

HI-FI CHOICE

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OCTOBER 1990 £2.95

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Ever wonder why brass instruments sound so non-musical on most coaxial and triaxial car speakers?

It's because, among other reasons, the midrange and tweeter are completely exposed to the woofer's hammering bass energy.

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We get you back to what it's all about. Music.

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

HI-FI CHOICE

ISSUE NUMBER 87: OCTOBER 1990

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Menu

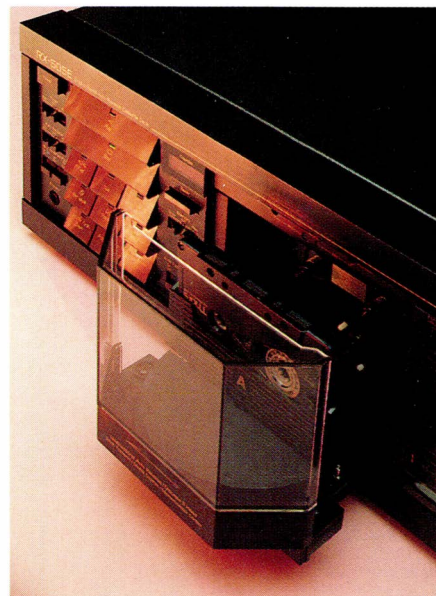
As you will read in *Choosing and Using Cassette Decks* on page 53 this month, we're still waiting to see how Dolby S noise reduction circuitry can improve the performance of compact cassette tapes. Based on Dolby Labs' Spectral Recording system, which is used in many recording studios around the world (those which haven't traded in their master recorders for expensive digital tape recorders), Dolby S promises improvements beyond the Dolby B and C systems in the cassette decks we use in our homes. *Choice* was hoping that the first Dolby S-equipped decks would have arrived in the UK this summer - but as we go to press we're still holding our breath. Hopefully we will have the opportunity to test the effectiveness of this much-touted system when we next test a large batch of cassette decks, in six month's time. Stay tuned!

You'll have noticed already, of course, that this month we have an unusual **free gift** for *Choice* readers. Produced by Design Logic of Birmingham, **CD Xtract** is a novel new idea which improves the design of CD jewel cases. No more grappling with those silver discs - once installed, a light press of the finger is all that's required to 'pop' the disc up from the central locking portion of the case. Further CD Xtract(s?) are available in packs of ten from hi-fi stockists nationwide.

In addition to our cassette deck tests, this month's issue includes reviews on a small group of CD players. We've a further 20-or-so CD players on the laboratory test bench as I write (the listening tests were completed last week), so watch out for our reviews next month. Your November copy of *Hi-Fi Choice* will also include another in our series of free **Choice Cuts** music supplements. We're calling this one *Metal Fatigue!* See whether you agree with our critics who have been set the task of picking the best heavy rock recordings of all time. And you'll love our glossary of 'metal' terms. I've heard of 'thrash' and 'speed' - but what, I ask you, is 'stencore'?

Regular readers will remember our feature explaining how valves work (June issue). The lesson continues next month, looking in more detail at different types of valves. Also, if we can manage it, we hope to bring you up to date with the various types of D-to-A converters used in today's compact disc players. Doubtless you've read all about PDM, PWM and MASH. But are you au fait with PEM and PLM? Read *Hi-Fi Choice* and you will be . . .

John Bamford



Cover photograph
by Chris
Richardson

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With our compliments this month, a free gift from CD Xtract. No more grappling . . .

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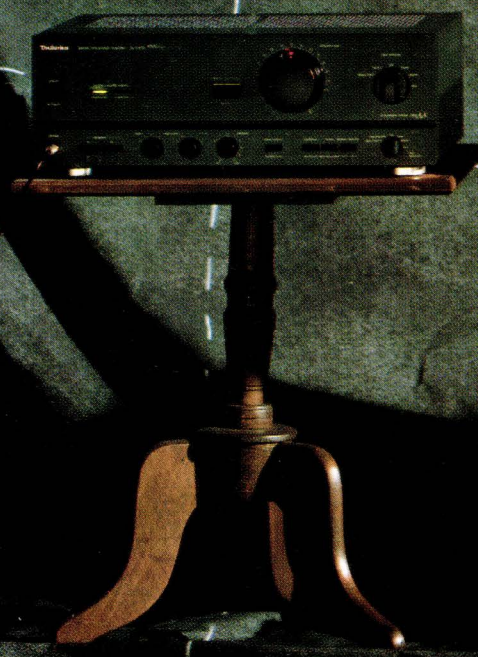
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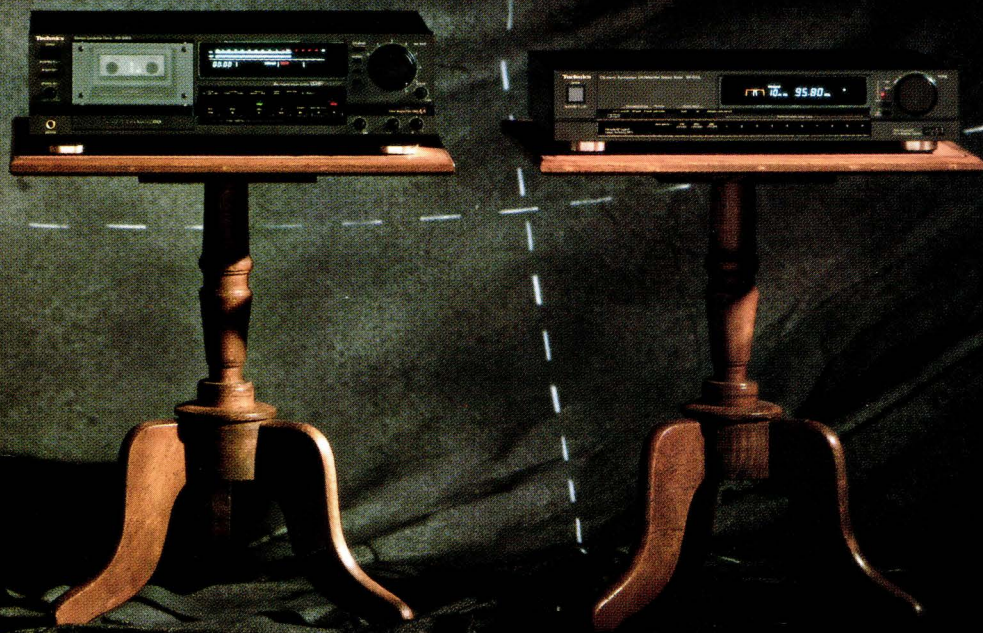
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MADE TO



MEASURE HI-FI. SUIT YOURSELF.



SEPARATES

What we hear is as individual as what we see. While some of us warm to a Pavarotti aria, for others anything but a Led Zeppelin classic will make their blood boil. And each one benefits from a different sort of hi-fi reproduction, so who better to put together your system than you?

Choose a combination from our extensive list of components. Each designed to reproduce perfectly an infinite range of sound, both individually or as part of a high performance system. And all tailor-made for your ears only.

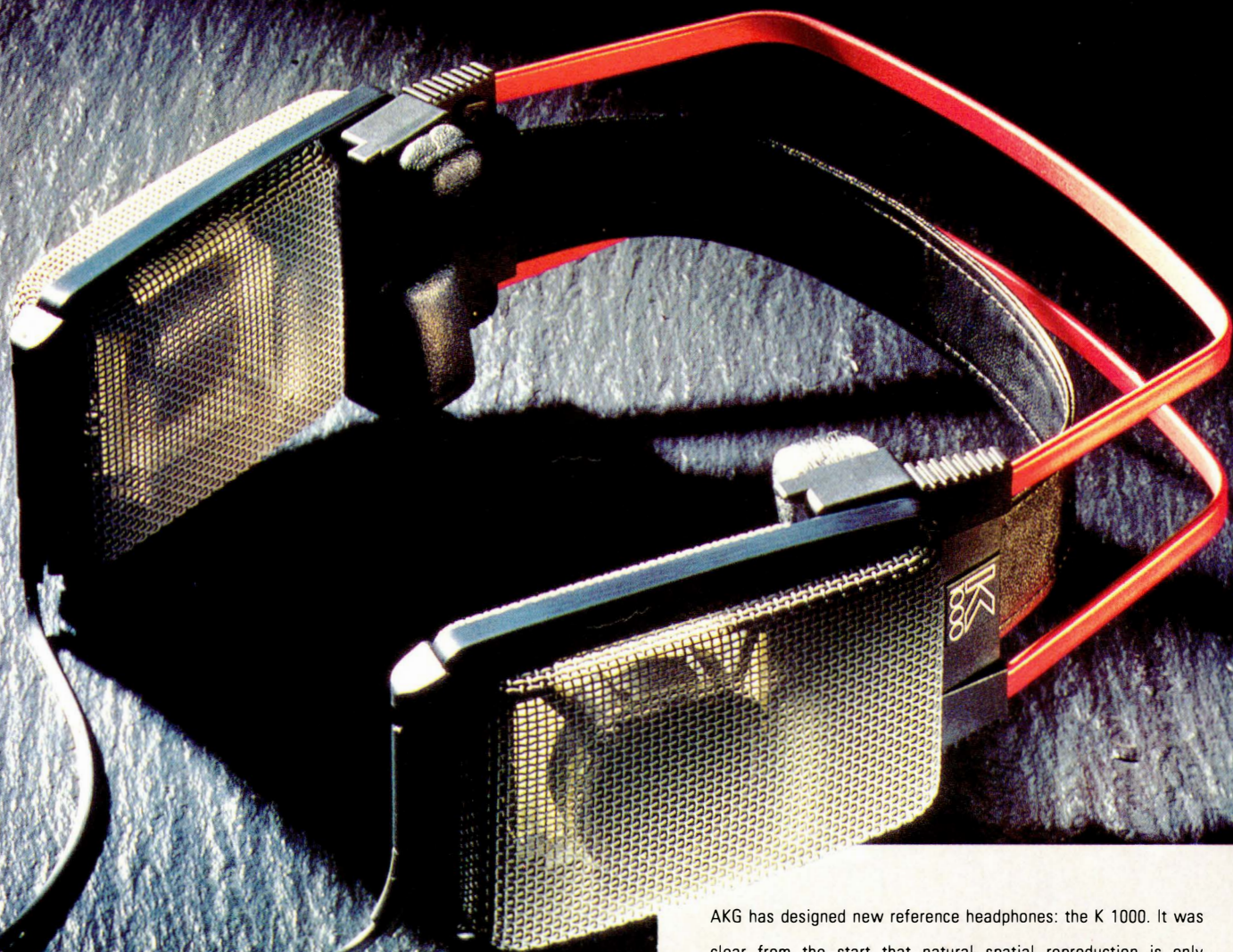
*Separates shown:
SU-V670 Stereo Integrated Amplifier.
ST-G70L Quartz Synthesizer AM/FM Stereo Tuner.
RS-B965 Quartz Direct Drive, Dual-Capstan 3 Head Cassette Deck.
SL-PS70 Programmable Compact Disc Player with MASH.
Contact your nearest Technics dealer as listed in Yellow Pages & Thomsons Directories.*

Technics
For Music Lovers.

AKG

ACOUSTICS

A New Reference: The AKG K 1000



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

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

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



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Update

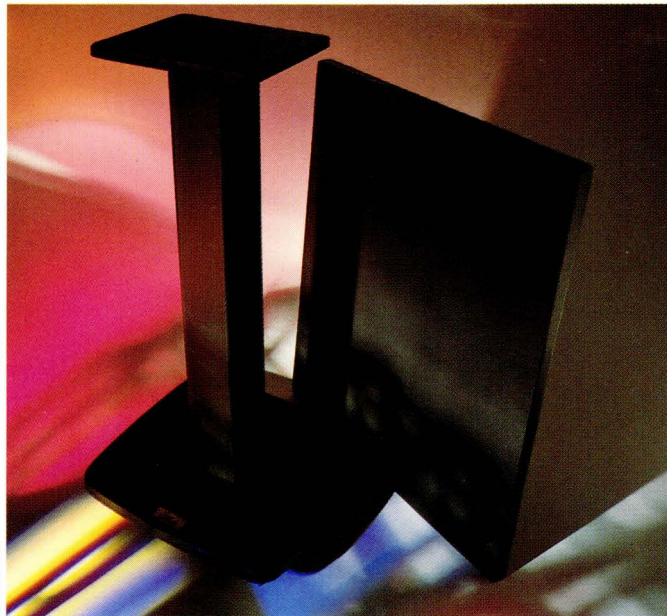


PRODUCTS

Handmade in Japan

That's the claim behind TDK's new flagship cassette tape - a £9-for-90-minutes metal spool of magnetic tape, the MA-XG. A substantial part of the price goes towards labour - each cassette is apparently hand-assembled in three minutes with ten screws holding the five-piece construction rigidly in place. Acoustically dead materials are used. Other features justifying the price are a new tape guide mechanism with better tape travel and stability over the head which results in greater imagery and soundstage (on playback).

The tape itself is also new and the culmination of three years' research. *Finavinx* - a new metal particle formulation, is applied in a dual layer with the upper layer consisting of a low noise top coat, giving



Platforms and stands from Shan: prizewinners announced.

excellent high frequency characteristics, while the lower layer is a high output grade for the low and mid frequency range.

The MA-XG is part of a new range of TDK tapes consisting of three chrome

tapes and two other metal (Type IV) models. Prices for the rest of the range are much more modest.

BUSINESS

Stands to deliver

The winners of our stands and platforms competition, held in July, have been chosen. Ten Shan Acoustics isolation platforms will go to: T. Plumb of Leighton Buzzard, Beds; A. Day of Hayes, Middx; J. Green of Manor Park, London; D. Keane of Ingatestone, Essex; G. Ness, of West Kirby, Wirral; G. Johnson of Chatham, Kent; C. Howlett of Tonypany, Mid-Glamorgan; D. Johnson, of Hitchin, Herts; R. Howat of Haddington, East Lothian and A. Heyes of Towcester, N. Hants.

Shan polymer concrete loudspeaker stands have been won by: P. Kees of Towcester, N. Hants; J. Natrass of Anstey, Leics; J. Tan of Winchester, Hants; M. Littler of Bolton, Lancs; D. Phillips of Saffron Walden, Essex; N. Dastour of Camberwell, London; E. Thorpe of Sutton Coldfield, W Midlands; S. Briggs of Burnley, Lancs; S. Gaynor of Reading, Berks

and R. Beckwith of Dartford, Kent.

Many thanks to all those who took part in the competition.

PRODUCTS

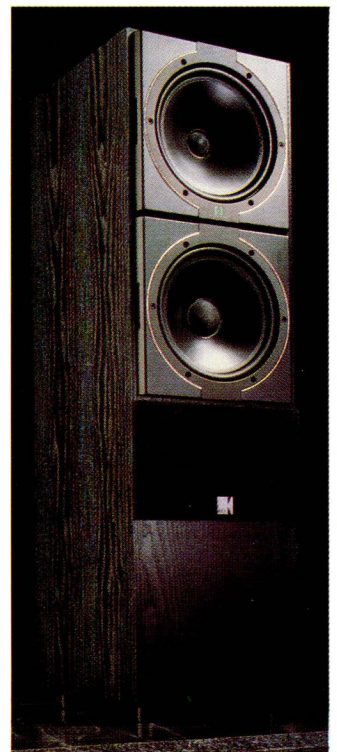
Big, bold and...

Due for launch at Penta, KEF's latest *Uni-Q* loudspeaker - the C85 - should be reaching the shops by early October. The floor standing £549 speaker uses the same cabinet structure as the C95 with an additional reflex-loaded eight-inch bass unit using a separate enclosure ported at the front. It is described as 'big, bold and dynamic'. KEF's *Uni-Q* unit provides mid-bass and high frequencies with its eight-inch driver and one-inch tweeter combined in the one driver to give a point source on the same axis and plane.

Bi-wireable, the speaker promises 90dB sensitivity and is suitable for amplifiers rated 10 - 150 watts (into eight ohms). It is finished in walnut or black ash vinyl.



TDK's new range: MA-XG is the 'hand-made' metal flagship.



KEF's C85, based on C95 but without coupled cavity bass.

BUSINESS

Fabulous five

The five lucky winners of our **Ortofon** moving coil cartridge competition have been chosen. The first prize of the *MC3000/II* - worth £850 - goes to P. T. France of Maidstone in Kent. The *MC2000/II* was won by J. Y. Gall, Hertford, Herts; a *Quasar* by S. Reading of Chesham, Bucks; the *Quattro* by P. Turner, Halifax, Yorks and a *Quartz* to P. Spurway of Kidbrooke, London.

The six answers were as follows: Denmark, Deltec, Michaelson & Austin, Infinity, Sugden and MASH. Our thanks to all those who took part - our bin liner full of entries was testament to a large number of you wanting the best from your LPs.

Life's a . . .

Cambridge Audio, the amplifier and CD player specialist, went into receivership in early August just as it was planning to launch a new range of products at the Penta show. A tired-sounding Malcolm Blockley, managing director of the Hi-Fi Markets distribution group which bought Cambridge out of receivership in early 1989, told *Choice*: "It was in a hell of a state when we bought it and I put all my money into it. It's taken 18 months to

turn it round and it was beginning to look good. But the bank decided not to hang on in there with us even though we're just at the start of the season. I could understand if they pulled out in February but this is ridiculous; I couldn't persuade them to hang on. . . life's a bitch."

Hi-Fi Markets recently ceased trading following the decision by NAD, its biggest client, to set up its own distribution network. Onkyo, another of HFM's brands is also in the process of appointing a new distributor.

Blockley said the receiver was looking for an early settlement on Cambridge. Speaking on August 7, the day after the receiver was called in, he said two firms were already "heavily into negotiations" to buy the brand and there would hopefully be a conclusion by August 15.



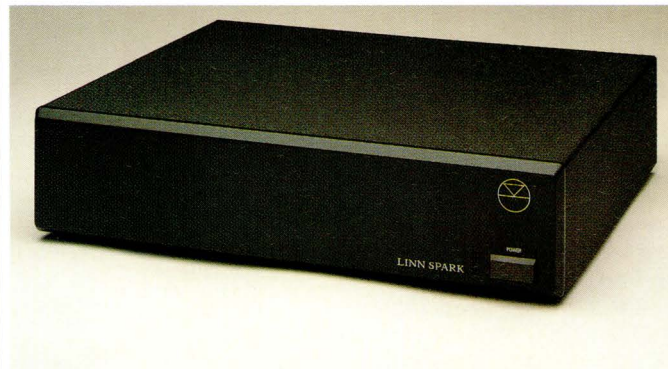
Rose Industries' upgraded RV-23 gains MC phono stage.

No Experience Required

A beginner's course in how to choose high quality audio and visual equipment is being run at the Charles Keene College in Leicester from November 12. The six-part evening course will examine factors affecting quality as well as new developments such as stereo TV. The course fee is £7.90. Details from the college: (0533) 616037.

Spark plug

Glasgow's Linn Products has developed a power supply for its *LK280* power amplifier. The *Spark* power supply upgrades the *LK280* to a dual mono system, using dedicated transformers (for each channel) and mains filters, giving cleaner, controlled and smooth performance characteristics. The *Spark* power supply is now sold with the *LK280* at an all-in price of £1,190 or as an upgrade for existing *LK280* owners for £495.



Linn adds a Spark to its *LK280* power amplifiers.

