table £55	Table Very Good	A deceptively simple structure that just happens to be engineered in a thoughtful, and ultimately successful manner.	37 x 45 x 35cm	BB	57
Sound Organisation Wall Stand £40	Shelf Very Good	The first of its ilk and still amongst the best, this simple framework represents a vast improvement over standard furniture shelves.	27.5 x 43 x 35cm	BB	57
Target TT1 £46.50	Shelf Excellent	This rigidly braced shelf offers both good sound quality and material value for money.	26 x 46.5 x 35.5cm	BB	57

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THE DIRECTORY

EQUIPMENT SUPPORTS

MODEL PRICE	TYPE FINISH	COMMENTS	SIZE (H x W x D)	VALUE	BACK ISSUE FULL REVIEW
Target TT2 £47.50	Table Very Good	Standing up to the best in most areas, the TT2's only real foible concerns a slight loss of bass 'slam'.	52 x 46.5 x 35.5cm	BB	57
Townshend Suspension Base £145	Platform Fair	Designed to complement the Rock turntable, this platform will bring subjective improvement to a wide range of electronics.	43 x 36cm	R	57

CABLES AND CONNECTIONS

Although cables and connections are sometimes thought to be the least important items in an audio system there has been a growing awareness in recent years that they have a significant effect on sound quality. To this end there is now a vast array of exotic cables and interconnects available to those interested in experimentation. The key observation on cables is that they are much more than mere accessories. Carrying the audio signal, just as an amplifier does, it's really not too surprising that they can influence the quality of that

signal. The characteristics of any cable are determined by the materials and topologies utilised in its construction. The purity of the conductor, nature of the insulator dielectric, mechanical construction, physical geometry, RF characteristics, efficiency of screening and finally the connectors themselves, all play vital roles in the sonic character. These factors tend to vary more with interconnect cables which are used to carry the signal between active components like pre and power amplifiers. The

interconnects summarised here were tested in 1m terminated lengths and therefore the results and prices relate to that length – some cables may well perform differently when used in longer lengths.

The features column contains information on the material make-up of the different cables with the following abbreviations: OFC – oxygen free copper, OFHC – oxygen free high conductivity (Audiocote define the HC as high crystal), PC-OCC – pure copper by ohno continuous casting, LC-OFC – linear crystal oxygen free copper.