Roksan's upgrade

Turntable specialist Roksan has formally released its cartridge amplifier which delivers 'line level' signal to the amplifier. The £495 *Artaxerxes* promises minimal harmonic distortion and radio interference, and delivers a claimed signal to noise ratio of -83dB. It is powered by the *XPS2* power supply (fitted to Roksan record decks since November last year). The power supply is retro-fittable to all Roksan *Xerxes* record players making the *Artaxerxes* compatible with older Roksan decks. *Artaxerxes* is small enough to be fitted within the plinth of a *Xerxes* - protruding some 35mm from the rear. It is described as being compatible with a wide range of moving coil cartridges and is 'virtually impossible to overload'.

Artaxerxes completes Roksan designer Touraj Moghaddam's aim to produce a record player rather than just a turntable. It joins the *Shiraz* cartridge, *Artemiz* tonearm and the *Xerxes* itself as Roksan's ultimate front end system for a total price of £2,440.



Did you get the answers right in our Ortofon competition?

PRODUCTS

Rosey future

Rose Industries has upgraded its hybrid preamp. Two years after the Rose was launched, the *MkIII* version of the *RV-23* preamp is aimed at CD users or people with moving magnet cartridges on their record decks at the original price of £395. It is joined by a £435 moving coil (switchable to MM) version which allows users to internally set the load for their particular cartridge. Rose also hinted at the imminent arrival of a power amplifier to complement the *RV-23*. . . Rose Industries, tel: (0235) 510322.

Potty hi-fi

Hi-fi in a pot that might have pleased a Chinese potentate has appeared from a company called Acoustic Arts. A pre and power amplifier combination has been released promising the highest sound quality in a visually stunning design. The Acoustic Arts *Amalthea* (power) and *Alethea* (pre) cost £3150 together. Cylindrical in shape, both amplifiers look exactly the same and will appeal to people who like vases in pairs.

The amps do indeed look like vases, and are finished in glazed ceramic cases decorated with gold cornucopia from the George Wade pottery at Stoke on Trent. Visually they match Pearl and Oakley's *Cerca Victoria* loudspeaker which has continually wowed some design-conscious hi-fi buyers with its unusual and exotic appearance.

Controls, which are kept to a minimum on the pre-amplifier, are on top of the case. While the looks of these amplifiers are aimed at the aspirationally-arrived, internally they boast MOSFET devices to produce over 105 watts RMS, with luxurious touches such as gold-plating on all sockets to produce the price tag's required sound quality.



Acoustic Arts amps and prototype coffee table CD player!

Check 'em out

Technics has launched four cassette decks in its 1990 range which list features and attention to engineering principles belying the advent of inflation. Even the cheapest (£129 *RS-B465*) is a direct drive two motor type with Dolby B, C and HX-Pro, fine bias adjustment and dedicated MX (metal compatible) head, with the eminently useful automatic record mute facility plus a timer.

The most expensive model in the range (£229 *RS-B765*) is a three-head machine incorporating Dolby B, C, HX-Pro and APRS and PSX smoothing circuitry. Using an insulated base and anti-resonant feet, the deck also

has a powered cassette loading system and stabiliser to hold the cassette in place giving improved tape-to-head contact and lower modulation noise.

Bookends?

Loudspeaker manufacturer Celestion's latest bookshelf loudspeaker is the *Celestion 5*. The £149 two-way '5 uses a one-inch titanium dome tweeter and six inch bass driver mounted in a 12 litre sealed box of high density particle board. The baffle edges are chamfered to reduce diffraction. It is available in simulated black ash or 'realistic grain effect' oak veneers. Frequency response at -3dB is quoted as 70Hz to 20kHz and sensitivity at 88dB. It is suitable for amplifiers producing between 10 and 90 watts.

Celestion has tweaked its *SL700* and produced a *Special Edition* model. Outwardly the same, the *SE* version uses a longer 'throw' bass unit, new suspension system and better aligned crossover with more consistent sensitivity across the bandwidth. The touted results are a more lucid soundstage, better dynamics and rhythm with easier positioning characteristics.

US builds UK design.

Acoustic Research continues its *Spirit Series* of loudspeakers with the £349 *AR152*. The two-way bi-wireable speaker uses an

eight-inch polypropylene bass unit and one-inch cloth dome tweeter. Finished in real walnut veneer, the cabinet promises rigidity by using a figure of eight internal brace and dual density baffle. Gold-plated terminals, air cored coils and van den Hul wiring all suggest high performance characteristics. Although sensitivity is high at a claimed 90dB, power handling is described as suitable with amplifier up to 125 watts. The speaker is manufactured in the States (following the closure of AR's factory here) but is designed by AR's British consultant David Berriman.

Speaker from WEA

New firm Welsh Esoteric Audio makes its debut at Penta this month with its three-way, three driver floor standing loudspeaker the *1.1*. Attractively finished in a real wood veneer the speaker has rounded sides making it visually sexy as well as helping to reduce diffraction. It measures just over a metre high, by half a metre wide but is very shallow at 16cm. Cosmetically it looks a little like Infinity's *Kappa* but is mechanically very different using an eight-inch sealed bass driver, two-inch dipole midrange and one-inch dipole tweeter - all with aluminium cones. Welsh Esoteric Audio, tel: (071) 263 9875

DIY house music

Music lovers who like the idea of having hi-fi through the house - and having it cheaply, will be delighted with QED's new *Roomlink* system. Derived from the firm's *Systemline* multi room system, *Roomlink* allows up to five pairs of loudspeakers to be run from your hi-fi. And the basic package costs just £100. *Roomlink* uses a driver, power supply and transmitting units as well as a sensing eye and speaker switch to give individual room control.

Further sensors and switches are available priced £45 and £14.95 respectively.



Celestion 5 - will it follow in the '3's successful footsteps?



IDEAL FOR IN-CAR ENTERTAINMENT

20 CHROME CASSETTES AT MID-PRICE

PIANO FAVOURITES
SPIRIT OF VIENNA
THE BEST OF BAROQUE
GREENSLEEVES
POMP & CIRCUMSTANCE
THE BEST OF GILBERT & SULLIVAN
SERENADE FOR STRINGS
LIEBESTRAUM
NIGHTS AT THE BALLET
GILBERT & SULLIVAN FAVOURITES
GUITAR FAVOURITES
VIOLIN FAVOURITES
VIENNESE ENCHANTMENT
COUNTRY GARDENS
GREAT CATHEDRAL ORGANS
THE MUSIC OF ERIC COATES
THE SOUND OF BRASS
PIANO POPS
HOMAGE TO GRIEG
THE BEST OF BRAHMS



OVER 80 MINUTES OF MUSIC ON EVERY TAPE
AVAILABLE FROM ALL GOOD RECORD STORES.

Bob Abrahams, for QED said: "It is being presented as a DIY system though if you don't feel up to very basic electronics you really should call in a specialist. In the past two years we've seen more and more remote control audio equipment in the marketplace and the system is ideal for use with your existing handset. Of course if the telephone goes in the room and the handset is elsewhere you can use the switch to turn the loudspeakers off in that room.

"The only problems may be encountered with loudspeaker impedance - if you get the impedance levels wrong then an amplifier may run a bit hot but we're introducing an impedance matching unit to counter that in November."

Roomlink is available from September. QED Audio Products, tel: (07842) 46236.

Autumn collection

A £1700 loudspeaker and £700 amplifier are Musical Fidelity's greetings to the autumn season. The new speakers are a tall floor-standing type ideal for a powerful amplifier with their 500 watt handling capacity. Dubbed MC6, they feature four woofers and a tweeter on the front panel with an additional two woofers and tweeter at the rear.

"Profound" and "musical extension with extraordinary dynamic attack" are the touted results of the design.

On the amplifier front, MF



The ultimate barbie amp, A200 doubles up as a burger grille!

continues to cater for a range of tastes with the A200. This £700 beastie is an integrated model described as an excellent option for those who don't want to get into pre/power combinations. Inside, the circuitry is similar to MF's MA50 monoblocks while the external features are similar to the A100, 'though the A200 is housed in a larger case.

Van den Hul on a budget.

Loudspeaker cable from Dutch cable and cartridge specialist van den Hul is now available at £3 a metre. The Clearwater budget cable is a twinlead copper and silver cable sheathed in a transparent jacket. Each 2.15 mm conductor uses 98 copper strands individually coated with silver. Clearwater and other vdH products are imported by Viper. Tel: (0268) 511166.

Taping louder

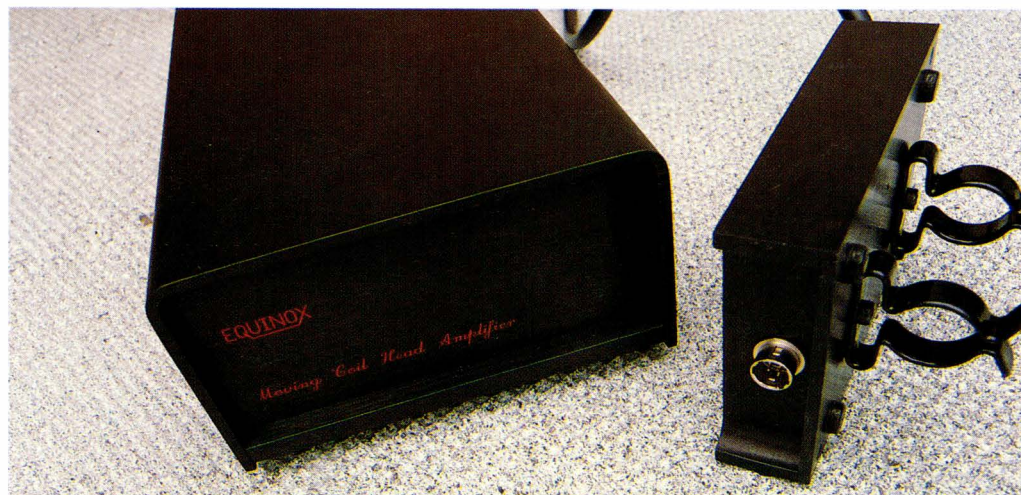
Taping even louder is possible with That's improved MG-X Type IV cassette tape. The new fine

metal MG-X promises higher MOL (maximum output level) and improved saturation characteristics with a claimed signal to noise ratio of 59dB. The 'print-through' figure is also said to be 3dB down on the older MG-X tape. The new cassette is wound in a clear plastic shell and coloured to differentiate it from its forebears.

Night and day

There's nothing much 'equal' about the new Equinox RIAA phono amplifier, which Editor Bamford reckons is one of the finest moving coil phono stages he's ever heard. Priced a cool £795, the tiny amplifier can be clipped to the leg of your turntable and is powered via a lead acid battery supply, continuously float charged from the mains. Included is a special cable to run from the base of your tonearm, the Equinox featuring a low noise balanced input. Watch out for a full Choice review.

Available from selected dealers, the Equinox comes with a 3 year guarantee. Equinox Audio, tel: (0327) 704231.



Phono amplification taken seriously: Equinox's power supply and table-clipped phono stage.

IN BRIEF

Rayleigh Hi-Fi has opened a branch in Southend-on-Sea. The new branch has three listening rooms and caters for multi-room installations as well as the luminaries in hi-fi separates such as Rega, Linn, Arcam, Quad and Naim.

The National Sound and Vision Show at the Last Drop Village just outside Bolton in Lancashire will feature many of the top brands and latest innovations in hi-fi. The show opens at lunchtime on Friday October 5 and at 10.00am on Saturday and Sunday. Entry is £1.50 for adults and free for children.

Albion Audio, of Sunderland, Tyne and Wear, now stocks Sonic Link, Voyd and Helius products.

Woodside Electronics (Radford) products are now available from Bily Vee Audio in Lewisham, London.

Agfa is giving away a couple of windsurfers plus 250 surfing music cassettes as part of an early autumn competition. The 'spot the difference' competition is featured on £5.75 HRC90 five packs and £4.74 SR-XS C90 twin-pack audio cassettes.

The extremely heavy loudspeaker stands, made by Slate Audio, of Leighton Buzzard, Beds, have been increased in price. A standard 19-inch pair in slate now costs £324.50; its marble equivalent: £379.

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Choice Sessions

Things we hear. . . This month's 'Sessions Extra' features news on a compact disc recorded with 1-bit A-to-D conversion, experiments with CD player supports, listening to KEF's excellent C200SW subwoofers (try them!) and, to begin, Pioneer's £230 A400 amplifier. It's a giant killer!



Pioneering spirit

Pioneer looks set to stir up the 'budget' amplifier market with its new A300 and A400 integrated models. John Bamford reports.

In July's *Update* we ran a story announcing the arrival of two new reasonably priced integrated amplifiers from Pioneer. The A300 (30watts per channel) costs £180; the A400, which is the one I've been listening to during recent weeks (50watts and the bonus of a moving coil phono input) costs £230.

New amplifiers from major Japanese manufacturers are two a penny, of course, as product cycles tend to rotate faster than we can keep up with them, but the design concepts employed in these new Pioneer amplifiers show a commitment to high performance which is unlikely to dwindle with changing fashion. Unusually for Pioneer – indeed the *first* time, to my knowledge – the Tokyo-based company has been persuaded to build amplifiers solely for UK consumption. There are no flashing lights or tone control circuits superfluous to the role of fine music making, the circuit configuration owing much to lessons Pioneer learned in making its flagship (very expensive) M6 monoblok amplifiers. Regular hi-fi show-goers may have come across these solid-state power houses, awesome state-of-the-art Class A devices in which the designers

A400 from Pioneer, one of two models designed exclusively for UK audiophiles.

have eliminated all negative feedback.

As an acquaintance of mine (who used to make hand-built amplifiers but gave up trying to make a living from them several years ago) often says these days: "I tell you, John, I'm glad I'm not in the electronics business any more. You just can't compete with the economy of scale advantage of the Japanese majors. And if any of them ever decides to get serious, well. . ."

Pioneer, it seems, *has* got serious. I can't comment fully on the less expensive A300 amplifier as I've not heard it. But the A400 has been in and out of my system (and in and out of several friends' systems) for six weeks or more now, and on the evidence of what we've all been hearing I predict that it is going to give most, nay, *all* British manufacturers of 'affordable' amplifiers a major headache. And no, that's not because the A400 sounds nasty. In a high grade system, what this amplifier is capable of is, simply, astonishing.

I guess what my acquaintance who used to make amplifiers has been saying to me in recent years is that we should never be so naïve as to think that the Japanese don't know to make good amplifiers. The 'British is best' tradition has developed only because the major producers of consumer electronics have

been far too busy selling amplifiers festooned with knobs and switches and flashing displays to consumers around the world who demand that amplifiers be like that.

World markets?

What's exciting the folks at the UK division of Pioneer is that after five years of consultation and haggling, they have persuaded the Japanese parent company to allocate some time on the manufacturing production lines to producing amplifiers designed specifically for the UK. If Pioneer (GB) Ltd sells a lot of them – and there's no doubt that it will, as the amplifiers are already flying out of hi-fi shopkeepers' doors faster than Pioneer can deliver them – then Pioneer (Japan) Inc may well consider making similar 'audiophile' amplifiers (ie amplifiers with no superfluous gadgetry and flashing lights) for other world markets too. The company is looking to change hi-fi fashion, albeit one step at a time.

Hot hatchbacks

What this has led to in the A400 I've been auditioning – and this is far more important than it sounds – is a decent power supply with a three-core mains lead. Like many a 'hot hatchback' amplifier (the Cyrus *One* is a classic example), controls are limited to a split-concentric volume control which facili-

tates channel balance when necessary, and two source selectors, one to govern which source you listen to and t'other to route a chosen source to the tape out sockets. Just what's needed, in fact. Yes, there is a headphone socket (hurrah), while the RCA phono input sockets are all tin plated (reckoned to sound better than gold) and decent 4mm sockets are fitted. The only shame is that they're of the 'super safe' type which accept only banana plugs or bare wire, and cannot be unscrewed sufficiently to take spade connectors or really chunky speaker cables. But then nor can they be inadvertently shorted out.

This one's red hot!

Not present on the A300, a push button selector chooses between MM and MC on the A400 (this switches sensitivity and impedance to suit the majority of high quality low output cartridges), while the power on/off button is similarly mounted on the fascia – which is perhaps as well as the amplifier's power consumption is a not inconsiderable 520W and it would be a bit extravagant to leave the unit powered-up all the time. Anyway, it sounds just fine after only ten or fifteen minutes warming up.

I say it sounds just fine, when what I really mean to say is, it sounds frighteningly good. Since these amplifiers arrived in the UK at the end of June several reviews have appeared in the hi-fi press (of both models), my contemporaries' comments ranging from (I paraphrase): 'fabulous for the money, check it out', to '... the A400 is one of the best audio bargains of the past 10 or more years'. One review I read the other day dared to intimate that the A400 is probably a better sounding amplifier than that £1,000-plus pre/power combo you were thinking of treating yourself to come Christmas time, going on to suggest that owning one is destined to be a passport to hi-fi credibility in the Nineties, as indeed was Pioneer's classic PL12D belt-drive turntable all those years ago.

I'm relieved to be reading such enthusiastic reports from elsewhere in the field, because the sound I've been enjoying from the A400 these past few weeks has been keeping me awake at nights. And to hear that other listeners have observed quite clearly that the A400 is a remarkably fine amplifier confirms that I'm not going gaga. You see, the Pioneer A400 is one of the best hi-fi amplifiers I've ever heard – regardless of price! And, not given to emitting floods of gushing hyperbole, it has taken me a few weeks to find the courage to put that in print.

It has a clarity through the midband, superb transparency and resolution of fine detail, which is not bettered by a

pair of triode monoblok valve amplifiers costing £2,500 which I've been running for comparison purposes. Yes, the triodes sound 'bigger' and 'fuller' and go a clear octave lower in the bass, and the top end is more 'open' and airy, but the sound of the A400 is simply clearer through the midband. Rarely in listening to hi-fi components do you come across one which really does allow you to hear further 'into' recordings, where you play a familiar recording and genuinely discover fine details which previously your system had masked over. There's something in the A400 which makes it that good.

Before winding up for this month the story of Pioneer's undeniable success in designing affordable amplifiers for aspiring audiophiles, a few brief words to put this rant of enthusiasm into real-world perspective. Compare the A400 with its peers (Cyrus One, Musical Fidelity A1, etc, etc) and you'll observe that it sounds better. That said, the phono stage in the Cyrus One is particularly fine, and if you're using LPs to make the comparison you might argue that the difference (which is not subtle) between Cyrus and Pioneer is not a question of which is best but more a matter of taste. I would concur with that observation. But using the respective amplifiers' CD inputs (or, in other words, compare their power amplifier stages) and you'll hear that the A400 is in another class entirely.

Analytical device

If you can't hear that extra clarity and detail, the fact that the A400 is a remarkably analytical device when it comes to resolving low level information, then either the source is not generating adequate information, or the loudspeakers you're using are incapable of resolving such fine low-level details. The same can be said when comparing the A400 with just about anything you're likely to be able to afford.

I've been feeding £3,000 worth of Rock Reference record player (fitted with an AT OC9 moving coil cartridge) into a high quality preamplifier (for the benefit of its top quality phono stage). The Pioneer has then been used as a 'power amp' to drive all kinds of (reasonably efficient) loudspeakers – including Vandersteen IIC, Snell Type C, KEF 105/3 and JBL XPL 200. These are all very large floorstanding models ranging in price from £1,500 to £2,500. Yes, I know it sounds crazy. Visitors to my home have been seen to depart shaking their heads in disbelief. They could not believe that the sound they had just heard was produced by a £230 (power) amplifier.