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Apature LSD N/A in UK	Poor Fair	Faint resonant boom was audible at very low frequencies, but otherwise this cable sounded remarkably neutral.	Silver plated copper, PTFE dielectric		59
Audioquest Reference 2 £29	Good Fair	Ultimately Reference 2 simply damped much of the atmosphere and emotional charge of a musical performance.	OF copper		59
Audioquest Livewire Topaz £29	Good Fair	Sounding 'bigger' and faintly richer than Reference 2, Topaz was also slightly grainy at the top end.	Gold-plated plugs, OFHC copper		59
Audioquest Livewire Ruby £45	Fair Good	Smoother sounding than the Topaz, the extended crystal Ruby is less grainy and coarse, better able to resolve complex passages.	FCL copper twin axial	R	59
Audioquest Livewire Quartz £65	Good Good	Quartz has an ideal, neutral balance that embodies sparkling clarity without the drawbacks of harshness or compression.	3 piece plugs, PTFE dielectric	R	59
Audio Technica AT6115 £50	Very Good Fair	This cable sounds somewhat 'quieter' than the original LC-OFC interconnect, but is also less transparent and three dimensional.	PC-OCC copper coaxial		59
Audionote Copper ANC £35	Fair Good	ANC sounded punchy with a faintly lean but tightly-focused bass character. This crystalline precision waned slightly at higher frequencies.	OFHC copper twin-axial	R	59
Audionote Flexible Silver ANS £85	Fair Good	ANS scored a hit with its transparent midband and revealing but quite unforced treble quality. Bass transients were slightly softened.	Silver signal & Copper screen	R	59
Audionote Silver ANV £140	Poor Fair	Fair weightier-sounding than the flexible ANS, ANV interconnect also possesses a fair degree of treble clarity and sparkle.	21 strand silver Litz		59
Aural Symphonics N/A in UK	Poor Good	This cable enjoyed an open and transparent midband and sounded remarkably neutral and faithful to the source.	OF copper PTFE dielectric	R	59
Budget Patch Cords see text	Fair Poor	As thrown in gratis with cassette decks and the like – frequency extremes were restricted and performances were veiled.	Thin coaxial		59
Budget OFC circa £7	Fair Fair	Subjectively, this cable did lift much of the aural fog experienced with scrawny standard hook-up leads.	OFC		59
Deltac Slink £32	Good Very Good	Ideally used in lengths of under 4 metres, it errs on the lean side of neutral but has an uncommon transparency in the midrange.	4 silver plated OFC strands PTFE dielectric	BB	59
Deltac Black Slink £152	Excellent Excellent	Inherently neutral the cable faithfully reproduced broad and deep stereo soundstages with precise focus and a sense of tactility.	8 silver plated OFC strands PTFE dielectric	R	59
Denon LC-OFC N/A separately	Very Good Fair	Supplied with Denon's dearer CD players this cable introduced a peculiar 'twangy' coloration at high frequencies, and a slightly soft bass.	LC-OFC, non-magnetic gold plated plugs		59
DNM Solid-core £15-£25	Fair Good	Transparent in the midband and full of sparkling detail in the treble, low bass was slightly curtailed (unterminated price £4.60 m.)	Single strand nickel-plated copper. Unshielded	R	59
Kimber Kable PSB £32	Very Good Very Good	An exceedingly transparent midband but slightly 'clanky' treble. It always managed to sound remarkably uncluttered and open.	OFC, PTFE dielectric	BB	59
Kimber Kable KC-1 £47	Very Good Fair	Tonally faintly leaner and brighter than the more open-weave PSB, KC-1's treble detail was just too sharp and grainy.	Multi-gauge PTFE dielectric		59
Kimber Kable KC-AG £375	Good Very Good	Treble detail resolution was perceived in a slightly abrupt if wholly controlled fashion. Depth re-creation and lateral separation were excellent.	Multi-gauge silver, PTFE dielectric	R	59
MDM Interconnect £14.95	Good Fair	The subjective performance of MDM did appear a little imprecise at the frequency extremes, but a worthwhile upgrade on budget interconnect.	Coaxial, solid core, gold plated plugs		59
MIT PC-Squared £75	Fair Good	This multi-gauge cable produced a very open and buoyant midband but sounded slightly 'peculiar' at frequency extremes.	OFC, multi-gauge	R	59
MIT Spectral MI330 £193	Poor Fair	MI330 displays a marvellously open and enticing midband quality, bass is warm and rich but this character has a tendency to dominate.	Multi-gauge balanced bandwidth		59
Monitor PC 0100381 £17	Good Fair	There is more than a hint of instrumental muddling and bass is slightly soft, however, the slightly 'shut-in' sound is par for the course at the price.	OFC, coaxial	R	59
Monster Interlink 400 £30	Good Good	Bass is solid and punchy, counterpointed by a slightly overblown midband which tends to make vocalists sound larger-than-life.	Multi-gauge	R	59
Monster Interlink CD £44	Fair Fair	Low frequency is commendably weighty, but the top-end sounds vague and lacking in image focus. Suited to some systems better than others.	Multi-gauge		59
Monster Interlink Reference £88	Good Fair	Protracted listening indicated a lack of dynamic speed – a subjective sluggishness. It may prove well suited to up-front systems.	Multi-gauge Balanced bandwidth Gold plated plugs		59
Myst Tm £15.60	Fair Good	Fairly neutral with a pleasantly open and transparent midband. Some deep bass detail is lost but treble is sharply focused.	Solid-silver PTFE dielectric	BB	59
Origin Live Soli-Core Super £60	Good Fair	Improves over previous Soli-core samples in stereo depth and bass weight, but a 'loud' treble presentation remains.	Solid-core gold-plated AT plugs		59
QED Incon P1-Gold £14.95	Good Good	A lively open presentation that just borders on the lean side of neutral, the quick and lucid delivery affording considerable musical insight.	OFHC, gold plated Deltron plugs	BB	59
QED Incon Graphite GPI Gold £18.95	Fair Fair	A shielded version of Incon P1, it sounded thicker at the frequency extremes, the top end being coarser and more out of focus. Good for long runs though.	OFHC Graphite shielding	R	59
Sony RK-C31DES £40	Excellent Good	Possessing deep firm bass and a sparkling top end it offers a balanced perspective with negligible coloration.	Coaxial LC-OFC	R	59

THE DIRECTORY

INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Sterling £250	Fair Good	Possessing a neutral if faintly rich overall balance it supplies a pleasantly open and transparent perspective. (Reviewed in pre-production form.)	2 silver strands per conductor		59
Thorens SAC 100 £50	Good Fair	Performance is undermined by a slightly coarse and splashy treble, not necessarily bright, simply rather confused – and fine detail lacks resolution.	Silver-plated OFC, coaxial		59
Van den Hul MC-D300II £59	Poor Good	It tended to highlight some upper mid detail, but a generally open and spacious acoustic proved its saving grace. Slightly soft at LF.	Silver plated single strand Vdh plugs	R	59
Van den Hul MC-1021II £69	Good Good	Possessing the same endearing qualities as the D300 it presented open and transparent soundstages and improved timbral resolution.	Twin axial silver plated copper	R	59
Van den Hul MC-D502 £77	Fair Fair	The tonal balance was 'tilted' by a strong and authoritative bass line, which had the knock-on effect of muting treble detail. A bit dear.	Twin axial silver plated copper, teflon dielectric		59
Van den Hul Thunderline £147	Good Fair	Thunderline essentially parallels the sonic performance of the cheaper D102. HF is occasionally tainted a 'lizzy' coarseness, bass is tight and	Silver plated 'matched copper'		59
Van den Hul MC-Gold £247	Fair Good	It possesses a rich and beguiling treble balance that matches a weighty, slightly warm bass character. Seductive balance may prove worthwhile in some circumstances.	Silver & gold plated copper		59
Van den Hul MC-Silver £747	Good Good	Although remarkably transparent for an asymmetric design this costly cable was not considered to be of 'state-of-the-art' standard, and is bettered by cheaper models.	19 silver plated copper strands		59
Vecteur 8045 £49	Very Good Good	Sounding solid and forthright it might seem slightly cold in some systems but the treble 'edge' is mercifully clean. Very low frequencies were a little lacking in 'slam'.	LC-OFc signal & screen	R	59