Doubtless there'll be more to come on this in the coming months. I've yet to discuss what makes the A400 tick: its patented Super Linear Circuit, 'clean ground' system in the power supply, or honeycomb chassis. There's much more to discuss. Don't touch that dial.

Down to earth

Can't afford huge speakers? Don't have the room for large enclosures? KEF's satellite/subwoofer system is just what you need. John Bamford moves air. . .

One could argue that affordable hi-fi shouldn't be this good. Shown at hi-fi exhibitions around the world as far back as a year ago, KEF's C200SW stereo subwoofer system seems to have had little attention from UK audiophiles, and comments about it in hi-fi magazines have been scant to say the least. *Hi-fi Choice* has been as guilty as anyone in not saying anything about this satellite/subwoofer system – so now's the time to put the record straight.

What you get for your modest outlay of £249 is two neatly formed bass enclosures, each containing a 200mm (8 inch) driver mounted in 'single coupled-cavity' configuration. This technique, which was developed by KEF for its



Tin plated sockets sound better than gold. These guys are serious. . .

top-flight *Reference Series* loudspeakers, combines the higher efficiency of a vented enclosure with the superior transient response of a sealed box. These are passive subwoofers; you take the speaker leads from your amplifier straight to the C200SW enclosures, and then a separate pair of leads from the subwoofers to the 'satellite' loudspeakers. Each enclosure has a dividing network which provides optimum filtering for KEF's 'miniature' C15 and C25 speakers which cost £119 and £149 (per pair) respectively. Incidentally, KEF does a deal for customers buying a complete package: a pair of C200SW subwoofers with C15s, which KEF calls the *Quattro* system, costs £379. This includes a pair of metal brackets which attach to the subwoofers, creating a platform to support the C15s a few inches above the woofers, making a 'complete' speaker system standing three feet or so tall. These brackets can be bought separately from KEF, but they cost £34.50 – so the all-in *Quattro* package is a pretty good deal for listeners with small rooms.

Stereo bass

Unlike most satellite/subwoofer systems on the market, this KEF system works astonishingly well. Although it has been argued that low bass information is essentially 'directionless' (hence mono subwoofers), KEF's separate left and right channel enclosures ensure that any stereo information contained in the recording at the lowest frequencies is reproduced faithfully. And it shows in this system's obvious superiority to three-box systems. In a large room, with the C15s sited on 5ft tall stands, I was astonished at how well my ears were fooled into thinking I was listening to massive, 5ft tall loudspeakers. I promise you, the system is *that* good.

Okay, so when switching back to a pair of £2,000 JBL XPL 200s the sound 'filled in' with a sense of solidity and 'completeness' through the upper bass and into the midband which this £400 KEF speaker system (I'm including the cost of the tall pillar stands I was using) couldn't quite achieve. But where the system comes into its own, of course, is in small rooms. I have two friends who are now using C200SWs in their homes (both are hi-fi enthusiasts, using tasty valve amplifiers and top quality front-ends), and each swears he has never achieved such a large-scale sound with such trouser-flapping bass in his small, London-style living room.

Which satellites to use, C15s or C25s?



KEF's Quattro package: C15 satellites and C200SW stereo subwoofers for £379 all-up. It gives serious bass output down to 35Hz.

For reasons which I won't attempt to explain here, you get subjectively *more* bass from the subwoofers when partnering them with the smaller C15s. Of course, the bass characteristics can be altered with positioning, but in very small rooms (say 12 x 12ft) it can sometimes be difficult to position the subwoofers away from walls. So think about that one before deciding. And before you ask, yes it *is* possible to use the subwoofers with other two-way loudspeakers, but you have to tread very carefully here. Talk to your dealer!

At which point I will sign off with the suggestion that you audition the C200SW subwoofers at your neighbourhood KEF stockist. And when listening, ask yourself: "Do I get anything like this sense of scale and drama from my system at home?" Unless you've got massive floorstanding loudspeakers which set you back the best part of £2,000, the answer will probably be no. As I said, affordable hi-fi shouldn't be this good. It makes it hard to justify spending more, that's for sure.

The first 'bitstream' CD?

Paul Miller reports on a Mitsuko Uchida recording of Debussy's 12 Etudes, made using a Data Conversion Systems DCS 900 A-to-D converter.

It had to happen sooner or later. First we were presented with bitstream compact disc players and now, completing the circle, Philips classics has announced the arrival of bitstream CD software. This is a logical train of events – after all, the benefits of glitchless, mono-

tonic 1-bit digital-to-analogue conversion cannot be fully appreciated if the discs themselves are already riddled with the distortions of multi-bit A-to-D conversion!

Of course, the digital data is not encoded on the CD in 1-bit form because this would render the discs incompatible with commercial players. Think instead of bitstream analogue-to-digital as the opposite of digital-to-analogue conversion. With the latter, the 16-bit code is accelerated and truncated into single bit form prior to conversion back into analogue music. Theoretically, bitstream A-to-D would sample the analogue music signal at an accelerated rate but quantize each sample with a single bit notation.

Downsampling and bit-combination would then be employed to generate the standard 16-bit 44.1kHz sampled data required by convention for storage on the CD itself. Compatibility is therefore ensured, whether you own a conventional 16-bit or bitstream type CD player. However only the latter, be they PDM, PWM, PEM (JVC) or PLM (Sony) players, will have the potential to realise the advantages of a bitstream recording.

Mitsuko Uchida and her interpretation of Debussy's *12 Etudes* is the first CD to enjoy the fruits of so-called bitstream A-to-D conversion. Yet the disc itself, recorded over a year ago at The Maltings, includes no information whatsoever in its booklet notes on the system or techniques employed at the time. Certainly one year ago Philips provided data on a bitstream A-to-D converter, the PCF5022/PCF5023, but at this time the ICs were still undergoing development. To the best of my knowledge there were no bitstream A-to-D converters in commercial use in April 1989.

In reality it transpires that Philips was using a Data Conversion Systems DCS 900 ADC with a Sony 2000 two-track U-matic digital recorder. The DCS 900 is a highly advanced and complete A-to-D conversion system that may be retro-fitted to any commercial digital recorder, including DAT and various PCM systems. Clearly it is particularly suitable for higher resolution systems like Mitsubishi's 20-bit X-86 2-track recorder.

The unit is based around digital signal processing 'building blocks' rather than any single custom IC and samples the incoming music signal at a maximum rate of 6.144MHz (equivalent to 48kHz x 128). An internal master clock also allows the base sampling rate to be reduced to the CD standard of 44.1kHz. However, the quantisation of this sampled music does not proceed in 1-bit steps. Rather, up to 16 digital 'words' are available to describe each sample – implying a lower limit of 4 bits rather than 1 bit @ 6.144MHz.

So, this is not 'bitstream' in the truest sense because at no stage is there a stream of single sign-bits. Nevertheless a high-speed 4-bit converter is still thought to be preferable to a 16 or 18-bit ADC when it comes to reducing glitches, zero-cross distortion and the like . . . Bearing this in mind the auditioning of such a recording is fraught with qualifications. Comparisons of this disc with similar multi-bit recordings are quickly invalidated if the listener uses a 16-bit CD player for instance!

Objective comparisons

Auditioned on my proprietary PDM system, this CD did indeed feature all the fluidity, coherence and seamlessness that first attracted me to the PDM process over a year ago. Yet my enthusiastic reception of this disc must be tempered against the lack of any 'equivalent' multi-bit recording from which a truly objective comparison might be made. After all, the specific microphone technique and standard of electrical housekeeping all play a vital role.

Instead a comparison of this one Philips disc played on both multi-bit and PDM players had to suffice, for only by this route could the subjective repercussions of glitches, non-monotonic conversion and zero-cross distortions be judged. With Arcam's redoubtable *Black Box II* (16-bit, 4-times oversampling), the cascade of ivory 'Pour les Huit Doigts' failed to shimmer in a realistic fashion. The rise and fall of each note seemed to be restricted despite the dynamic inflections of both

loud and quiet sounds being accurately resolved.

With Arcam's *D120* converter (1-bit, 256 x) the natural airiness and ambience captured at the point of recording was now more faithfully revealed. Individual keys were easier to discern, burning brightly at their peak with embers of decay that persisted momentarily longer. Instead of stopping abruptly at some faint level the subtlest of tonal colours now faded into a velvety darkness. The music was that much easier to interpret; vivid, detailed and alive, it was simply that much more convincing.

So what of the future? Well, Philips Classics Productions has a number of similarly recorded discs that are due for imminent release. These include a recording of Milhaud and Poulenc by the Labeques sisters and solo piano (Mozart and Brahms) played by Alfred Brendel. Furthermore I have it on good authority that other commercially available discs have already been recorded using the DCS 900 processor for labels other than Philips. I shall endeavour to locate and report upon specific examples at a later date.

As far as Philips is concerned the DCS 900 system is seen as something of a stopgap, an expedient step between multi-bit and its own true 1-bit converters. Sooner or later Philips will have its own multi-track 1-bit ADCs on line for use throughout its recording repertoire, whether 'live' or for re-mastering old analogue tapes. Only then, with hand

on heart, can Philips justify a 'bitstream' logo on the packaging of its discs.

Supporting acts

Vibe damping: Jason Kennedy experiments with alternative approaches to CD player support.

CD players are, it would seem, as prone to external vibration as most other audio components. Despite that old chestnut 'Perfect sound forever', the performance of virtually any player can be enhanced by improved isolation and damping. It's notable that high-end players incorporate panel damping and suspended transports with the idea of keeping the laser and disc transports as free from vibration as possible.

The keen hi-fi tweaker can use Bluetack and specific audio damping materials like Q-damping and Sorbothane sheet to tame the cabinet and, with care, parts of the transport itself, but further subjective improvements can be brought about with careful selection of support systems.

There seems to be a variety of different approaches to this problem, and so we decided to investigate some of the alternatives to see which ones had the most beneficial effects on the sound of discs played with an Arcam *Alpha* CD player. We chose a representative from three different support camps to try out on the lower shelf of a Target table. These were the Sigma *V-damp* feet which are unlikely looking cartwheel-



Try this on your PDM or MASH CD player, recorded using a low bit ADC.



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like devices, Vecteur *Les Cones*, rubber ribbed gold plated cones made by the French cable company and the Shan *Isolation Platform*, a composite polymer cement board that sits in place of the usual Medite or chipboard shelf on most equipment tables.

Out of interest, we tried the *Mana Sound Table* which at £200 is somewhat more expensive than the other options here but quite a remarkable turntable support as readers of *Personal Messages* might have ascertained. Of the three 'support systems' (for want of a better name) *V-damp* is perhaps the most unusual. It's made out of a polymer that has been specifically designed to isolate and damp at the same time. *V-damp's* characteristics can be altered by changing the size and shape of the material, which means that the product has considerable potential as a tailor made support for specific components and printed circuit boards. As it is there are two sizes of feet currently available; one for components that weigh up to 10kg and another for heavier pieces of equipment. Both cost £25 for a set of four. We tried out three of the smaller ones with the *Alpha* and three of the larger ones with an Audio Innovations *Series 1000* tube preamp, not that the latter weighs more than 10kg but because the smaller ones are not deep enough to raise the amp off its own feet.

Attack and decay

The sonic effects of placing three *V-damp* feet twixt *Alpha* and chipboard shelf were amongst the most impressive of the group. Music sounded considerably more natural than it did with the other supports. Ambient information was more prominent, as was low level detail in general, the attack and decay of notes seeming more precise. The feet allowed the player to make CDs sound more informative and yet more relaxed at the same time.

The Vecteur *Les Cones* are a bit more straightforward. They are large, glamorous gold plated cones with notches cut into them so that pairs of rubber damping rings can sit inextractibly around the cone. This makes for a stylish and chunky little device that costs around £30 for a set of three. Using two at the front and one at the back, the cones made the *Alpha* sound more precise and specific – perhaps 'focused' is the best word for the effect. *Les Cones* elicited a smoother and more obviously dynamic quality in music, making things like Steely Dan's *Babylon Sisters* sound tighter and more polished but

without adding aggression or harshness. Compared to the *V-damp* feet they made the sound a little harder or more lively if you like, generally not extracting as much detail from discs but presenting it in a slightly more upbeat fashion.

The *Shan Isolation Platform* is a pretty basic looking shiny black board with only the Shan badge and its weight to set it aside from the common or garden equipment table shelf. It is in fact made out of the same polymer cement that is used in the *Shimma* loudspeaker and accompanying stand. This material is a lot harder and stiffer than MDF and thus likely to resonate at a higher frequency – closer, one might assume, to the frequency of your average equipment rack. In place of the vinyl-wrapped chipboard shelf on the target *TT2* table used for these tests, the *Shan* platform performed in a similar fashion to *Les Cones*, giving discs a slightly lively, forward feel. Again, information content seems a touch down on that heard with the *V-damp* feet, but it is a step up in quality compared to the standard board which sounds soft and warm in comparison.

The *Shan* platform seemed to have a more beneficial effect upon the Innovations preamp which managed to sound more dynamic and informative. The overall effect was still the same as with the *Alpha*, ie increased liveliness, but the nature of the component meant that this had a greater positive effect upon its sound quality. The cones and larger *V-*

damp feet both improved the preamp but by relatively small margins compared to the *Shan* board, and basically they did the same sort of things that were noted with the CD player, ie the cones produced a more focused sound and the feet a more informative and coherent one.

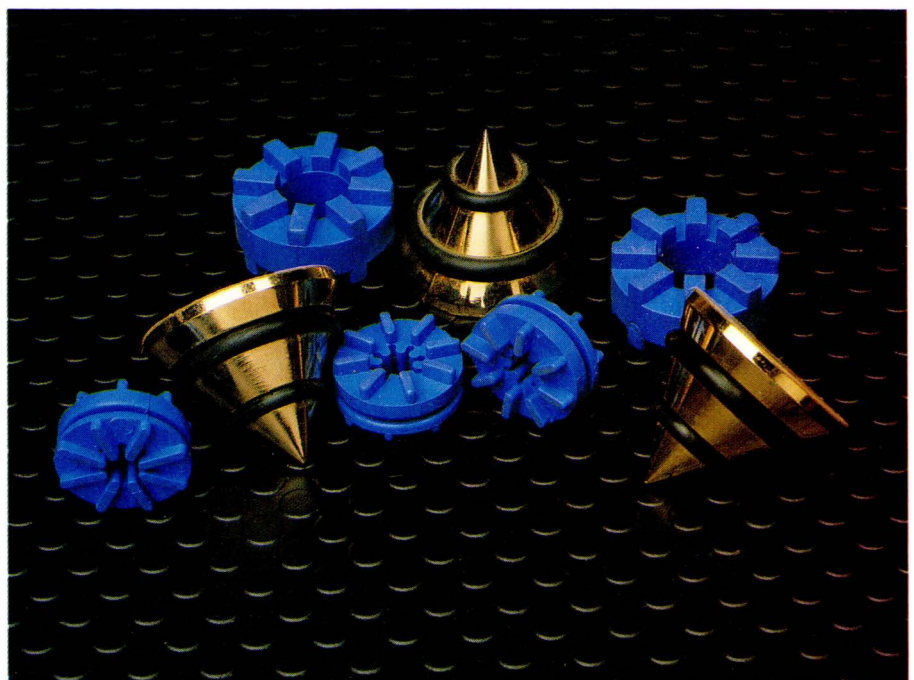
More space

The best sounds we managed to get out of the *Alpha* resulted from placing it on a *Mana Sound Table*. This table does remarkable things for suspended sub-chassis turntables, and although the results with this digital transport weren't in quite the same league, it did improve matters quite significantly. There was more space around notes which sounded more natural and distinct, and again the player seems to be able to extract more information from discs, quite a lot more than it did with the supports assessed here but arguably not enough to warrant the expense involved. However, more expensive players in CD based systems might well benefit to a degree that makes such a purchase logical, and given the vogue for two box players, a two-shelf *Mana* could well be the answer for serious CD'o'philes.

Shan Isolation Platform – Audio Dimensions, tel: (0232) 655135.

Vecteur *Les Cones* – Presence Audio, tel: (0403) 891777.

Mana Sound Table – Mana Acoustics, tel: (081) 429 0118.



Vecteur's *Les Cones* and interesting rubber things called *V-damp* from Sigma UK.



Our latest A-300 and A-400 amplifiers haven't received acclaim from every quarter. Indeed, for our friend on the left, they'll never reproduce the sound of his faithful 1919 gramophone.

We couldn't agree more. Neither could the other critics we consulted. If you're looking for an outstanding amplifier at a very silly price, the Pioneer A-400 is it. Even if your budget

extends to £1,000, it could be exactly what you're after. Make sure you audition it. One of the best audio

have impressed almost bargains of the past ten or more years.

every critic.

JIMMY HUGHES, AUDIOPHILE, SEPTEMBER 1990. The Phono-stage, based on an integrated circuit pre-amplifier, has an astonishingly wide band width, with almost perfect audio flatness. A clean and

sparkling sound. RICHARD BLACK, HI-FI NEWS AND RECORD REVIEW,

SEPTEMBER 1990. True to 'sound first, features last' British form,

it's the internal guts of the A-400 that are the meat of the

matter. And what guts. It loves music, the A-400. It loves

it with a vengeance... MARK PAYTON, HIGH FIDELITY, SEPTEMBER 1990

But there's no need to take the critic's word for it. Already

the A-400 has been nominated for the What Hi-Fi 1990 Best



Amplifier Award. You can hear our A-300

and A-400 amplifiers at all our Reference Point dealers. Phone



free on 0800 300340 for a brochure and

the address of your local Pioneer dealer.

*Dan Houston and
photographer Chris Richardson
have a dawn rendezvous with a
street machine which bespeaks
a sound system worthy of its
custom looks.*

The Bitchin Bug



Not even the seagulls were awake when we arrived on Brighton seafront to use the early morning light for photographing this in-car hi-fi feature. Huffing and stamping in the pre-dawn chill, the gentle rasping sound of waves on the shingle was suddenly replaced by the harsh 'diggy-digger' tune of our quarry – changing gears through the town before tooling into view. On first impression the 18 year old Volkswagen *Beetle* looks like

most models of its age; with a stylish paint job and flashy wheels. But look twice. This car was taken off the road for nine months from October last year and every panel has been re-worked. Its shape is sleeker, lower on the road and devoid of chrome. Minus a front bonnet handle and bumpers, it looks as though it's chewing on a piece of tarmac. Its US-style number plates beneficially (and coincidentally, I'm told) include the letters VW and are underscored at

the front with the legend: *Bitchin* – as though from some fabled state. Bitchin, I now know, is west coast surfspeak for brilliant, or magic. The standard retort to something being bitchin is: "Yeah, totally. . ." Moving around the car the rear number plate is thus underwritten: Totally.

The car belongs to a 26 year old graphic designer, Gary Parkin. Gary hails from Sunderland and now runs a graphic design studio – Bitchin Design – in Brighton. Yes, he has a surfboard. "When I bought the car (for £1,200) it was turquoise green and I drove it around like that for a while; it was my first car," he said. "I first got the idea of customising it when changing the dashboard – I wanted to put in a rev counter, oil pressure and volt meters so that I could get a better idea of what is hap-



pening in the engine."

It seems he then got the Bug bug, deciding to customise his *Beetle* according to the Cal (California) look which was first tried by a mechanic from Orange County in the late Sixties. Advocates of the Cal look try to make their *Beetles* look as much like Porsches as possible, nevertheless retaining the car's populist roots; there's nothing so elitist as a Porsche. The Bitchin Bug is therefore resprayed in Porsche granite green and uses Porsche alloy wheels, polished to differentiate them from the 911 crowd, and with the original wheel drums rebored to take the five wheel bolts.

There's something about the Volk-
Brighton Rock (below); but the dawn chorus today is from the Red Hot Chili Peppers.

swagen *Beetle* which invites change. The car that epitomised being young in the Sixties has inspired several distinct types of customisation – not to mention the various body kits which have been designed for its chassis and engine. Designed by Dr Ferdinand Porsche, and financed by Hitler's Third Reich, the humble *Beetle* was originally a car for the people in the mid Thirties. In terms of numbers sold it overtook the Ford *Model T* in 1973 and has created a record in automobile design.

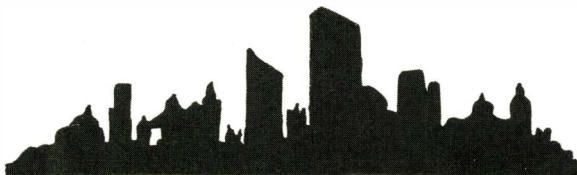
Choose your style

Twenty-two million models have found their way into every corner of the globe and it's still being made in Mexico. According to Peter Dickinson, of *VolksWorld* magazine, there are three main ways of customising a *Beetle*.

"With the Cal look it's been made to look the business, but there's Baja as well, for off-road racing, where the front and rear are cut off to make the car easier to get out of big holes. The Resto approach isn't strictly customising – that's restoring the car back into its original condition. And of course there are variations of these such as Resto/Cal, or whatever.

"As to why people choose the *Beetle* rather than other cars. . . well, I think there are as many answers to that as there are people to ask the question of. Basically it's such a reliable car; you just get in, turn the key and it goes until you run out of petrol. It was mechanically out of date by the late fifties, but VW kept making them because they became a cute little car. Now it's a cult thing. And it provides a wonderful canvas on





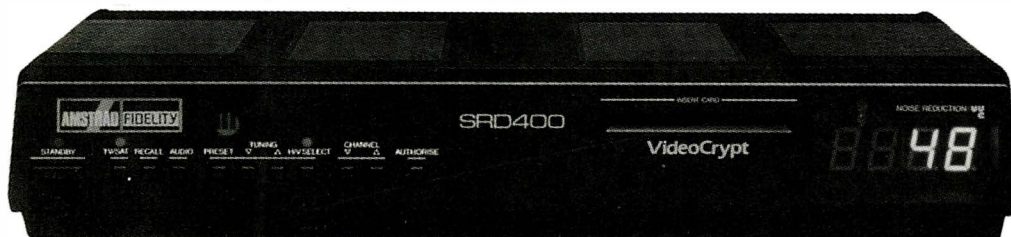
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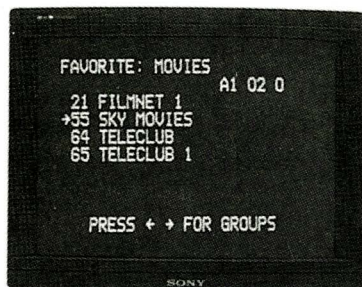
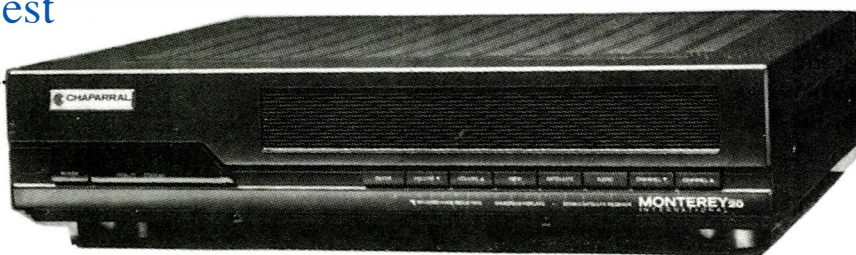
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which to work; you can raise or lower the suspension – make it go faster, that sort of thing, all quite easily.”

Few things have been achieved ‘quite easily’ on this *Beetle* however. Gary was particular about the result he wanted, and scoured the South East for experts who could rework the various body panels. While much of the work was done by a Shoreham body shop, the wheels were polished in London. The rear bootlid had to be re-louved on a large metal press in Southend because few metal engineering works can cater for curved surfaces. The rear indicator and brake lights have been ‘Frenched’ or ‘tunnelled’ into the wings so they no longer sit proud. The bootlid is now levered up on raised chrome hinges offering a glimpse of the engine. Apart from the exhaust, the only concession to chrome is the gear stick handle – from a Sixties drag racer. Even the quarter lights were taken out with one piece windows procured and installed. The suspension was lowered until there was only an inch clearance at the front but Gary thinks this is a mite low. “I like the ‘dumped in the weeds’ look but I’ll have to bring it up another inch because it’s grounding out at the moment.”

“The whole plan was to keep it minimal so that it looks good, but you’d have to give it a second look to realise why it looks good.” Internally the car has black vinyl roof covering, and black woollen carpets. The front bucket seats – from SCAT in America – are a further addition in terms of comfort and style. The dashboard contains the extra (VDO) instruments that provided the catalyst for this experiment and a couple of redundant ultra sonic alarm microphones. The original alarm system was replaced for a Scorpion ‘voltage drop’



Bug at bay: the whole car was reworked to create ‘the look’.

sensing type favoured by the socially aware driver. Previously the system used to go off in a high wind, serenading neighbours in the (like as not) small hours, or REM stage of sleep.

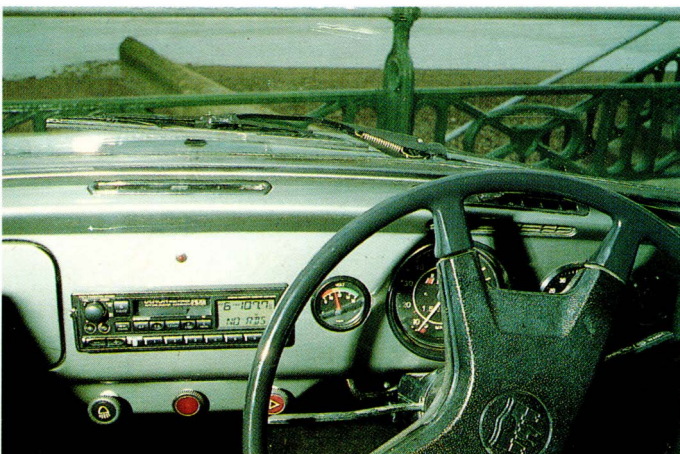
One of the last legs in this odyssey to an aesthetic ideal, if one can call the nine month search-and-employ mission that, was to install a sound system which would ‘kill small animals and children’. ‘Children’ was deleted fairly early in the proceedings when my status of fatherhood was revealed. It was to be the finishing touch, and had to conform to the car’s essentially simple, though not simplistic, style and operation. It also had to go very loud. . . so loud, in fact, that Gary would be able to cross unwanted passengers’ aural pain thresholds in order to dissuade them

from ligging lifts with him too often.

The finishing touch

When we first heard of this car we immediately thought it would be an American style system. There the practice of ‘mean sound-system installations’ was born, with regular Thunder on Wheels rallies being held for gnostics of the Louder Than Thou creed. Noise levels (150dB plus) way above the pain threshold have been recorded and entrants can no longer stand next to the cars with their bootfuls of amplifiers and banks of woofers on the back seats. It’s all good fun the way America knows it.

Thankfully the system in this car is less ostentatiously powerful – quality of sound was one of the most important



The dashboard with its extra gauges and simple (but effective) Denon head unit.



‘No RDS’ (yet) from the radio station; Gary’s voltmeter says it’s time to switch the engine back on.

WHAT THE PRESS HAS TO SAY ABOUT THE BEST RANGE OF HI-FI COMPONENTS ON THE MARKET

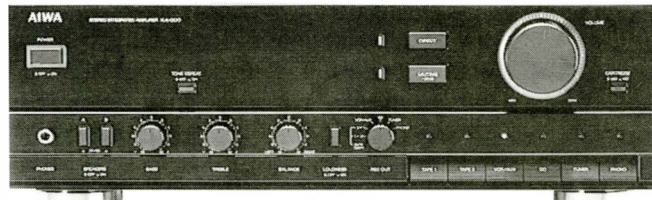
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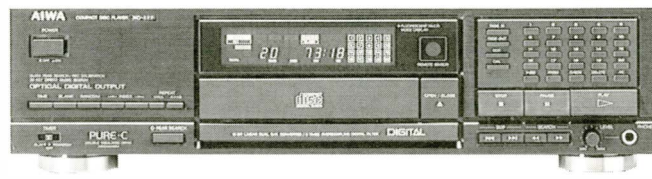
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criteria, and aesthetics made it impossible to rig a bank of loudspeakers on the back seat even if that had been suggested. "The sound system really goes with the car," affirmed Gary, "it's a real good time cruising car and it really needed this kind of sound system to finish it off."

He took the unusual step of visiting a hi-fi specialist, the Power Plant of Brighton, to talk about an in-car system. The Power Plant doesn't really deal in car systems – well it didn't then, but its manager Christian Bolton was able to supply the equipment and the shop gainfully stepped onto the learning curve of installing something suitable.

A Denon radio cassette head unit and power amplifier were decided upon. The head unit is one of the latest designs, incorporating RDS (Radio Data Service), Dolby B and C among other scintillating features, and also offers flexibility to upgrade (to CD) later. Gary can either plug in a CD standalone player on the dashboard, say, or install a CD multi changer into the boot at some later date. "The amplifier was chosen because we wanted to put in a subwoofer and it has an internal crossover for that," I was told. "It's effectively a five channel amp with one channel for the subwoofer." The amp thus has the benefit of being relatively compact – it doesn't take up a lot of boot space but is also powerful and versatile enough to handle the system.

Speaker placement

Once the level of amplitude had been decided, the next step was loudspeaker placement. Gary wanted speakers mounted in the door skins at the front, rather than putting them in the footwells or elsewhere, and a comparatively shallow drive unit was needed for the small space. Infinity delivered the goods here with a two-way design described as necessarily a little bright by the Power Plant: "We needed that because they are placed very low in the footwells and we couldn't put a tweeter nearer to the driver's ear level." The Infinity units have just a centimetre of spare space between them and the door panel.

On the back parcel shelf (not the right word in a *Beetle* unless you want your parcel shaken not stirred) further full range Infinity speakers have been installed for their characteristics of 'top end clarity and ideal matching to the subwoofer (underneath)'. Additional reasoning of the: "they-look-a-bit-mean-



Denon's tiny power pump.

as-well" variety made watertight the choice of these units.

Feel the bass

The Collins eight-inch subwoofer, slung on nylon straps in the space between parcel shelf and the engine compartment, looks like a stocky little Bazooker – and behaves like a donkey kicking out bass that you feel rather than hear. It's crossed over at the amplifier to deliver sound below 80Hz. Sitting in one of the SCAT seats listening to a Dinosaur Junior or Red Hot Chilli Peppers tape, the bass felt like I naively imagine one of those ultra sonic kidney stone-destroying machines might feel. It thudded palpably away between the base and the small of my back, turning the Bitchin Bug into some kind of alternative massage parlour.

The subwoofer is unlike most others of its type and is ideal for use in cars where it is impossible to install something permanently, or onto a parcel shelf. It is designed to be taken in and out, and is tough enough to have things thrown on top of it. Although it's almost free standing, it's a tuned ported enclosure and designed to fire into the corner of a boot – using the surrounding surfaces to reflect and build up bass notes. Its makers say it's designed for 100 watts RMS and will give 126dB at 20Hz – no petty claim. Needless to say the sound of the engine, normally so prevalent in these cars, gets lost with the system operating at ordinary levels, while the amplification seems effortless. Taking into account the limited acoustic inside an automobile, one is bathed in sound rather than being aware of a couple of speakers in the doors or on the back shelf. And while the bass is definitely there, it's not at the expense of the rest of the frequency range or the musicality of the system. Gary turned it up, squeezing the entire Chilli Peppers



The Collins 'strap-on' subwoofer.

lineup into the back seat. "Mega, isn't it?" I lip-read. "The good thing about it," he continued, muzzling the guests by about 30dB, "is that it doesn't rip your ears out like a lot of these systems. There's no distortion." That's just as well; Gary's tastes are limited to 'mostly hard core thrash music and West Coast stuff', which many music lovers would consider had their own levels of distortion to begin with.

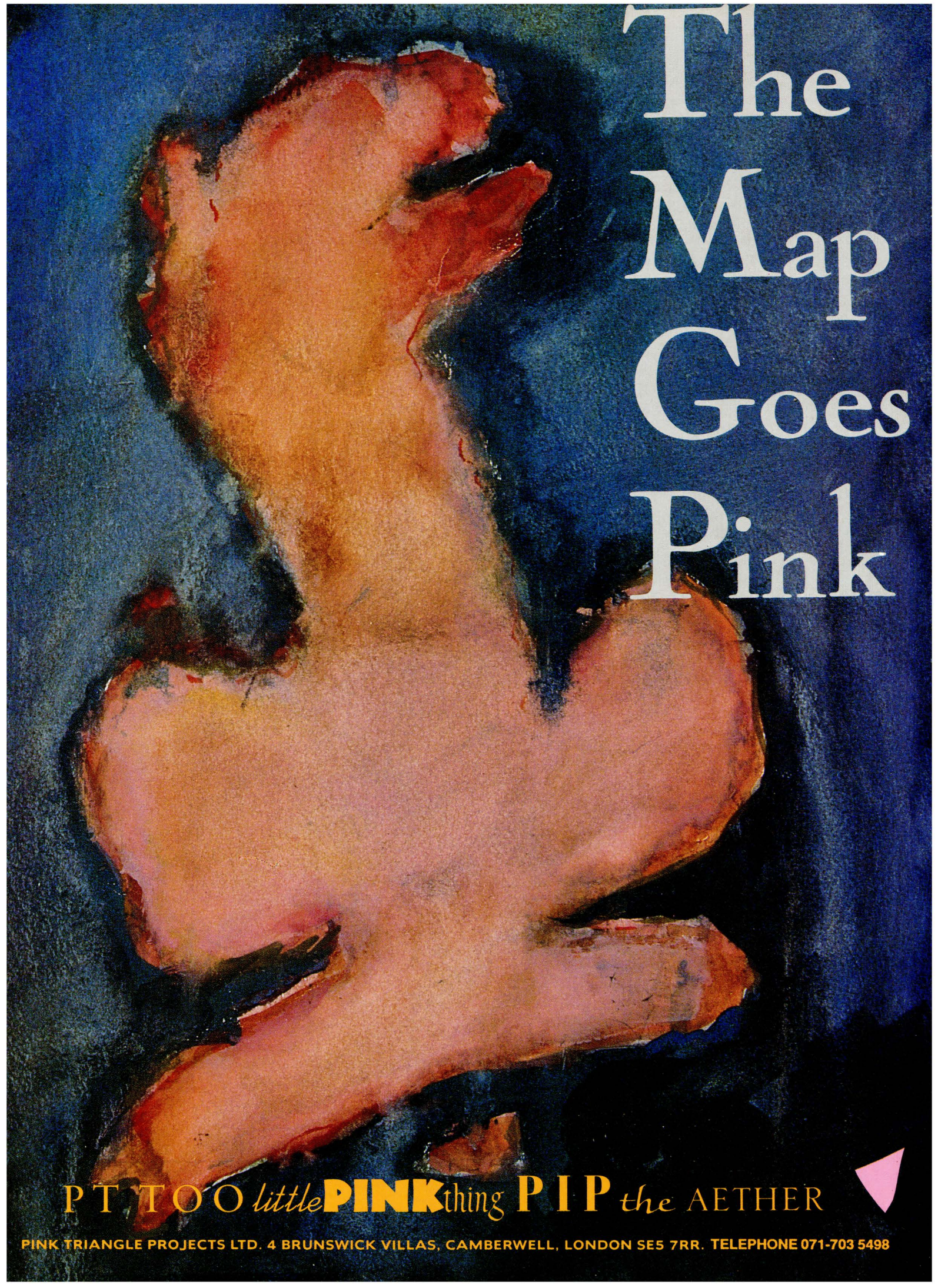
One of the problems with installing a system such as this, in a car as old as this, is that the original electricity supply was not designed to cope with the demands now made upon it. The car is still fitted with a dynamo rather than the more efficient alternator for recharging the battery. "I'm going to have to fit an alternator soon," Gary said. "As it is, the stereo would probably drain the battery in about three minutes without the engine running."

Indeed work on this car isn't over yet; there are plans to take out the 1600cc engine soon and re-work it, putting in new twin carburettors and no doubt the odd piece of 'concours' chrome. Meanwhile he has a car with a sound system which, if not hi-fi in the purist sense, certainly delivers something close to what was required of it; your gerbil would not be happy riding in the back.

The System:

Denon DCR900R head unit	£459.95
Denon DCA3500 power amplifier	£399.95
Infinity RS52K front loudspeakers	£89/pr
Infinity RS693K rear loudspeakers	£159/pr
Collins Super Tube CST803D	£195.95

System supplied and installed by:
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Tel: (0273) 775978.



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HI-FI CHOICE

NOVEMBER ISSUE ON SALE
OCTOBER 12th

The regeneration of French hi-fi in the late Seventies has seen the birth of several high-end manufacturers. One of the best examples is

Paris Partisans



Lectron, a valve amplifier specialist based in Paris.

By Dan Houston with

Chris Richardson

photographing.

Paris again. Following last month's feature on La Maison De L'Audiophile - the French high-end shop specialising in kit hi-fi - we visited one of its sister companies, Lectron: maker of valve amplifiers. Not just ordinary valve amplifiers either. Lectron was founded in 1979, and has been one of the names in the vanguard of a French hi-fi renaissance, not to mention being a partisan in the resurgence of valve amplifiers' popularity in general. As this issue of *Choice* arrives on the newsstands, the company is planning to show its latest tube monobloks, costing £5,500 a pair, at the London Penta hi-fi show.

Lectron is one of three companies started by Edward Pastor. It was born two years after he began publishing the French audio magazine, *L'Audiophile*, and was later joined by the shop. According to Pastor, specialist hi-fi in France was virtually non-existent in the Sixties and Seventies, with barely any industry to support a domestic audio market of the kind that was reasonably healthy in Britain during the same period. Pastor had been working in the hi-fi industry during these bleak decades and saw that a new generation of French were ready for something different from the Japanese imported mainstream products. His magazine helped fuel that

potential demand but there were still very few outlets for the ideas being discussed to be put into practice. Pastor was joined by Gerard Chretien,

Gerard Chretien sitting behind fellow directors P. Viboud and Jean Hiraga.

previously a medical research scientist, who edits *L'Audiophile* and who is now the managing director of Lectron.

"The magazine was successful - more than 2000 readers subscribed in the first three issues," Chretien told me. "People wanted to experiment; to read was one



thing but to listen was another. So we decided to organise a demonstration of prototypes we had presented (in the magazine). We had all our new ideas: power supplies, circuitry, componentry etc. And a new market was born. It was a kit market, at first, principally for audiophiles. They wanted to be involved and to be active with their system.