IN-CAR ENTERTAINMENT

In-car entertainment is an area not usually associated with the esoteric world of domestic hi-fi. However, it represents a source of musical entertainment that many of us are exposed to every day. The majority of new cars are fitted with some form of radio before they leave the showroom and in many cases this usually very basic player is taken for granted and accepted as representative of in-car audio standards.

For the price of a budget amplifier there is a wide variety of in-car machines to choose from, some of

them offering practically every gadget or feature under the sun. The majority of sub-£300 players are integrated units featuring a cassette player, AM/FM tuner and amplifier, all in one remarkably compact standard sized box. At this price level the cassette players tend to be fairly basic affairs, although autoreverse and noise reduction systems are both fairly common. Tuners are usually of the digital variety with varying degrees of sophistication in signal tuning and presetting, with some machines featuring as many as 18 FM presets. The emphasis

is on the frequency modulated band and AM often suffers as a consequence, but fortunately for radio enthusiasts there are some exceptions.

The amplifier is usually designed to drive two pairs of speakers mounted fore and aft of the vehicle, and a fader is fitted to adjust the balance between the two. The dearer machines feature separate bass and treble controls which can be quite handy given the unusual acoustic of the car environment and the variety in balance and presentation to be had from car speakers.


MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Alpine 7282L £250	Good Very Good	A very attractive and seductive sounding player. The matt surfaced transparent preset keys are especially sexy.	Bass/treble controls, 12 FM, 6 AM presets, chrome eq., clock, 8W	R	61
Aiwa CT-23500YL £199	Fair Fair	A nicely designed machine with a flip up lid for disguise purposes. Sound quality from cassette is a bit poor but the radio is exemplary especially on AM.	Bass/Treble controls, 6 FM, 12 AM presets, Dolby, chrome, 8.4W	R	62
Blaupunkt Paris SQM 48 £253	Average Average	A powerful and sensibly designed player but let down by a very dull sounding cassette. The radio is a bit better.	Bass/treble controls, 5 FM, 10 AM presets, uni-directional, 11.5W		62
Blaupunkt Windsor SQR 38 £275	Good Average	Not very enthralling sonically, the Windsor is rather low powered but does have a reasonably stable tape transport.	5 FM, 10 AM presets, 3.1W		62
Clarion 916HP £160	Good Average	With its rubbery buttons and touches of white this is a modest looking player let down by a weak cassette.	Bass/treble controls, 5 FM, 5 AM presets, 9W		61
Clarion 946HP £250	Very Good Very Good	A good FM side let down slightly by AM performance. This Clarion is particularly nice to use with its nifty SAM tuning system.	Bass/treble controls, 12 FM/6 AM presets, Slot-in, 15.1W	R	61
Goodmans GCE229 £150	Fair Average	If knobs, switches and legends are your bag then the GCE229 is the one for you – a lot of gizmos for the price and it even sounds OK.	Bass/treble controls, 6 FM/6 AM presets, Chrome eq., clock, MSS, 10.1W	BB	61
Hitachi CSK-402E £250	Good Good	An attractively designed little player that for once doesn't disappoint when it comes to playing music, and it even has a security system.	Bass/treble controls, 6 FM, 12 AM presets, Dolby, chrome eq., music search, 7.4W	R	62
JVC RX-318 £200	Average Average	This JVC sounded quite enjoyable and turned in an impressive performance on FM. It even looks quite nice.	Bass/treble controls, 5 FM, 10 AM presets, slot-in, 8.8W	R	62
JVC RX-418 £250	Average Fair	An attractively designed machine with a fair selection of features – even an aux socket for a portable CD player.	Bass/treble controls, 10 FM, 10 AM presets, Dolby, chrome eq., slot-in, aux socket, 7.7W		62
Nakamichi TD-400E/PA-300 II £450/£275	Very Good Excellent	If you want your in-car entertainment to compete on sound quality grounds with your domestic system, this combo offers a very strong challenge.	Bass/treble controls, 5 FM, 10 AM presets, uni-directional, chrome eq., Dolby B, C, 75W	R	62
Panasonic CQ-497 £117	Fair Poor	The CQ-497 has a traditional style analogue tuning system making it easy to use. AM reception was good but the other sources are less encouraging.	Bass/treble controls, chrome, NR, 7W		62
Philips 553 £120	Average Average	Not the most ergonomic player on test but sound quality was quite refined for the price. Presets are a bit gauche.	4 FM, 4 AM presets uni-directional cassette, 3.1W		61
Philips DC680 £180	Average Good	A colourful and musically competent player that despite a gammy volume knob is well worth checking out.	8 FM, 4 AM presets 3.5W	R	61
Pioneer KE-3030 £150	Poor Fair	A tasty looking, if sonically bass heavy, little box well suited to blasting out rock or dub.	18 FM, 6 AM presets 4.2W		61
Pioneer KEH-5080B £230	Fair Good	A chunky and neatly styled player with healthy power output and an easy relaxed sound. Just the thing for pumping up the volume.	Bass/treble controls, 18 FM, 6 AM presets, anti-theft device, slot-in, 9W	R	61
Sansui RX-3100L £180	Poor Fair	Quite flash looking with a reasonable feature count but FM sound and cassette replay quality could be a bit stronger at the price.	Bass/treble controls, 12 FM, 12 AM presets, chrome eq., 8W		61
Sansui RX-5100L £250	Good Very Good	One of the cleaner machines around the 5100 has an excellent AM section and a reasonable cassette player.	Bass/treble controls, 12 FM, 6 AM presets, chrome eq., slot-in, 12.5W	R	61
Sharp RG-F816E £200	Poor Average	Nothing if not novel the 816, with its unusual anti-theft system is custom built for the furry dice brigade, but is sonically a bit lacklustre.	Four band graphic, 8 FM, 16 AM presets, ASP, Dolby, MSS, 10.9W		62
Sharp RG-F882E £220	Average Average	Again a glitzy full feature machine with a flip out control panel and plenty of lights. However, sound quality is a bit disappointing.	Seven band graphic, 5 FM, 10 AM presets, ASP, chrome eq., Dolby, 8.5W		62