Pioneering esoterica

L'Audiophile was the origin of the new market, and in 1979 we decided to create a new company to distribute components and kits. The object was to deliver special components for audio which weren't otherwise available."

It seemed that the new market - the new breed of audiophile in France - was eager to adopt some of the new ideas being proposed in *L'Audiophile* as well as some of the esoteric Japanese audio magazines. "These new ideas," explained Chretien, "established that classical measurements are not sufficient to explain sound perception; there were many more parameters needed to have a precise idea of sound production." By challenging the measurement techniques, Gerard and others were able to assert the now commonly accepted notion that passive components in audio circuitry - such as capacitors - made a difference to sound quality. At the time however, the hi-fi industry regarded such a contention as heresy!

Gerard Chretien was joined by Jean Hiraga in 1980. In the same year the company began selling its first 'Classe A' kit amplifier. French born, Hiraga had sent the magazine an article from Japan. He returned to France in 1980 and began both writing and designing with the Lectron and *L'Audiophile* team. Hiraga was the first hi-fi luminary to upset the European audio community in the mid-Seventies by announcing that different types of cable could affect the sound of hi-fi. While Lectron is a team effort, most of the amplifiers bear his initials or name and he is credited with their principal design.

The partnership suggests a cosy little set-up with the magazine proposing that its readers buy the equipment supplied by Lectron. But Chretien is adamantly against that, and claims that *L'Audiophile* hasn't tested a Lectron amplifier in the last ten years. "The two things are entirely separate and we never wanted to use the influence of the magazine to promote the product. It was important for our integrity to have the two operations independent of each other. The best example of our integrity was that we were more successful in other markets such as Germany than in France itself (where the magazine is read). In fact the amalgam was a handicap. We



now sell 90 per cent of our product abroad."

The first (*Classe A*) power amplifier from Hiraga's drawing board has also been one of Lectron's most successful, indeed a version of it was sold until last year as a kit. Even at 8W the transistor amp earned itself the nickname of *The Beast* with its huge power supplies and heat sinks. "In less than a year we had markets in 15 countries all over the world. We expected success but not that much!" boasted Chretien.

Audio is like cuisine

In 1983 Lectron established a manufacturing facility in Paris and began making finished products, later moving the production facility to the same building that houses the magazine. "We improved quality step by step," Chretien commented, and outlined the company's basic code of conduct.

Lectron has always imported high quality active and passive components from Japan (with the exception of Partridge transformers from the UK) in order to ensure consistency and the best sonic achievements. As they say in France: "Audio is like cuisine; if you can't

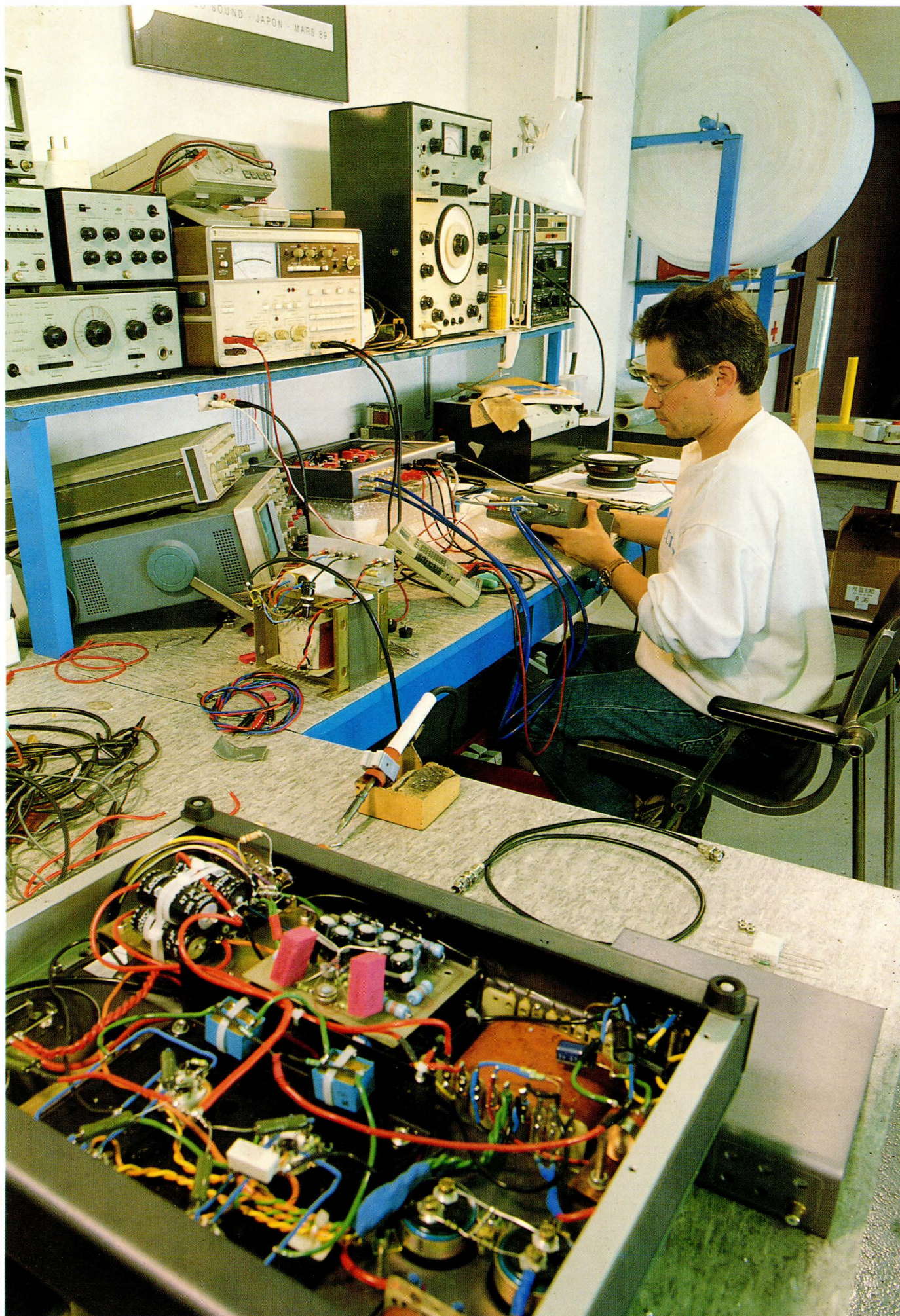
Audio is like cuisine: Lectron's master chefs at work.

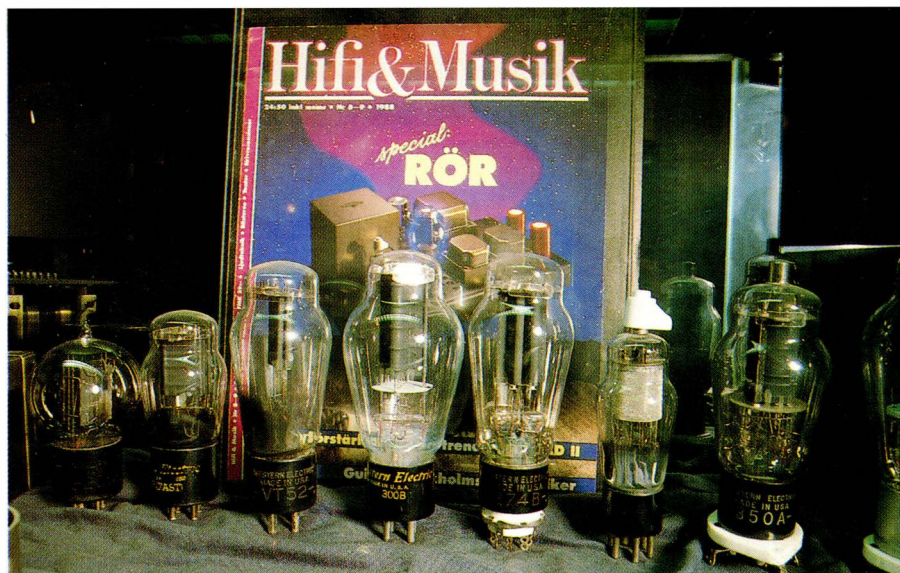
get good raw materials you can't eat well."

Chretien pointed out that to make the basic components itself Lectron would have had to invest heavily and would find it difficult to achieve any economy of scale, or quality control.

The company, with Hiraga's blessing no doubt, has always recognised the influence of cables and connections within its products and has also tried to keep its designs 'simple and linear' with each component complementing the rest rather than having to employ extra 'corrective' circuitry within its designs. As with much high end audio, there seems very little in terms of features and facilities; Lectron never made an amp with flashing lights. The cost of one of these amps is in using high quality componentry and painstaking design to bring the listener closer to the sound of the original recording.

The need for simple linear circuitry has seen the regular employment of valves in the Lectron catalogue, especially during the last four years. The





first of these came in 1983 with 'Le Tube', a two box (separate power supply) valve hybrid preamp which was reviewed and recommended by *Choice* and which was imported by Absolute Sounds. This was also the first finished product from Lectron although the company did not start putting its own name on designs until 1986 or '87. Instead they used the magazine logo. The *Tube* preamplifier improved upon the designs of the *DC1*, another two box design offered to enthusiasts (with a screwdriver) in 1982.

Sonic solutions

Combining valves and transistors was a 'good sonic solution' according to Chretien. "It's easy to make a Class A transistor amp but using tubes is a better solution to have both power and a reasonable price," he explained. Designing a power amplifier which would be more powerful than the original *Classe A* was further hampered by the disappearance of high voltage FET transistors, especially those designed for audio applications, in Japan in 1985. The company's first design using its own name - the Lectron *JH 50*, was born in 1986 and is a Class A/B design using valves to give 50 watts per channel. To make an amplifier of comparable quality using transistors would have resulted in an exceptionally costly and very weighty number. Lectron found a way to cater for the high voltage requirements of its new power amp cost effectively using solid state semi-conductors to regulate the power supply.

The Lectron *JH* range has developed with the introduction of the *JH 30*, a hybrid valve integrated model in 1989, and the hybrid monoblok (*JH 80*) this summer. The latter uses a new polypropylene capacitor. "The problem with chemical capacitors is that they are not very good in terms of structure as far as sound is concerned," said Gerard. "They were always a bit elastic. But polypropylene has a very high capacity (of more than 1000F) and Lectron doesn't

Test bay procedures (opposite page), valves await trial in the Lectron listening room (above).

make its products to suit any other.

The listening room at the factory in Paris is a shop window of specialist hi-fi with European, Japanese and American products. "We leave it to the distributor or the dealer to advise on components to match our amplifiers," said Chretien. Last year the £2,300 Lectron *JH 50* was shown at the Penta hi-fi show (near London's Heathrow airport) by Electroactivity, which now imports the brand. Les Wong, who runs Electroactivity, hasn't imported the *JH 30* yet, candidly reasoning that other British amplifiers may offer more value for money. But he was looking forward to showing the *JH 80s* this year.

As far as the future is concerned Chretien is reticent about likely products. Will Lectron be making a digital amplifier? "We have many ideas concerning digital technology and Jean Hiraga is always very inquisitive," he answered. "We may develop a digital

converter, perhaps, but we also need to be stable and there has to be a gestation period for both the ideas and the business to be consolidated."

With classic French unconcern he adds offhandedly: "Our goal was never to increase the turnover; it was just exciting enough to produce product and step by step to learn."

Curriculum Vitae

Lectron.
Founded 1979
Number of employees: 6
Turnover: £700,000

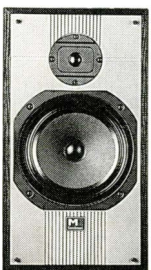
First product: *SRPP* tube preamp (kit)
1980 *Classe A* Hiraga power amplifier
1981 Hiraga preamplifier
1981 *DC1* preamplifier
1983 Begins supplying completed amps.
1983 *Le Tube* preamplifier (Recommended by *Choice*)
1985 *Le Solstice* preamplifier
1987 Lectron *JH 50* - all valve power amp
1989 Lectron *JH 30* integrated valve amplifier
1990 Lectron *JH 80* hybrid monobloks

Lectron:
1 boulevard Ney, 75018 Paris, France
Tel: +33 1 42 38 84 53.

UK Distribution: Electroactivity, 132 Longland Drive, London N20 8HX.
Tel: (081) 445 6151.



The finished product sits above a batch of (British) Partridge transformers.



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Goodmans

Statements

Monitoring what's happening on the high-end scene. . .

This month, Jason Kennedy listens to a substantially modified CD94 from T&R Industries and a 'Garrotted' AKG pickup courtesy of the Cartridge Man (!). And John Bamford finds a taste of the high-end in the modestly-priced Linx Vega pre/power amplifier combo.

As if to prove the point that there's really no need to suffer for your audio pleasures, Linx Audio's Vega pre/power amplifier combination is designed not only to look stylish in 'designer conscious' homes but also to offer all the facilities any sensible hi-fi user is likely to need. Along with inputs for any eventuality – the Vega preamplifier can accept signals from both high and low output MM and MC phono cartridges, a CD player, radio tuner and (say) a Hi-fi video recorder – there are sockets and switches allowing two tape recorders to record from any source along with bi-directional dubbing between the two.

Attention to detail

The preamp's volume and balance controls feel suitably luxurious and all switching is accomplished via laser-cut panels in the Perspex fascia which trigger a bank of relays. CMOS logic controls the input selection. There are no tone controls, of course. As the Vega is about good sound as well as looks, internal circuits adhere to the philosophy that 'simple is best'. Signal paths are kept sensibly short, unnecessary complications (such as tone controls) are avoided, and there is evidence of surprising attention to detail in the choice of internal components used. I say surprising because in the Vega combination Linx Audio uses many audiophile grade passive components of the kind usually found only in much more esoteric hi-fi gear with higher price tags.

The power amplifier has a generously specified power supply, and boasts 75watts per channel into 8ohm, this power output figure increasing to over

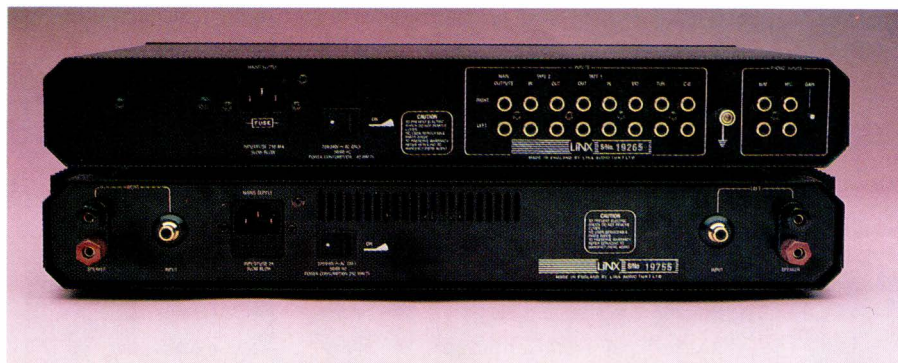
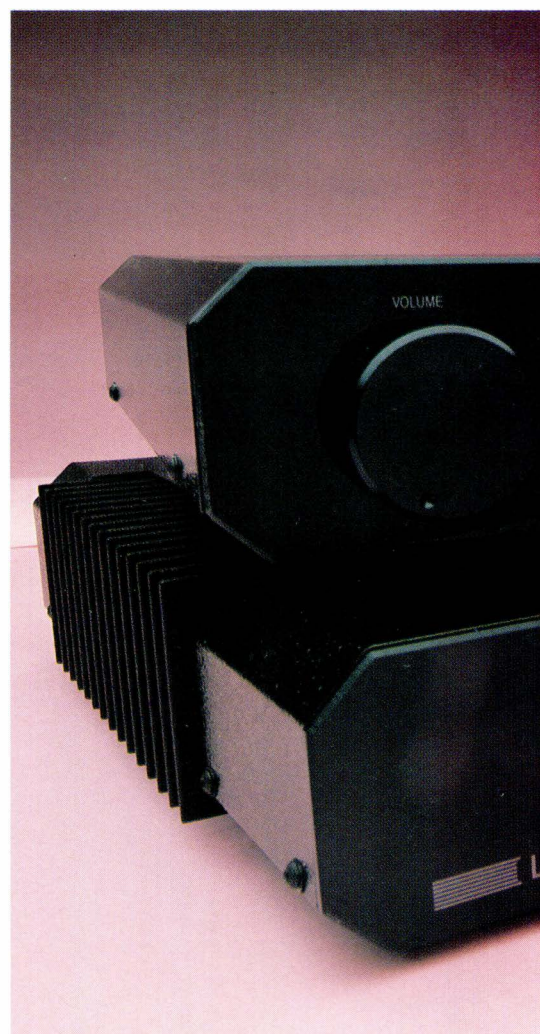
100W into 4 and 140W into 2ohm. It's got good muscle for all but the most power hungry loudspeakers and provided ear-shattering sound pressure levels in my larger-than-average (27ft by 15ft) listening room with large floor-standing loudspeakers such as Snell Type C and JBL XPL 200s.

The Vega combination is both pleasing on the eye (these eyes, in any case) and easy to use. Given a high quality source, that's how it sounds too. Although lacking the transparency and soundstaging of really expensive esoteric amplifiers, it nevertheless has the ability to produce reassuringly solid stereo images. It's not especially detailed either, but tonally it has a satisfying 'warmth' and sense of homogeneity, and is especially easy on the ear. Lacking the delicacy of the finest (usually vacuum tube) amplifiers, it still sounds sweet, refined, and relaxing over long listening periods.

I got on with the Vega pre/power amplifier rather well during the weeks leading up to this summer's exceedingly hot spell. Power consumption is low, consequently I didn't feel too guilty

(or spendthrift) in leaving both preamp and power amp continuously switched on. Indeed, the power-on switches have been sited at the rear of the units to encourage owners to leave the Vega combo running all the time anyway – except when going away for a day or two, that is. The preamplifier is fitted with a standby function, which can be used if desired to ensure that tweeter-destroying thumps cannot, in any eventuality, ever reach your loudspeakers.

Knowing that the folks at Linx are keen listeners, I knew they were serious when they told me their amplifiers needed a good hour or more to reach optimum performance. They were of course right, as it's not an imaginary



Power switches are hidden at the rear, encouraging users to leave it switched on.



Good looks and ease of use make the Vega pre/power combo a delight.

phenomenon with this or many other hi-fi components I could name. With prolonged listening I found the Vega's rhythmic solidity and high 'boogie factor' characteristics reminding me of Naim amplifiers. Given my listening experiences, I would argue that while mid-priced Naim combos sound 'tighter' and more dynamic, Linx amplifiers typically make up for this in better resolving power at very low frequencies and a more 'open' midband.

Going down...

I was surprised to find that the Vega went as low in the bass as my 'reference' Audio Innovations triode monoblocks (the £2,500 *Second Audio Amplifiers*), and was impressed to find that the preamplifier worked splendidly when used to partner these valve power amps. Few preamplifiers around are quiet enough to use with Audio Innovations' power amps due to the latter's unusually high input sensitivity, and I would not advocate a mix 'n' match set-up involving any of their power amps without first checking very carefully with a dealer. The same goes here, because the subjective annoyance (and

The Vega combination is both pleasing on the eye and easy to use. Given a high quality source, it sounds easy on the ear too. Although lacking the transparency and soundstaging of really expensive esoteric amplifiers, it nevertheless has the ability to produce reassuringly solid stereo images.

masking of detail) caused by a system's noise floor can alter from one installation to another. My basement listening room is 'electrically quiet', and I sit a long distance from the loudspeakers. But a system's noise floor must always be *very* low when near-field monitoring – and there's no accounting for hum loops and mains quality.