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 25

SELECTED DEALER DIRECTORY

Choosing a good hi-fi dealer is the most vital step in acquiring the system that is right for you. This unique directory gives full information on dealers in your area.

AVON

ABSOLUTE SOUND AND VIDEO, 65 Park St, Clifton, Bristol. (0272) 264975. A&R, Denon, Dual, Linn, Mission, NAD, Quad, Roksan, Rotel, Yamaha, etc. (closed Weds). BADA MEMBER 


PAUL GREEN HI-FI LTD, Kensington Showrooms, London Rd, Bath (0225) 316197. A&R, Creek, Dual, Heybrook, Linn, Musical Fidelity, Rotel, Systemdek, Wharfedale. Dem facilities available, ring for appointment, car park. Open Tues-Sat, 9-5.30. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa. BADA MEMBER 

RICHER SOUNDS, 20 Cotham Hill, Bristol BS6 6LF. (0272) 734397. City-centre budget hi-fi discounts; most popular 'majors' from A to Z and all points in between; monthly 'specials'. Facilities: expert advice; free 48 page Hi-Fi Guide and monthly Newsletters; mail order; part exchange. Open Mon-Fri 10-6, Sats 10-5. Credit cards: Access, Visa, Richer ChargeCard.


BEDFORDSHIRE

ASHTON AUDIO, 6 High Street, Dunstable. (0582) 608003. AR, Akai, Ariston, Cambridge Audio, Denon, Dual, Incatech, JVC, Linn, Monster, NAD, Nakamichi, Proton, Quad, Rotel, Sony, Trio Kenwood. Instant credit up to £1,000. Credit cards: Access, Amex, Diners, Visa. Service department. Open 9-5.30. Open to 6p.m. Friday. No early closing.

BERKSHIRE

READING HI-FI CENTRE, 4-6 Harris Arcade, Friar St. Reading. (0734) 585463. 'The best equipment, advice and service from Berkshire's premier Hi-Fi emporium'. BADA MEMBER 

BUCKINGHAMSHIRE


AUDIO INSIGHT LTD, 53 Wolverton Rd, Stony Stratford, Milton Keynes. (0908) 561551. A&R, Audiolab, Heybrook, KEF, Linn, Mission Cyrus, Musical Fidelity, Nakamichi, Nytech, Rotel. Dem facilities available. Open Tues-Sat. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa. Service dept. BADA MEMBER 


AYLESBURY HI FIDELITY, 98 Cambridge St, Aylesbury. (0296) 28790. Dual, Heybrook, Linn arms, Musical Fidelity, Mission, NAD, Nakamichi, Quad, Rotel, ITL. 2 Dem rooms available, ring for appointment. Open 10-6 Mon-Fri, 9.30-5.30 Sat. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Amex, Diner, Visa. Service dept.