Combining no-nonsense, fuss-free performance with a high 'pride of ownership' factor, Linx's Vega pre/power combo offers a good taste of what high-end hi-fi is all about but at less than high-end prices. The preamp costs £465, the power amp £495. Linx makes a heavyweight power amplifier too which is well worth hearing, the 130W stereo *Pulsar* (£965).

For those on a tighter budget, the company's *Nebula* integrated amplifier possesses many of the Vega's musical qualities and works extremely well in small systems. This costs £449 – not £499 which was printed in error in our August issue – and like its bigger brother is the kind of amplifier which grows on you over extended listening. The *Nebula* didn't come across as a very exciting amplifier in our blind listening sessions for the August issue, so beware quick A/B demonstrations in a dealer's showroom. Its musicality is subtly understated.

Regular readers may remember a review of some T&R Industries pre/power amplifiers in *Choice's* June issue (83). They are built by a small Coventry based company run by a meticulous Malay called Tuck Thong. In the process of designing the amps, Tuck decided that a first class CD player was needed to help develop the line stages of the preamp. But despite considerable research into the CD player field, he couldn't find one that really came up to spec and decided to see if he could improve what was on offer.

Some months later he had a Marantz CD94 that weighed somewhere in the region of 20kg and sounded rather better than the 'standard' model. So much better, in fact, that several of his existing customers were prepared to spend close on £1,600 to have their players upgraded in a similar fashion.



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I came across this extraordinary machine when Tuck brought it down to show off his amps with, and was duly impressed, deciding there and then that a review was in order. At the time this didn't seem to be all that straightforward; the company wasn't geared up to mass tweaking and didn't know whether it could keep up with the demand that might follow a good review – if that were the outcome! However, by July Tuck was sufficiently confident to lend us a sample of his hernia-inducing disc player and one appeared on the *Choice* doorstep with a note to the effect that the price for the job, which can be carried out on any of the higher quality Philips based machines, had been reduced to £1,200 in anticipation of higher volumes of work.

Increased rigidity

So what has he done? Not an easy question to answer, I'm afraid. Like the T&R amps, this customised CD94 is held together with security bolts that require an obscure tool to remove. The best that can be done is to pass on what Tuck explained to me. This is that the machine's weight and extra depth are due to an inch and a half slab of low resonance aluminium that has replaced the base of the machine and adds rigidity, mass and some degree of RF screening. Apart from this, most of the ancillary electronics have been replaced by T&R's own circuits which are built along similar lines to those found in its preamp, so power supplies will have been beefed up and things like op-amps, resistors and caps replaced by more capable varieties. Mechanically, apart from the new base, we're told that the transport itself has been improved, but externally, except for the removal of the optical output and the extra height, the machine looks much like a standard 94 (the model shown is the company's dem model hence the steel sideplates and lack of a badge).

Operationally it's the same as a standard model in all respects, except that the display turns itself on only when receiving commands from keys on the machine or its remote; after a few seconds it's turned off. This is perhaps the nicest touch about the machine, combining as it does user friendliness and hi-fi principles in one neat delay unit.

For the purpose of subjective evaluation, the player was connected directly to the Audio Note *Ongaku* power amp with T&R cables. The *Ongaku* has sev-



eral line inputs and the smoothest volume pot in the business. Speakers were the trusty Snell *IIIs* hooked up with some silver Audio Note cable. This might not be the most commonplace of CD replay systems, but is easily one of the most revealing.

Sonically, this machine turned out to be the first that I've listened to extensively that really shows up the differences between discs. And as with LPs, only the minority that I had access to proved to be particularly convincing. But some did, and they had real depth, speed and power. John McLaughlin's recent live album recorded at the Festival Hall turned in a particularly appealing performance even if it seemed to lack the ambience that usually accompanies live material. Another good album in both artistic and sonic senses is Tom Verlaine's *The Wonder* which revealed considerably more depth and information when played on this machine – in fact it's good enough to warrant buying the LP (whilst the going's good).

A few comparisons

The T&R CD94 is by far the most informative and listenable player that I've had at home. Only the Micromega *Classic*, which was auditioned quite some time ago, can offer it any competition. However, not being a convert to the CD medium, I've not had the sort of exposure to players that is required to put a machine like this in context. So it seemed like a good idea to see how much improvement could be wrought by using a similarly costly outboard DAC with a standard CD94. What even-

A CD94 like no other: T&R Industries' modifications include replacing the base with a 1.5 inch slab of aluminium.

tually turned up was a Wadia *Digimaster X32*, no less, which at £2,000 costs nearly as much as the T&R upgrade and a CD94 together. Nevertheless Tuck was confident that his machine could hold its own and comparisons were made.

It survived the stand off well, giving the Wadia a run for its money in most musical departments, even giving it a hard time in that vaguest of all reviewing categories: musicality. The X32 proved to be more dynamic and natural but only subtly so, and with many discs the differences were negligible. (That said, differences between players of a similar price never seem enormous.) I also managed to grab a Meridian 203 for a quick spin (it's reviewed by Alvin Gold in this issue) and found that in many respects this offered a similar level of information retrieval to the T&R. That was until I played a live Terry Bozzio drum solo which the Meridian reproduced almost as if recorded in a studio, such was the lack of hall acoustic compared to both the T&R and Wadia. The T&R upgrade seems to be sonically worth the asking price and the standard of workmanship, (and weight!) is very high.

With CD technology still progressing at a remarkable pace it's difficult to wholeheartedly recommend this type of upgrade. Mind you, a T&R CD94 would leave you with a very substantial machine to use as a transport should you feel the need to add an outboard

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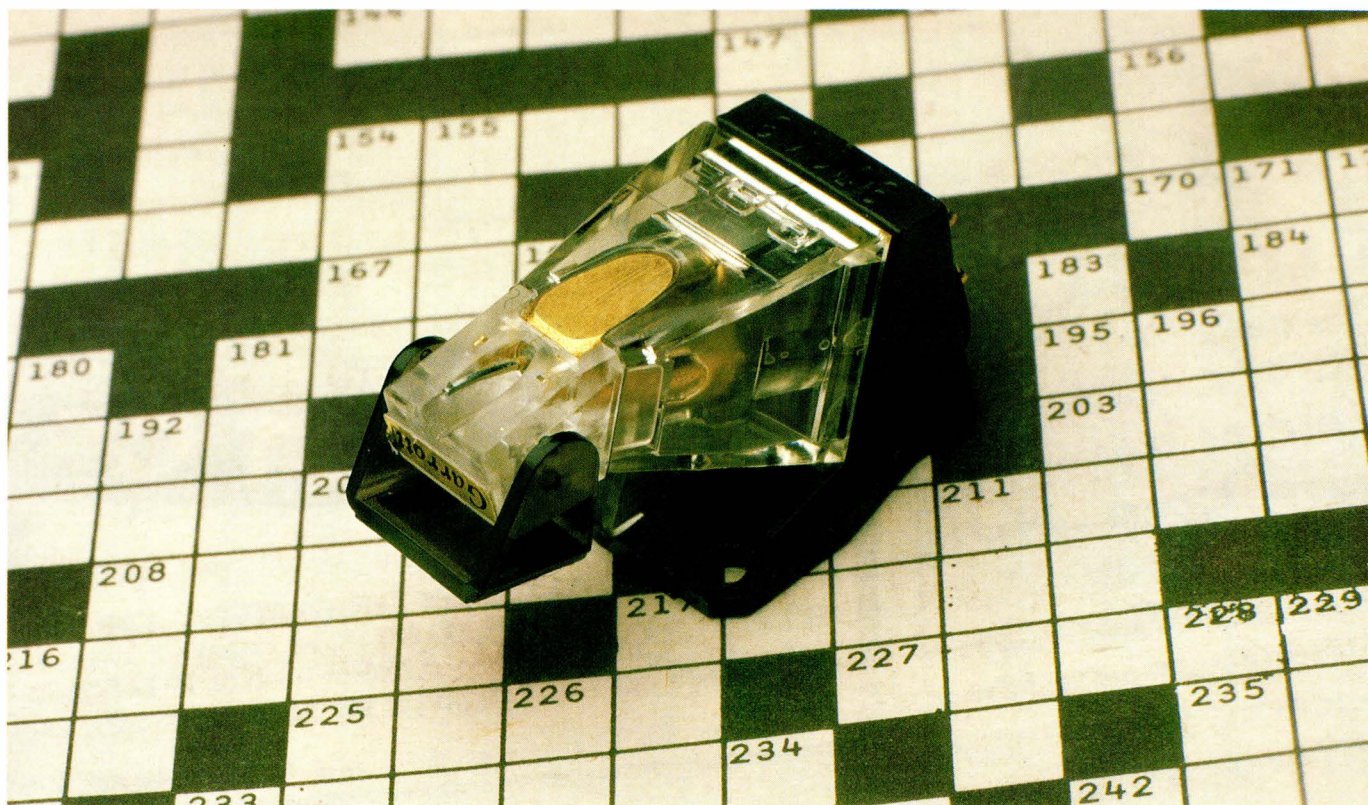
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DAC in the future. Although the tested sample had a dead (coax) digital output, this function could presumably be left active if required, which in the light of recent developments (eg 'bitstream') should be considered a must.

At the end of the day, the T&R megatweak does transform the CD94 (and presumably any of its stablemates) into a more informative and substantial machine. Assuming you're not obsessed with keeping abreast with the latest developments, you'll find it represents a worthwhile upgrade for the price.

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

A few months back I noticed a small advertisement in the back of *Choice* that went something like: "Ring the Cartridge Man and have your ideas about high-end cartridges turned on their head." Being a sucker for such devices, the number was duly dialled and I was connected to the Cartridge Man himself – or Len Gregory as he is known to his friends. Len runs a small audio consultancy business from his Croydon home, and it was there that I first heard the cartridge that is so confidently announced in the advert.

It turned out to be an AKG P8E fitted with a Garrott microscanner stylus. The AKG is no longer in production but was born in the late Seventies and remained in production for about ten years. Len, having discovered it some time ago, set

AKG's P8E of yore, now given the Garrott treatment by the Cartridge Man.

about buying up stocks and looking for used samples. (Being a moving magnet cartridge, the cantilever and stylus assembly are removable and can still be bought, so secondhand bodies are very useful.) Len is also the UK agent for the Garrott Brothers, those antipodean audiophiles who have done so much for Decca cartridges in the past, so it is no surprise that the two have been combined to create the Garrott/AKG. The P8E was designed in the days of the low mass tonearm, when SME III and Fidelity Research arms ruled the roost, and for this reason it's a very high compliance cartridge, tracking at a mere 1.25 gram. As such, it not only tracks very well but lessens record wear compared to many exotic MCs in current production. On the other hand, it is complemented by the type of tonearm that is relatively unfashionable these days – of the twenty five or so arms we list in the *Directory* only about five would be suitable. However, it's worth remembering that there are many such arms on the secondhand market, and they're often remarkably inexpensive.

Extracting information

After my brief exposure to the beast in Len's system, I managed to borrow a sample to try in my admittedly unsuitable Townshend *Rock*/SME IV based system. Under these circumstances the cartridge proved remarkably good at extracting information from the grooves

placed under it. At mid and high frequencies especially it is incredibly revealing and 'open'. It's also very analytical, in the style of expensive Ortosons, and not in the slightest bit romantic (well, perhaps a little bit, but like a Decca rather than a Koetsu).

I managed to rig up a more appropriate arm, an elderly Mission 774, on my Systemdek and, after filling up the damping trough, got some very pleasing results. Under these circumstances it sounded more open and dynamic, if not quite as solid as on the *Rock*, but the tradeoff is worth the extra scale and life in the music. Detail retrieval was still very good, the combo having little difficulty sorting out Steve Vai's Strat abuse on Zappa's *Conehead*, his wicked licks sounding fast but still clean. The AKG's slightly bright balance, caused by a very low tip resonance, favours laid back rather than up front records, but is rarely aggressive if used on a deck which has some form of damping for the arm.

No worries...

At £350 Len's Garrott/AKG represents good value if used in an appropriately equipped turntable. If you like, it's a Decca without the worries, the high compliance and low tracking force ensuring that Decca-style groove modification is improbable. But it does have a lot of that cartridge's speed and transparency.

Don't take my word for it, go see the Cartridge Man. You can call him on (081) 688 6565 for more info and a new approach to old Thorens decks.



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- Philips CD610II add £50
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Our simple hi-fi quiz requires six answers which must be written on the entry form provided. Fill in the form, remembering to include your name and address and send it to the address shown in bold type at the bottom of the form. Mark your envelope **Luxman competition.**

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The first correct entry drawn from our mailbag after the closing date will win an *LV104U* hybrid amplifier (worth £640) together with a *D103U* CD player (value £609), *K110* cassette deck (£215) and *T11L* tuner (£199). Total value of the first prize is £1,663!

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The Questions

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

1. Roksan Engineering now makes an RIAA phono amplifier to go with its *Xerxes* turntable. What is it called?
2. Which British company manufactures Radford CD players and amplifiers?
3. Name the engineer responsible for many superb audiophile recordings on the Water Lily Acoustics record label in the US.
4. What is the commonly used acronym for metal oxide semiconductor field-effect transistor?
5. Name the well-known hi-fi commentator who is responsible for some of the design work behind the Lectron brand of valve amplifiers.
6. Which British company manufactures a PDM 1-bit D-to-A converter called the 203?

Entry Form

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ADDRESS:

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HFC/OCTOBER/90

Closing date: Monday, 12th
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Your answers:

1

2

3

4

5

6

COMPETITION RULES

- 1) All entries must be on the entry forms provided. Photocopies will not be accepted. Incomplete forms will not be considered.
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- 4) The competition is not open to readers living outside the United Kingdom.
- 5) The prizes will be awarded to the first sets of correct answers opened after the closing date. The Editor's decision shall be final and binding. No correspondence whatsoever will be entered into regarding the competition.
- 6) The winners will be notified by post and the results will be published in *Hi-Fi Choice*.

Send your completed forms to:
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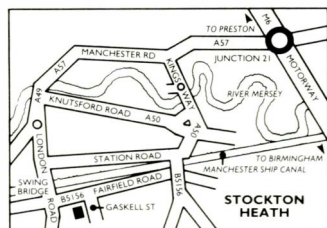
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Readers Write Choice Answers

Cable conundrums

Your review of Sumo amplifiers in the *Choice* Separates Systems issue (July '90) was of interest as I have a system comprising Pioneer PD91 CD player, Sumo Athena/Polaris pre/power amps and IMF TLS 80II loudspeakers. The speakers have upgraded crossovers and are bi-wired with RS (Hitachi) LC OFC cable.

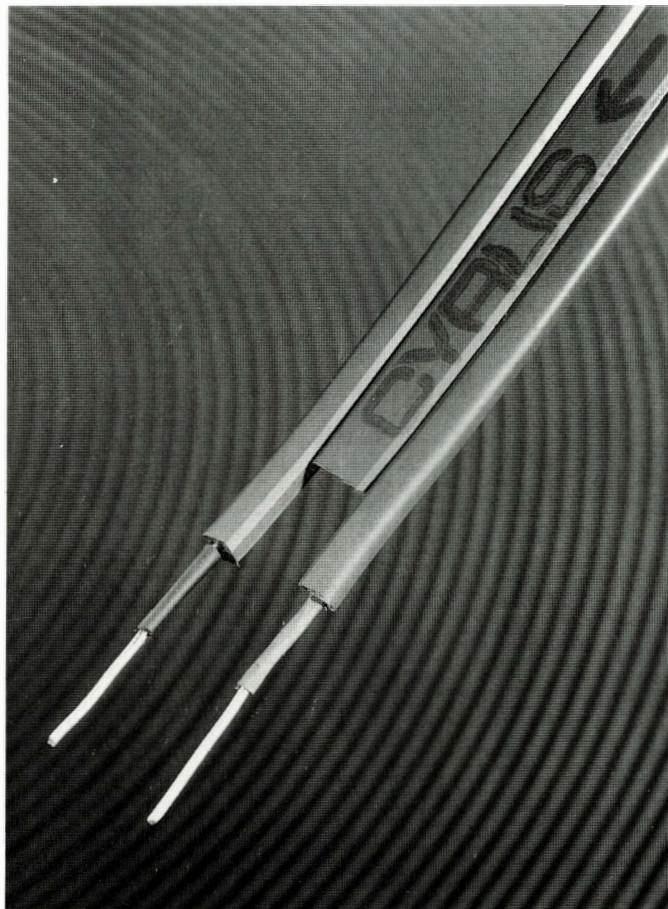
The system sounds OK but limited experiments with speaker cables like Audioquest Brownline and mains twin and earth have made quite significant differences.

In the review Alvin concludes that single core cable rather than thick stranded stuff was preferable in the £4640 system, and I wondered if you could suggest an optimum cable for my system.

ALAN DAVIES,
HEDNESFORD, STAFFS.

It's quite likely that your system would benefit from a good quality solid core cable, but equally it might sound a lot better with a good stranded cable. It depends a lot on the results you have achieved with the cables that you've tried. If the mains cables did things that appealed to you then investigating one of the better solid core types like Furukawa FS-2T15S (£50/m) or Mission Cyrus (£2.50/m) would be worthwhile. The Furukawa is available on a trial basis by the way.

Alternatively, if you preferred the results with the RS cable you currently use, then a better stranded cable would improve matters. We've found that Rotel Supra 10 (£6.91/m) and Deltec 8S (£144/5m pair) are both very neutral and informative. And of course having the bi-wire option means that you can experiment with different cables on the mid/bass and HF sections of the speakers. . . the possibilities are endless. But at the end of the day taste tends to play a fairly large part in cable selection and it's very difficult for us to say this is the cable for you.



Cyrus solid core, one of perhaps too many cable options.

It would be preferable to persuade a local dealer to lend you a few samples from his dem stock over a Sunday, and spend the day assessing which ones work most effectively in your system.

Straying from the path

Firstly, thank you for a quality magazine that I for one look forward to receiving every month. Normally I wouldn't bother writing for advice, I'd read your reviews instead, but the problem is that you haven't reviewed the products I'm most interested in.

My current system comprises Linn LP12/Iltok/Asaka front end, Naim 62/140 amplification and Linn Kan speakers. However, I want to upgrade the speakers and have come up with the following shortlist; Celestion

3000, Naim IBL, Epos ES14 and Proac Response 1. Could you comment on these or any other suitable alternatives. Incidentally, what I most value in a speaker is transparency (I love electrostatics). I'm also basically committed to the Naim faith and would like to follow the path vis HICAP, 250, Active. . .
ANDREW MEADS,
WELLINGTON, NZ.

Having not reviewed any of the models you list it's slightly difficult to say which ones are the most transparent and best suited to your system, which is a pity because our speaker reviewer's system is much like your own, if a bit further down the path. Going by the aural snippets of those that we have heard, the Proac has so far eluded us, the Celestion is probably the most transparent, the Epos the most musical and

the Naim the most 'up-front'. Obviously these comments are based on short exposure under diverse conditions and cannot be used as the final word, but they might give you an idea of which models to audition more closely. Alternatives that you should consider include the Snell K or JII depending on funds, Monitor Audio R852, Royd Apex and Sendor SP2/2. The Snells are probably the most transparent sub £1000 speakers we know and seem to work well with a lot of different systems, their high efficiency and benign impedance making them a veritable dream load for your amplifiers

New tip required for Little Pink Thing!