CAMBRIDGESHIRE


CAMBRIDGE HI FI, 1 Hawthorn Way, Cambridge. (0223) 67773. AR, Mission Cyrus, Monitor Audio, Panasonic, Pioneer, Sony ES, Technics, Thorens, Kenwood. Demonstration facilities. No appointment required. Open 9.30-5.30 Mon-Sat. Free installation. Credit facilities. Credit cards: Access, Barclaycard. Service dept. available. STEVE BOXSHALL AUDIO, 41 Victoria Rd, Cambridge. (0223) 68305. Quad, Rotel, Dual, Denon, Krell, Nakamichi, Marantz, Monitor Audio, Tannoy. Demonstration facilities. No appointment required. Open 10.00-6.00, Mon-Sat. Home trial facilities, free installation, credit facilities. Credit up to £3,000. Credit cards: Access, Barclaycard, Service dept.


CHESHIRE


ASTON AUDIO, 4 West St., Alderley Edge. (0625) 582704. Wide selection of equipment in N.W. Two-year guarantee. Dem facilities: 3 dem rooms, appointment required. Open 10-6 Tues-Sat. Home trial facilities, free installation. Instant credit up to £1,000. Credit cards: Access, Amex, Diners, Visa. Service dept. BADA MEMBER 

DOUG BRADY HI-FI, Kingsway Studios, Kingsway North, Warrington. (Padgate 0925) 828009. 1986 Sony/Hi-Fi News Best Dealer in N.W. England and Wales. 'Largest choice of specialist Hi-Fi in N.W. £100-£20K'. All credit cards. 3 Dem Rooms. Dem facilities. BADA MEMBER 

NEW DAWN HI-FI, 1-3 Castle St, Lower Bridge St, Chester. (0244) 24179. Linn, Quad, Technics, National Panasonic, Denon, Rotel, Dual, Meridian, Aiwa, Philips. Dem facilities: 2 dem rooms. Open 9.00-5.30 Mon-Sat,

closed Wed. Free installation, instant credit. Credit cards: Access, Visa, Trustcard. BADA MEMBER 

SWIFT OF WILMSLOW, 4-8 St Annes Parade, Wilmslow. (0625) 526213. A&R, Aiwa, Denon, Dual, Marantz, Mission, Monitor-Audio, Pioneer, Trio, Yamaha, NAD. Dem facilities available. Open Mon-Sat 9.15-5.45. Closed 1-2 Lunch. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa. Service dept. BADA MEMBER 

RICHER SOUNDS, 4 Wellington St, Stockport SK1 3RN. (061) 480 1700. Cheerfully small store by BR station with virtually all major 'budget' names; many on special offer. Facilities: expert advice; free 48 page Hi-Fi Guide and monthly Newsletters; part exchange. Open Mon-Fri 10-6, Sats 10-5. Credit cards: Access, Visa, Richer ChargeCard. Mail Order for all Richer Sounds stores from this branch. CHRIS EROOKS HI-FI, 29 Gaskell St, Stockton Heath, Warrington. 0925 61212/3. Open Tues-Sat 10-6pm. 2 dem rooms. Credit facilities. All credit cards. Total absence of hall... BADA MEMBER 

CORNWALL

N.C.E. HI-FI, The Bridge, Boscastle, N. Cornwall (08405) 248. Ariston, Arcam, Creek, Denon, Dual, Gale, Heybrook, Incatech, ITL, JPW, Manticore Mantra, Marantz, Michell (Gyrodec & Synchro), Proac, QED, Rogers, Tannoy. Most cartridges. Dem room. Full credit facilities including interest free. Access, Visa. Evening dems a pleasure (by appointment).


TRURO HI-FI & E.T.S. Ltd, 25 King St, Truro (0872) 79809. A&R, Denon, Dual, Heybrook, Linn, Mission Cyrus, Nad, Quad, Rotel, Thorens. Dem facilities: Single speaker studio. Open Mon-Sat 9.45-5.30. Home trial facilities, credit up to £1,000. Credit cards: Access, ETS Visa. Service dept.

DERBYSHIRE

ACTIVE AUDIO, 12 Osmaston Rd, The Spot, Derby. (0332) 380385. Meridian, Mission, Denon, Yamaha, Rotel, A&R Cambridge, Monitor Audio, Trio, Marantz. Demonstration facilities. Open 9.30-6.00 - early closing Wednesday. Home facilities: credit up to £1,000. Credit cards: Access, Barclaycard, Diners, American Express. Service dept.

ESSEX

A.T. LAES, 442/4 Cranbrook Rd, Gants Hill, Ilford (01) 518 0915. Open Mon-Sat, 10-6. Two single speaker dem rooms. Credit cards: Access, Amex, Visa.


EADA MEMBER 


RAYLEIGH HI-FI, 44a High Street, Rayleigh, Essex. (0268) 779762/747571. 216 Moulsham St, On the Parkway, Chelmsford, Essex. (0245) 265242. A&R, Audiolab, Beyer, BLQ, Cyrus, Celestion, Denon, DNM, Epos, Gale. Access and Visa. 3 years parts and labour guarantee on hi-fi systems.

ERENTWOOD MUSIC & HI-FI CENTRE, 2 Ingrave Rd, Brentwood (0277) 221210. Alphason, B&W, Cambridge Audio, Denon, Harmon Kardon, Marantz, QED, Quad, Yamaha. Dem facilities available. Open Mon-Sat 9.30-5.30 (Thurs from 10am, Sat from 9am). Home trial facilities, free installation, credit facilities. Credit cards: Access, Visa. Hi-Fi Markets. Service dept.

LYON AUDIO, 16 Peartree Business Centre, Peartree Road, Stanway, Essex CO3 5JN. (0206) 560259. QED, Rogers, Denon, Nad, Rotel, J.A. Michell, Mission, Roksan, Gale Quad, TDL. Dem facilities available. Open Mon-Sat 9am-6pm. Home trial facilities, installation, credit facilities up to £1,000. Credit cards: Access, Visa, Hi-Fi Markets, Eurocheque. Service dept available.

GLOUCESTERSHIRE

ABSOLUTE SOUND AND VIDEO, 40/42 Albion St, Cheltenham. (0242) 583960. A.R. Denon, Dual, Linn, Meridian, Mission, NAD, Rotel, Technics, Yamaha, etc. (Closed Wed). BADA MEMBER 


AUDIO EXCELLENCE, 58 Bristol Road, Gloucester. (0452) 30046. Audio Research, Dual, Krell, Linn, Magneplanar, Naim, NAD, Yamaha and lots more. Closed Mon. EADA MEMBER 

ROBBS OF CHELTENHAM, 3 Clarence St, Cheltenham. (0242) 584404. Sansui pure hi-fi, Kenwood, Sony ES, Dual, Technics, QED, Heybrook. Dem facilities. Open 9.30 Mon-Sat. Instant free credit. Credit cards: Visa,

Access. Service dept.

HAMPSHIRE


ABSOLUTE SOUND AND VIDEO, 4 Feathers Lane, Basingstoke, Hants RG21 1AS. (0256) 24311. A&R, Audiolab, Denon, Dual, Linn, Mission, NAD, Rotel, Technics, Yamaha. Dem facilities. Open: Mon, Tues, Thurs, Fri 9.30-6.00. Sat 9.30-5.30. Closed Wed. Home trial facilities. Free installation. Credit facilities. Credit cards: Access, Barclaycard, Connect, Amex, Diners. Service dept.

HAMPSHIRE AUDIO Ltd, 2-12 Hursley Rd, Chandlers Ford. (0703) 252827/285232. Quality CD and analogue agencies. 5 dem studios. Large free car park. BADA MEMBER 


TRUE-FI SOUND AND VISION, 10/12 Grosvenor Rd, Aldershot. (0252) 26390. Akai, Aiwa, B&W, Nakamichi, Hitachi, JPW, Mission, Mordaunt Short, Nagaoka, Sony, Technics. Dem facilities available. Open 9.30-6.00 Mon-Sat. Free installation, instant credit up to £1,200. Credit cards accepted. Access, Barclaycard. Service dept.

HERTFORDSHIRE

ACOUSTIC ARTS Ltd, 101 St Albans Rd, Watford, Herts. (0923) 45250. A&R, Audiolab, Denon, Magneplanar, Quad, Rogers, Meridian, TDL, Jadis, Krell. Dem facilities. 2 dem studios, ring for appointment. Open Mon-Sat 9.30-5.30. Home trial facilities, free installation. Instant credit up to £1,000. Credit cards: Access, Visa. Service dept.

BADA MEMBER 

THE AUDIO FILE, 40 Hockerill St, Bishops Stortford, Herts. (0279) 506576. Linn, Roksan, Rega, Naim, A&R (Camb), Heybrook, Rotel, Denon, Epos, QED. Demonstration facilities, no appointment required. Open 9.30-5.30 Mon-Sat. Home trial facilities. Free installation, credit facilities up to £1,000. Credit cards: Access, Visa, Diners, Amex. Service dept. available.

BADA MEMBER 

ISLE OF MAN

ISLAND COMPACT DISC CENTRE, Parliament Square, Ramsey. (0624) 815521. Musical Fidelity, Sugden, Celestion, Harman Kardon, Teac, Castle Acoustics, Philips, A&R, JBL, Luxman. Open Mon-Sat 9.00-5.00pm. Dem facilities. Home trial facilities, free installation. Full credit, no limit. Credit cards: Access, Elite. Service dept.

KENT

JOHN MARLEY HI-FI CENTRES, 2 Station Rd West, Canterbury (Canterbury) 69329. Also at Dover - (0304) 207562. B&W, Heybrook, Magnum, M.Y.S.T., Nakamichi, Pink Triangle, Rotel, Sansui, Technics, Quad. Dem facilities available. Open Mon-Sat 9.00-5.30. Closed Thurs. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa, Creditcharge. Service dept.