I have Denon DL110 cartridge that is in need of a stylus replacement, but wonder whether it would be best to do that or replace it with a new cartridge such as an AT-F3. I have a Little Pink Thing turntable but my preamp doesn't have an MC input. I would, however, be prepared to upgrade it, if a moving coil cartridge would give a worthwhile improvement.
PHILIP YATES,
BANWELL, AVON.

Given the fairly high cost of re-tipping it makes more sense to replace your Denon with something new. Given a sub £100 budget and a preamp without enough gain for a low output moving coil cartridge, we'd suggest something like the Glanz MFG310-LX (£50), a remarkably capable moving flux cartridge that did great things on our reviewer's PT TOO - a good start for an LPT owner. If you fancy spending a bit more then look no further than the Shure VST V (£158), a cartridge which proves that MMs can be more than the equal of similarly priced MCs.

Poem please

With reference to your article regarding the recording of *Stereophile* magazine's LP Poem: Works for flute and Piano, I would be interested

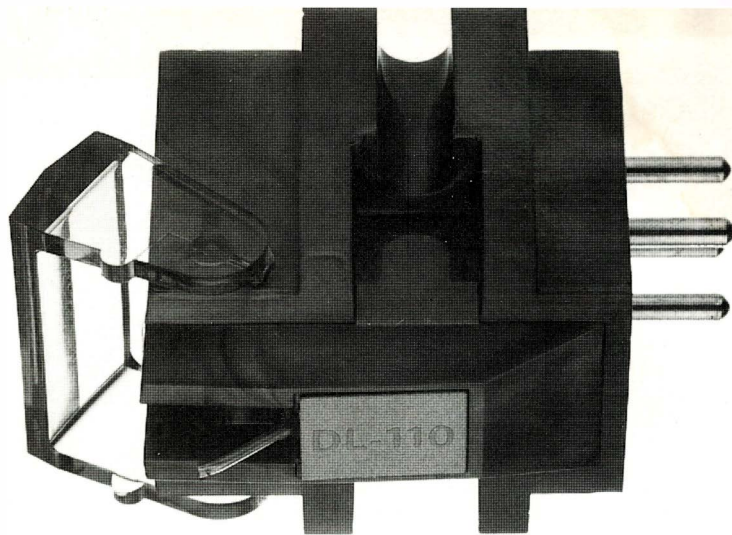
to know if this record is going to be made available in *Hi-fi Choice*. Or, if not, could you please supply an address and price (including freight) that can be used to order a copy.
 M J FLOOD,
 WEST DRAYTON, MIDDLESEX.

We have attempted to speak to the people at *Stereophile* regarding the possible sale of this particular recording through the magazine, but so far have received little in the way of returned calls or faxes. Current issues of *Stereophile* carry an order form for the LP which it sells for \$15.98 per copy plus \$5 for delivery of (presumably) any

amount to the UK or any other non-US or Canadian address. The magazine accepts major credit cards and orders should be sent to: *Stereophile*, Record Dept., PO Box 441, Mt. Morris, IL 61054, USA. Alternatively credit card holders can call this department on 010 1 800 435 0715, but remember that Illinois is six hours behind us.

Vinyl is dead, long live the LP

I have read with interest the numerous letters that have appeared in the hi-fi press for some time now, regarding the apparent determination of



Denon's DL-110: good, but not really worth re-tipping.

the record companies to force the vinyl LP into extinction. I too share the disgust expressed by those who care about music, rather than those who seem to spend all day worrying about 'pops and crackles'.

A colleague and I have decided that there is a need to bring together all the music lovers who are committed to analogue by forming a user group.

The project is still at the planning stage, but initial ideas are based around members telling us of those recordings they have discovered so that we can tell everyone else about them. This is probably most

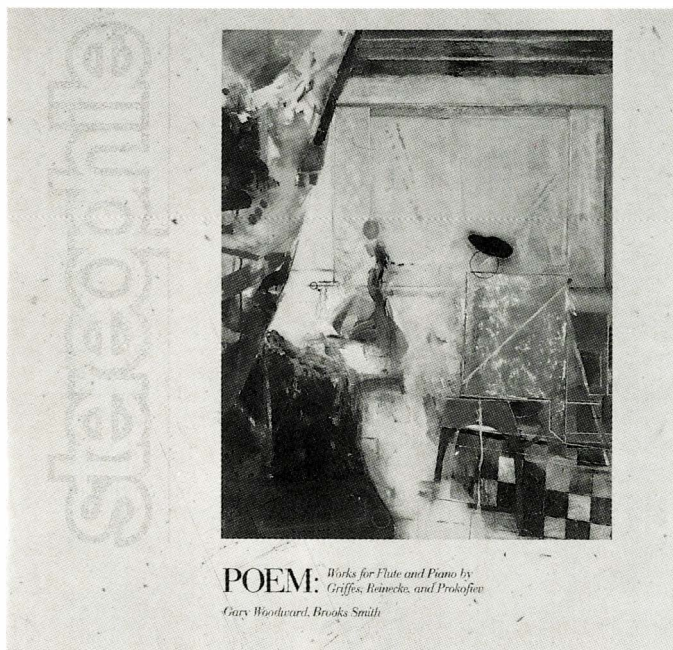
important in the classical field where it is becoming increasingly difficult to find digital, let alone analogue issues at all. Other possibilities include news, reviews, features and a secondhand record mart. Whilst it is planned to concentrate on the software, hardware will not be excluded. We will try to negotiate discounts although we can't promise anything in this department yet. A newsletter would be produced at regular intervals, but we hope that a large proportion of it will come from the members themselves.

There is no intention to concentrate on any one type of music, or any one manufacturer of equipment. We just want to create a group to whom the record companies will listen.

If you are at all interested, have any ideas and suggestions of your own, or feel you might be able to help us, please let us know and send a SAE to the address shown below. We will then be able to finalise our plans and hopefully provide a voice for all analogue music lovers.

Richard Hudson
 24 Exley Crescent
 Keighley
 West Yorkshire
 BD21 1NE.

Word has it that there is an organisation called *Analogue Addicts* which is pursuing a similar goal. Perhaps you should get together. We are always interested in hearing from groups like this and will pass on any important news.



A high-end magazine's theories put into practice on vinyl.



A veritable wolf in real wood veneer: Snell's deceptively plain-looking but remarkably transparent JIIs.

Uxbridge Audio



Dear Sir

Wembley Park,
Middlesex.

The EXCELLENT service, personal attention and professionalism I found with your staff, compels me to write this letter.

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

A quick phone call to your Shop to find out whether you had them in stock and I was lectured on how a Music System should be purchased . . . "HAVE YOU LISTENED TO IT? HOW DO YOU KNOW YOU WILL LIKE IT'S SOUND? It isn't the same as buying a washing machine, when it has to be taken on faith that it will do the job as you want it. It is more like buying a musical instrument, where personal preference dictates. You do not need to be an expert, you only need to listen to it and decide for yourself . . ."

Not too keen on the lecture, I was, none the less, taken up by what he said, and decided to pay you a visit. This turned out to be quite an experience! After listening to a few systems I had already decided I would be buying my own combination and not the one recommended in the magazine. A MUSIC SYSTEM SHOULD, INDEED, BE LISTENED TO, BEFORE PURCHASING. In addition, the personal attention, friendly, untiring and "non pushy" attitude of your sales assistant, Jas, turned the daunting prospect of choosing the right hi-fi into A MOST PLEASANT EXPERIENCE.

When I first read the letter from a satisfied customer in your advert I didn't think it genuine. But after my experience I know just what he meant. I echo him in commanding you and your staff and I will not hesitate to recommend you. I, once again, thank you for the help in choosing my system and the excellent service and attention I have received at and since it's installation.

Wishing your Company every success

Mrs. F. Monteiro



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Choosing and Using . . . Cassette Decks

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

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

Although DAT appears to be getting another marketing push now that the SCMS system has been agreed on (this system allows a DAT recorder to copy a CD in the digital domain – but will *not* allow you to make a copy of the copy), the message is that the humble cassette trundles into a new decade, consolidating rather than loosening its grip on the market. Cassettes are cheap, flexible and insensitive to being moved around (unlike any disc based system), but most of all they're widely understood and used, currently outselling all other prerecorded media by miles.

Though the future of the cassette seems assured, this is not to say it will escape the winds of change. Potential buyers should take into account the imminent introduction of a new noise reduction process called Dolby S, which is both extremely powerful and yet is claimed to provide a degree of compatibility with Dolby B. That last claim should be taken with a pinch of salt, remembering that Dolby Labs said much the same of Dolby C. But it also claims that a Dolby S deck will perform comparably to digital media with respect to noise. Dolby clearly sees the process as one that will eventually usurp Dolby B for prerecorded applications, so it shouldn't be underestimated.

You can't buy a Dolby S cassette deck yet, although H/K is promising that first generation machines are imminent. Anybody buying an expensive cassette deck should at least take Dolby S into account.

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

prop up flagging high frequency dynamics on musical passages recorded at high level, keeping compression at bay a crucial few decibels more than otherwise would be the case.

Metal tapes tend to be noisier (as well as being more expensive of course), and consequently it's harder to dispense with Dolby noise reduction. Nevertheless, metal tapes remain the best option for capturing music's solidity and dynamics since the nature of the recording process with metals is inherently less prone to compression. At the same



becomes a factor only well into the several hundred pounds territory.

One advantage of better quality cassette decks is that they make more of the tapes you feed them. Ultra-quiet Type IIs for example can often be used to record even quite wide range music without Dolby noise reduction yet without obvious signs of hiss at normal volume levels given an inherently quiet deck with good heads. It's surprising how noise free a sympathetically chosen deck and tape combination can be, and omitting noise reduction processing generally adds clarity and articulation to the sound which is, literally and metaphorically, less manipulated. Dolby HX Pro assists here, since it helps

time, metals need high bias and record currents through the head, and therefore the task of the cassette deck is considerably complicated.

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

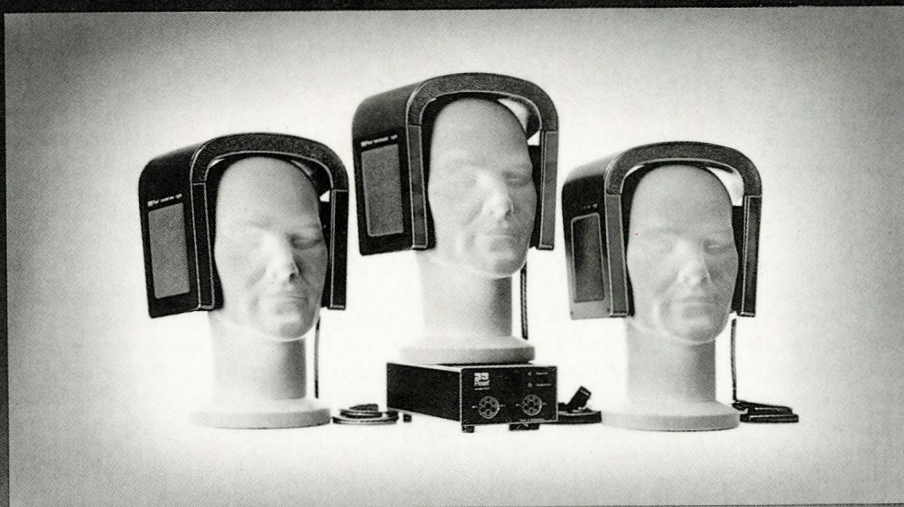
In other words, you get what you pay for, a comment equally applicable elsewhere.

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

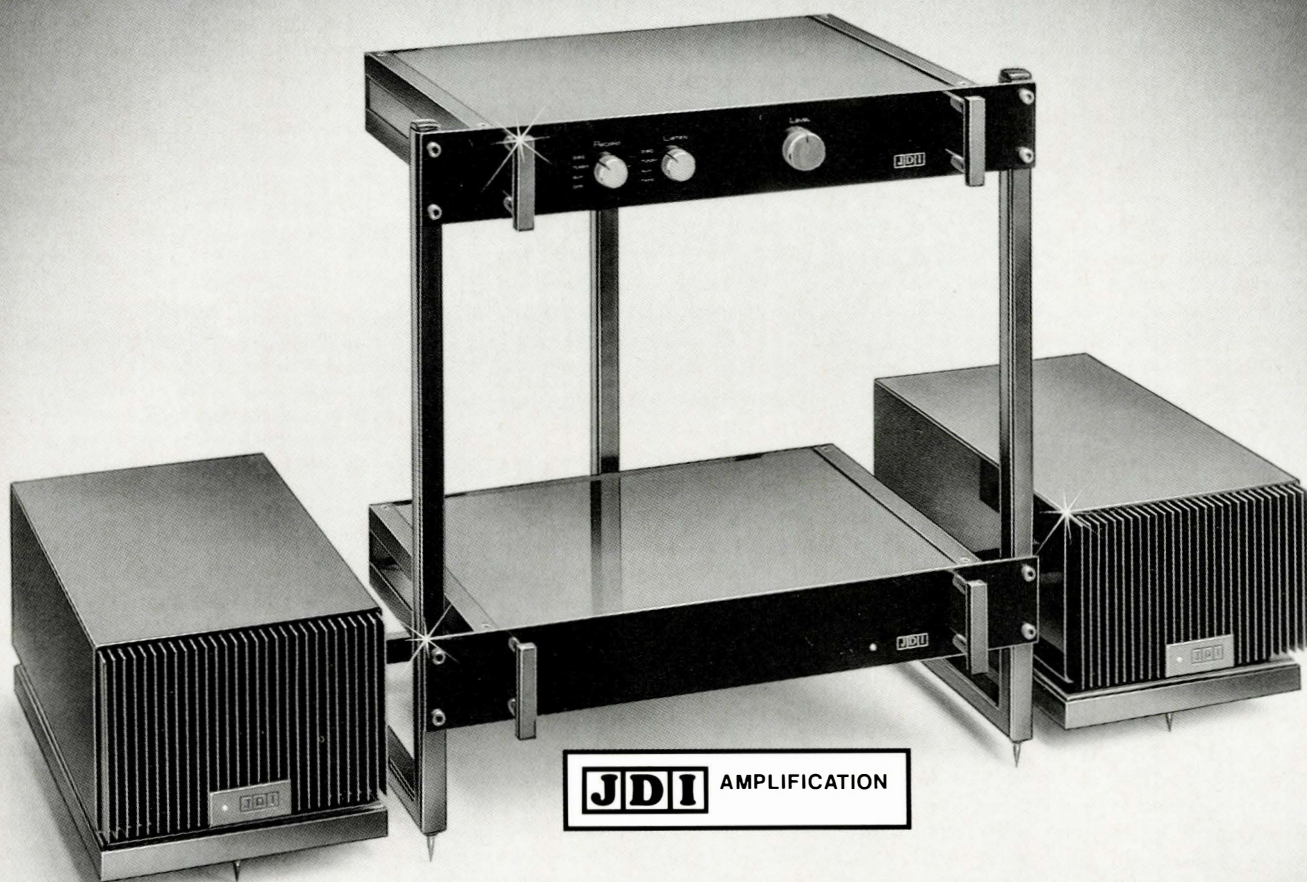
Electronics are being used for more and more functions of course, but sometimes this backfires on the user who should beware that not all logic decks can be left in record standby using an outboard timer (this facility is automatically available with decks featuring mechanically latching transport controls)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

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

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



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Akai GX-65

AKAI (UK) LTD., 12 HASLEMERE HEATHROW ESTATE, SILVER JUBILEE WAY, HOUNSLOW, MIDDLESEX. TEL: (081) 897 6388.



It is not customary to review a single model in two successive issues, but here it was made desirable because the previous test sample turned out to have been a European (ie non-UK) standard prototype, and there was a real possibility that the poor scoring would be overturned by a representative production sample.

The first point made about the GX-65 in the original review (April issue) was that it should be an attractive proposition for the audiophile. In the main, the designers had their eyes on the ball and concentrated their attention on the engineering fundamentals instead of plastering the deck with gadgetry. The end result is a deck with comparatively few convenience features but one that boasts a sophisticated dual capstan transport to help promote pitch stability, good tape to head contact and perhaps most important of all, greater transport consistency. Tape slack is taken up automatically, and the guides have received special attention to reduce weaving across the heads. The Akai GX-65 is also a 3-head deck, capable of monitoring from tape in real time. The monitoring control switches between tape and source outputs automatically, though the deck's decision can be overridden.

Dolby HX Pro headroom extension circuitry is used to improve high frequency dynamic range along with the usual Dolby noise reduction circuits. The record level meters are wide ranging (33dB) and unusually attractive. An electronic tape counter provides the usual guidance, while other features are limited to fine bias adjust, a headphone level control and the promise of an infra-red remote control if you can splash out a few more coins.

Lab Report

Wow & flutter measures 0.13 per cent weighted, which is better than the origi-

nal sample (0.17 per cent), but the unweighted figure and those for wow and flutter separately indicate that what has changed is not so much the amount of w&f, as its distribution with frequency. This is confirmed by the spectrum analysis which shows that wow and flutter sidebands have been moved around. It's also worth noting that the test results are below average for a £300 deck.

Frequency response trends are barely different to the previous sample, except that the treble looks a little sharper. The bass ripple is probably related to the head contour, and can be expected to influence bass tunefulness and uniformity. All three tape groups show a slowly rising response trend into the treble, evidently due to an equalisation error that affects the playback-only response shape. The signal/noise figures represent the most important improvements over the previous sample, best demonstrated by the Type II Figure of Merit which is fully 4.5dB up at 54.5dB.

Sound Quality

The improved and altered measurements are paralleled by significantly improved musical standards. It still proved impossible to achieve a wholly natural tonal balance with the Type IIs tried (TDK, Maxell and Sony), despite playing around with the bias setting whilst switching between source and tape monitor. Furthermore, the Dolby circuits tended to sound coloured and opaque. Metal tapes however, tended to put these shortcomings to right, which suggests that the problem (such as it was) had more to do with the tape to machine interface than the recorder itself.

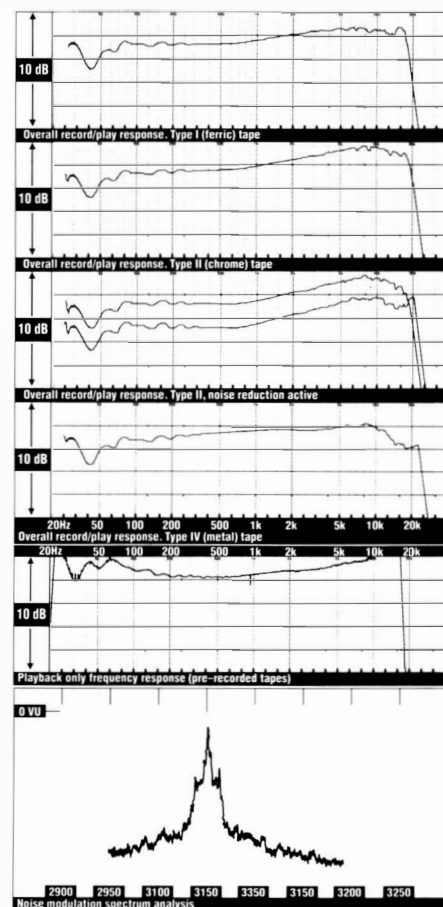
Conclusions

The Akai is finally capable of making

stable, accurate and believable recordings, through there remains a touch of coarseness at times and the bass can still sound thin and coloured. Nevertheless, a good deck, and worth shortlisting.