LANCASHIRE


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


LEICESTERSHIRE

SOUND ADVICE, The Sound Factory, Duke St, Loughborough LE11 1ED. (0509) 218254. A&R, Creek, Linn products, Epos, Mission, Cyrus, Naim, Rega, Roksan, Rotel, Yamaha. Dem facilities, domestic size and furnished studios. Callers welcomed. Demonstrations by appointment. Open 9.30-6.00 Mon-Sat. Free installation. Credit facilities. Credit cards: Access, Visa, Amex. Service dept.

ALPHA AUDIO, 1-3 Guildhall Lane, Leicester, LE1 5FQ. (0533) 518597 or 530330. Open 9.30-5.30 Mon-Sat. Stockists of Aiwa, Adc, Akai, Ariston, Beyer, Bose, Cambridge, Celestion, Denon, Dual, Godmans, Infinity, Harman Kardon, JBL, Jeklyn, Monitor Audio, Musical Fidelity, Rogers, Rotel, Sennheiser, Supra, Teac, Thorens, Van Den Hul and more. Free installation, instant credit up to £1,000. Access, Visa. Demonstration facilities. Comprehensive repair facilities.


LONDON


A.T.LABS, 159 Chase Side, Enfield, Middlesex. (01) 367 3132. Open Mon-Sat 10-6. Two single speaker dem rooms. Export worldwide. Service dept, car park. Amex, Visa, Access. BADA MEMBER 

AUDIO T, 190 West End Lane, London NW6. (01) 794 7848. Open Mon-Sat, 10-6. Two single speaker dem rooms. Access, Amex, Visa. BADA MEMBER 

CORNFLAKE SHOP, 37 Windmill Street (just off Tottenham Court Road), London W1. (01) 631 0472. 10am-7pm, Mon-Sat. Cambridge, DNM, Epos, Koetsu, Naim, PS Audio, Roksan, SME, Van den Hul. Excellent demonstrations, 2 demo rooms, full delivery and installation service. Full credit facilities. Credit cards: Access, Visa.

COVENT GARDEN RECORDS, 84 Charing Cross Road (01) 379 7635/7427. Quad, B&W, Meridian, Mission, Yamaha, Sony, Philips, A&R Cambridge, Nakamichi, Rotel. Dem facilities - no appointment required. Open Mon-Sat 10am-7.30pm. Home trial facilities, free installation - to suit the customer. 7.30am-11.30pm weekdays, 9am-9pm weekends. Credit cards: Access, Visa, American Express, Diners Club. Service dept.

DOUG BRADY HI-FI, 18 Monmouth St, London WC2H 9HB. (01) 379 4010. Wide range of top specialist hi-fi from Britain, America and Japan. Dem facilities. 3 Dem rooms. All credit cards. BADA MEMBER 

GRAHAMS HI-FI, 86-88 Pentonville Rd, London N1. (01) 837 4412. 'FBA Dealer of the year 1985'. Linn, Naim, Rega etc. £300-£3,000-£13,000. BADA MEMBER 

H.L. SMITH & Co Ltd, 287-289 Edgware Rd, London W2 1BE. (01) 723 5891. Aiwa, B&W, Denon, Dual, KEF, Ortofon, Panasonic, Sony, Technics, Yamaha. Dem facilities available. Open Mon-Sat 9.5-3.0, Thurs 9-1, instant credit up to £1,000. Credit cards: Access, Visa, Diners. Service dept.

KJ WEST ONE, 26 New Cavendish St, London W1M 7LH. (01) 486 8262. A&R Cambridge, Audio Lab, B&W, Audio Res - Krell, Rogers, Gale, Musical Fidelity, Linn, Magneplanar, Nakamichi. Dem facilities available - appointment required. Open Mon-Sat 10am-6pm. Limited home trial facilities. System Design & Installation. Credit facilities - Credit cards: Visa, Access. Service dept available. BADA MEMBER


SUBJECTIVE AUDIO LTD, 12 Park Avenue, Palmers Green, London N13 5PF. (01) 882 4975. Air Tangent, Apogee & Alphason, Audio Research, Koetsu, Krell, Magneplanar, Meridian, Nakamichi, Oxford Acoustics, Tanderberg. Dem facilities: 2 single speaker dem rooms, appointment required. 10-6 Tues-Fri, 9-5 Sat. Home trial facilities. System design & installation service. All major credit cards. Service dept.

THE SOUND ORGANISATION Ltd, No. 1, Cathedral St, London Bridge, London SE1 9DE. (01) 403 2255/3088. Counterpoint, Denon, Exposure, Koetsu, Linn, Naim, PS Audio, Roksan, Rega, SME and others. Dem facilities available, ring for appointment. Open Tues-Sat, 10-7. Free installation. Credit cards: Access, Visa. Service dept.


RICHER SOUNDS 2, 6 London Bridge Walk, London SE1. (01) 403 1988. Major names in esoteric hi-fi, unusually matched to discount offers and special end-of-line purchases. Demo facilities, expert advice, free local delivery & installation (£500+), plus 2 Yr G'tee. Hi-fi Guide and monthly Newsletters; part exchange. Open Mon-Fri 10-7, Sats 10-5. Credit cards: Access, Visa, Richer ChargeCard. Service Department on premises.

RICHER SOUNDS, 2 London Bridge Walk, London SE1 2SX. (01) 403 1201/4710. The original bargain hi-fi store, now refitted, 100s of regular and special discounts on most budget/mid price major names. By London Bridge. Facilities: expert advice; free 48 page Hi-fi Guide and monthly Newsletters; mail order; part exchange. Open Mon-Fri 10-7, Sats 10-5. Credit cards: Access, Visa, Richer ChargeCard. Service Department on premises.

MIDDLESEX

UXBRIDGE AUDIO LTD, 278 High St, Uxbridge, Middx UB8 1LZ. (0895) 33474/31993. Music from the best equipment at all price levels. Acoustic Energy, A&R Cambridge, AR, Ariston, Audio Lab, Cambridge Audio, Canton, Creek, Cyrus, Denon, Dual, Epos, Exposure, Heybrook, JPW, KEF, Lynn Products, Manticore, Marantz, Meridian, Michell, Mission, NAD, Naim, Nakamichi, Onix, QED, Quad, Revolver, Rotel, Stax, Tannoy, Wharfedale, Yamaha. Two demonstration rooms, system design and installation, two year guarantee, seven day equipment exchange. 10am-6pm six days a week. BADA MEMBER 

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W.A. BRADY & SON, 401 Smithdown Rd, Liverpool. (051) 733 6859. Largest choice of specialist Hi-Fi in N.W. £100-£20K. All credit cards. 3 dem rooms. BADA MEMBER 

PURE SOUND - Acoustic Energy, ADC, Audio Quest, Beard, DBX, Denon, Deltec, Incatech, ModSquad, Mordaunt-Short, QED, Radford, Sumo, Target, Meridian. (Dem. stock at reduced prices). Home demonstration a pleasure, plus evenings and weekends. (Sundays by appointment). Birkenhead 051-645 6690. Wallasey 051 630 5055. RICHER SOUNDS, 69B Church St, Liverpool LI 1DN.

(051) 708 7484. Virtually every major 'budget' name - small store with big discounts and special offers. Facilities: expert advice; free 48 page Hi-fi Guide and monthly Newsletters; mail order; part exchange. Open Mon-Fri 10-6, Sats 10-5. Credit cards: Access, Visa, Richer ChargeCard.

NORFOLK

SOUND APPROACH, 161 Unitank Road, Norwich. (0603) 622833. Ariston, AR, Claymore, Castle, Elite Rock, Heybrook, Matra, Musical Fidelity, Revolver, Yamaha. Dem facilities. Open 9-6.30 Mon-Sat. Home trial facilities. Free installation. Credit up to £1,500. Credit cards: Visa, Access, Diners Club. Service dept available.

NORTHAMPTONSHIRE

CLASSIC HI-FI + VIDEO, School Lane, Kettering, Northants. (0536) 515766. We are stockists of ADC, Marantz, Onkyo, Sansui, Teac, Harmon Kardon, Pioneer, Proton, Ariston, Thorens, Mantra, Goodmans, Castle, JPL, Mordaunt Short, Seleco TV, Monitor Cable + others.

WEST MIDLANDS


SOUND ADVICE, 162 Alcester Road, Moseley, Birmingham B13 8HS. (021) 449 3328. A&R, Creek, Linn, Epos, Mission, Cyrus, Naim, Rega, Roksan, Rotel, Yamaha. Dem facilities, domestic size and furnished studios. Callers welcomed. Demonstrations by appointment. Open 9.30-6pm Tues-Sat. Free Installation. Credit facilities. Credit cards: Access, Amex, Visa. Service Dept.

BADA MEMBER 

ALTERNATIVE AUDIO Ltd, 93-95 Hobs Moat Rd, Solihull. (021) 742 0254 (sales), 0248 (service). A&R, Audiolab, Denon, KEF, Marantz, Meridian, Mission, M.A., The Source, Philips. Dem facilities available, appointment required. 10-6 Tues-Sat, closed Mon. Home trial facilities, 3 demo rooms, service dept, free installation, instant credit. Credit cards: Access, Visa, Amex.

FIVEWAYS HI-FIDELITY Ltd, 12 Islington Row, Edgbaston, Birmingham. (021) 455 0667. A&R, Denon, Dual, KEF, Meridian, Musical Fidelity, Nakamichi, Philips CD, Quad, Revox, etc. Dem facilities. Single speaker dem room. Open 9.30-6 Tues-Sat. Home trial facilities, free installation, credit facilities. Credit cards: Access, Visa. Service dept.


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