TEST RESULTS

Dolby Level reading on deck's meters	-1dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	90Hz-19kHz
IEC Type II	90Hz-21kHz
IEC Type IV	90Hz-22kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.13%/0.24%
Wow/Flutter - Peak DIN wtd	0.20%/0.23%
Speed error	+1%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	51dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	55.5dB
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	54dB
Noise Figure of Merit (Dolby level/noise Type II)	54.5dB
Crosstalk + Noise ref 0VU/1kHz	54dB
Line input sensitivity/overload	112mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	650mV/3.95V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.25%
Azimuth check R-L phase at 10kHz	40 degrees
VU indication at IEC 0dB	0dB
Dimensions (w x h x d)	42.5 x 13.7 x 35.3cms
Average wind/rewind time (C90)	1min 52sec/fast
Typical Retail Price	£300



Dual CC 5850RC

RAM PROJECTS, UNIT 27, STRETFORD MOTORWAY ESTATE, STRETFORD, MANCHESTER M32 0ZH. TEL: (061) 8668101.



Dual is a German manufacturer which became famous for its low cost turntables. The company is now part of the French owned Thompson group, but its electronics have been made on an OEM basis in the Far East, a fact concealed by the absence of any country of origin markings on the review machine.

Although the words 'Audiophile Concept' are writ large in florid (one might almost say lurid) script on the loading door cover, the Dual is hardly in the carriage class of cassette decks. The unit is no lightweight, in fact it is quite well endowed in relation to price, but the casework is rattly (the lid should have been damped or restrained in some other way) and the operational feel is rather pedestrian and, in the case of certain transport modes, downright obstructive.

The range of features is utterly without surprise. Dolby B and C do the hiss cutting bit, Dolby HX Pro improves HF linearity with low bias tapes and the MPX filter network can be removed from circuit. The tape counter is electronic; it reads in traditional rolling numbers rather than minutes and seconds. Memory stop and repeat are triggered by the counter. The meters are well but not extravagantly designed. Other features include record mute, track search and a bias adjust circuit. Headphones can be accommodated, but at fixed level, and no provision is made for timer controlled recordings, something the author at least would miss horribly.

All in all, this is the kind of package that most people will learn to drive in their sleep, and for which instructions are practically superfluous (which is just as well since they were missing from the review sample). There's nothing wrong with such quickly attained familiarity however; as a working tool the Dual is practical and easy to use.

Lab Report

If nothing else, the Dual is a well set up machine. The record and replay electronics are anyway. All responses are pancake flat (or close), with just a suggestion of rising output in the deep bass, which in the case of the replay only response run, is exaggerated a tad due to the lack of complementary replay processing.

Noise and distortion figures are adequate, the high level IM distortion is already high at 0VU which casts some doubt on headroom with metal tapes specially, despite the use of an amorphous record/replay head. Pitch stability however, is dire, especially for a deck costing the best part of £300.

Sound Quality

In the case of cassette decks with very high levels of wow & flutter, wavering pitch of many instruments gives the game away very quickly. But in borderline cases, the symptoms tend to be more general and subtle, always including an element of loss or muddling of low level detail. This was the case here. The Dual doesn't sound bad. Its tonal neutrality stands it in good stead, and bass quality is firm and true, despite a measured treble excess. Metal tapes clearly provided something a little extra by way of openness, clarity and dynamics compared to Type IIs.

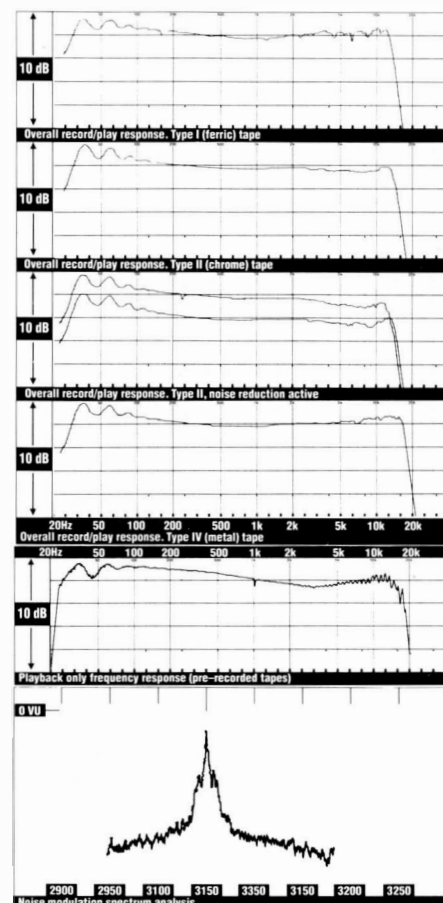
There were no problems with noise or distortion either, but there was a tendency for very subtle, low level detail to be obscured, and for imagery to sound vague. One small scale choral recording made of Taverners *O Wilhelme pastor bone* sounded mushy, with ill-separated voices and an amorphous acoustic, though upfront multi-miked material often escaped more lightly. On the other hand there was little pitch imprecision except on a few rare cases involving sustained notes on woodwind.

Conclusions

There is not a lot wrong with this machine beyond a slightly dicky transport. But the price tag is plainly over the top for one with the facilities and build quality on offer here.

TEST RESULTS

Dolby Level reading on deck's meters	0dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	22Hz-14kHz
IEC Type II	22Hz-15kHz
IEC Type IV	22Hz-18kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.25%/0.50%
Wow/Flutter - Peak DIN wtd	0.06%/0.35%
Speed error	-0.2%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	51dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	54dB
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	53.5dB
Noise Figure of Merit (Dolby level/noise Type II)	54dB
Crosstalk + Noise ref 0VU/1kHz	50.5dB
Line input sensitivity/overload	77mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	833mV/2.2V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	3.16%
Azimuth check R-L phase at 10kHz	0 degrees
VU indication at IEC 0dB	1dB
Dimensions (w x h x d)	44 x 12.2 x 31cms
Average wind/rewind time (C90)	2mins 24sec/slow
Typical Retail Price	£269



Marantz CP430

Recommended

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



The CP430 looks rather like an ordinary and old-fashioned battery portable. It is a battery portable, but it decidedly isn't ordinary, for this is a full feature high quality cassette deck with all the attributes of a portable as well. Conceived as a semi-professional tool and popular with broadcasters and reporters, it is also an attractive proposition for semi-critical location music recording, for recording birdsong in the wild, or what have you.

Size notwithstanding, the CP430's specification includes three heads for real time off-tape monitoring (through headphones or a built in mono speaker switchable L, L+R, R), Dolby B and dbx.

As a portable, the Marantz can be run from three MN1300 batteries or a rechargeable battery pack which can be charged in situ (in 16 hours plus). A record limiter and 5.3mm mic inputs with an attenuator will take care of most low impedance microphones including high output electrets. Variable level headphone monitoring is also available. No power supply is provided for powered mics however, and all inputs are unbalanced. Normal phono based line level connections are fitted.

dbx has a particular relevance here because it all but eliminates the need for level setting and obviates any likelihood of overload. The Marantz is supplied with an ever-ready case (not weather-proof), a quick release shoulder strap and a mains adapter. Shoulder hung, the transport controls, which are visually well differentiated, and the meters (moving coil with peak reading LEDs) face the user.

Lab Report

The single capstan transport produces fairly high flutter levels, but the combined wow & flutter level is still comfortably below 0.1 per cent. The playback frequency response is affected by a

portable head alignment error, and ferric (Type I) tapes reproduce with a gross error (+5dB at 15kHz is not small beer!) but Type II and IV error levels are down to a manageable 2dB at the standard bias setting, and the latter can be used to bring them closer into line. Treble responses are well extended, and bass output is clean though slightly truncated. Unfortunately it is possible to clip the line output amplifier as there is barely 3dB headroom above 0VU.

Sound Quality

The powerful (30dB) noise reducing effect of dbx is not achieved without cost. The bass has a ringing coloration and the harmonic structure of many instruments is badly skewed, though record/replay frequency response errors may be responsible for most of this.

Matters are considerably improved with Dolby B (the working space between overload and the noise floor is too narrow to make it feasible to record without noise reduction in most cases) but it is hard to get away from a certain coarseness and music related compression, and some odd background LF noise. Whilst overall musical results were satisfactory, piano transients sounded somewhat muffled and the subtle harmonic structure of certain instruments was on the crude side. Woodwind instruments, which in many ways stress tape unduly, lived up (down?) to expectations in respect of mod. noise especially, whilst prerecorded material often sounded somewhat lacking in joie de vivre.

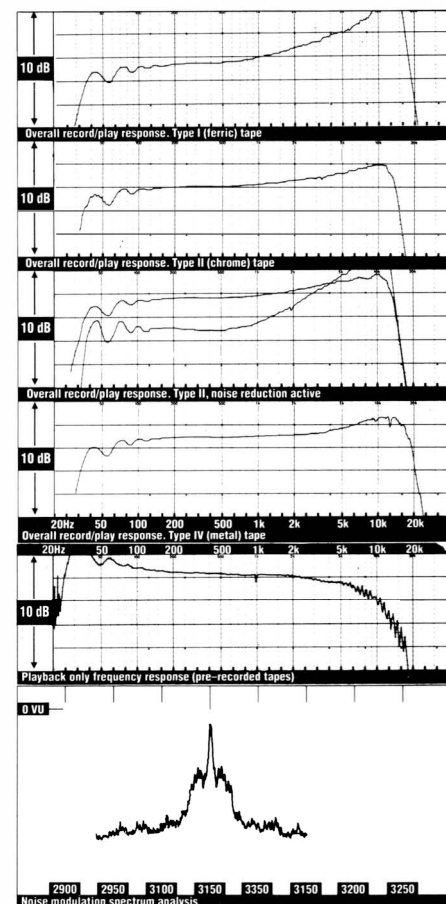
Conclusions

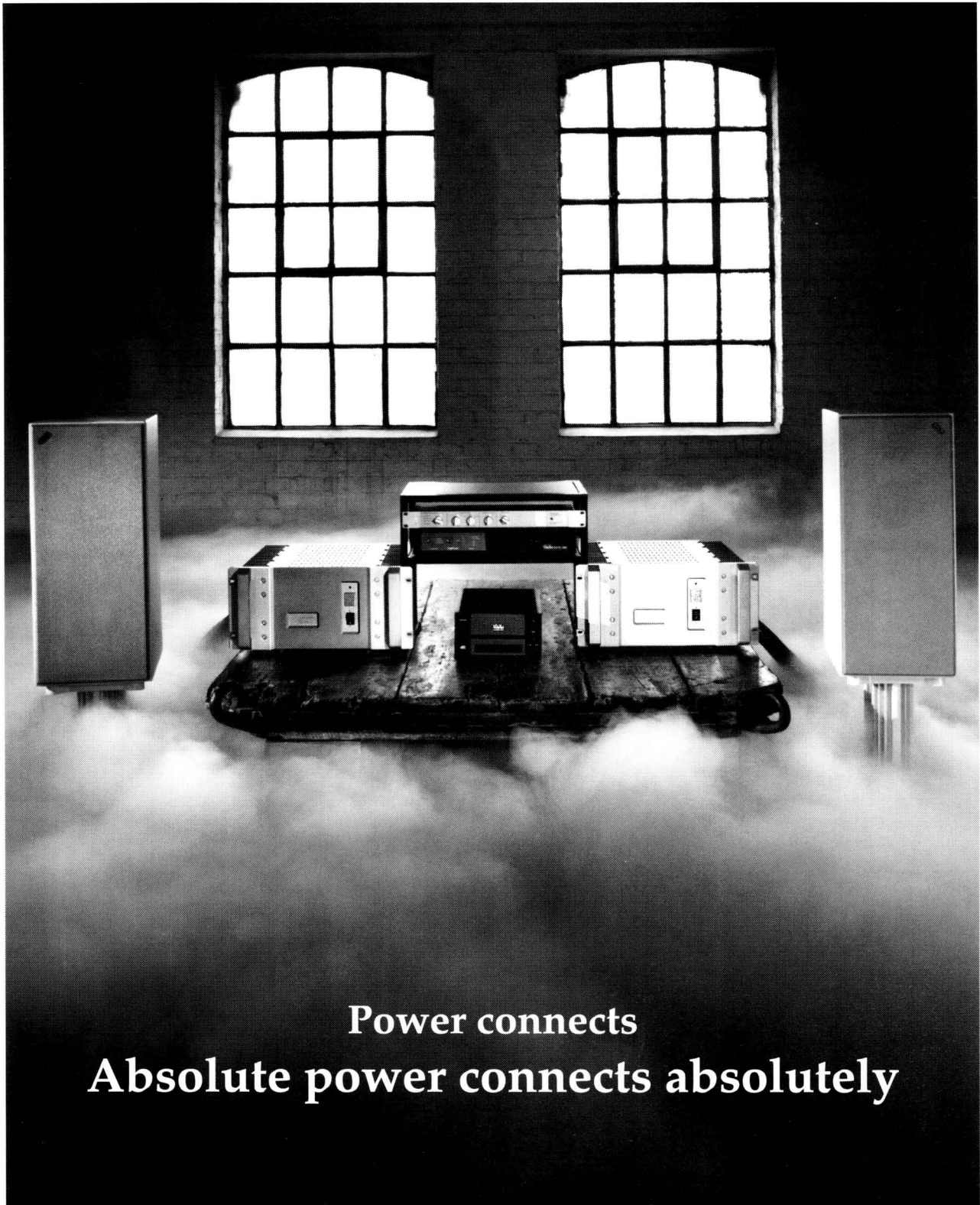
Assessed without reference to its special features, the CP430 would have to be found wanting as the list of shortcomings demonstrates. Nevertheless, performance standards are rather better than many budget cassette decks, and

the other advantages offered by this unique package – flexibility, portability, battery operation, and the surprisingly well thought through control system – make it a must for a range of applications that other recorders are not in a position to handle. Recommended.

TEST RESULTS

Dolby Level reading on deck's meters	4dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	35Hz-19kHz
IEC Type II	33Hz-15kHz
IEC Type IV	31Hz-20kHz
Wow & Flutter – Peak DIN wtd/unweighted	0.09%/0.25%
Wow/Flutter – Peak DIN wtd	0.04%/0.25%
Speed error	-0.01% nom/variable
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	47dB 0.7%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	52dB 0.6%
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	51.5dB 0.65%
Noise Figure of Merit (Dolby level/noise Type II)	50dB
Crosstalk + Noise ref 0VU/1kHz	50dB
Line input sensitivity/overload	96mV/>13V
Mic input sensitivity/overload	0.39mV/26mV *
Line output for 0dB/maximum	545mV/1.25V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	2.8%
Azimuth check R-L phase at 10kHz	20 degrees
VU indication at IEC 0dB	4dB
Dimensions (w x h x d)	22.7 x 5 x 18.5cms/1.3kg
Average wind/rewind time (C90)	2mins 19sec/slow
Typical Retail Price	£400
* 0.65V with 30dB attenuator	



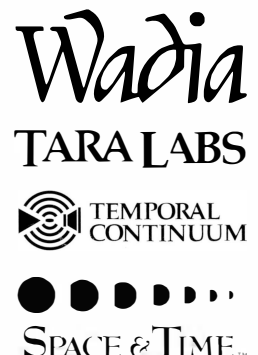


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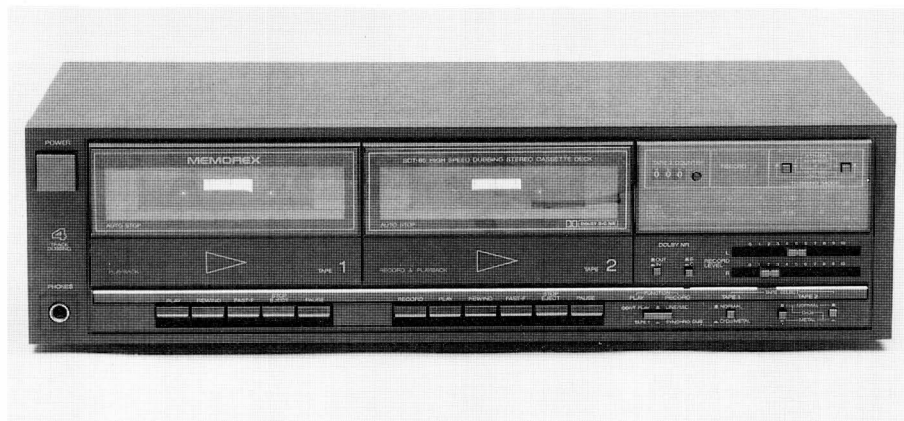
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Memorex SCT-5

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



Made in China to a conventional recipe, the Memorex SCT-5 is light and comparatively flimsy in build. Front panel graphics are on the messy side too, though I've seen plenty worse, and the transport controls are all mechanical where most modern decks use some form of logic control and solenoid or gear actuation. In fact there is some power assistance, and the controls are not unduly heavy, though they do seem somewhat sloppy.

The layout is a familiar one in which one transport records, the other is for playback purposes only. Both transports are unidirectional. Neither transport has autostop at the end of side in fast wind mode, but the most annoying feature without doubt is the manual tape group selection. On the play deck there are just two settings as replay equalisation for Type II and IV (chrome and metal tapes) is identical. The record deck however requires three settings which are provided by a set of two inconspicuous and confusingly labelled mutually dependent switches, an arrangement surely guaranteed to result in errors.

Dolby B and C noise reduction circuits are fitted. The record levels cover a narrow 13dB in four steps, and other creature comforts include – well nothing really, unless you count a mechanical tape counter.

Lab Report

Whilst flexibility provides the real raison d'être for this machine, it is also incumbent on any manufacturer to make at least some attempt at providing a basic level of sonic fidelity. The lab test programme suggests that no such attempt has been made; better measurements have been extracted from carry around mono portables, and whilst good measurements are no guarantee of good sound, sufficiently bad ones certainly preclude good sound, a condition

more than met by the Memorex SCT-5.

Speed stability is simply terrible. The test tone could be heard warbling rapidly and strongly; the broadening of the peak in the spectrum analysis tells an all too eloquent story. And so it continues: the response shapes are curtailed at the frequency extremes and uneven within them; the bass shows gross ringing, and noise and distortion results are amongst the worst I have measured.

Sound Quality

Sound quality is poor. In one test using a recording of Beethoven concertos (Perahia/Concertgebouw), piano tone was wobbly and wooden, with occasional abrupt changes in tone as the tape appeared to take up a new path across the heads. There was little sense of light and shade, of variation and space between the notes, and although Dolby noise reduction reduced the raw hiss levels in the approved manner, the sound appeared to fur up with hiss as long as the music was playing, an effect that is not normally audible with Dolby when correctly set up.

I was intrigued to note that the two transports sounded significantly different – the play only transport was superior in pitch accuracy and resolution. In both cases, however, any significant treble input such as from a number of percussion instruments sounded as though transformed into angry buzzsaws, often accompanied by severe dropout. Dubbed recordings merely magnified the problems, especially when the dubs were made at high speed. The most objectionable feature of the Memorex however was its erratic speed behaviour which once identified proved impossible to put out of mind.

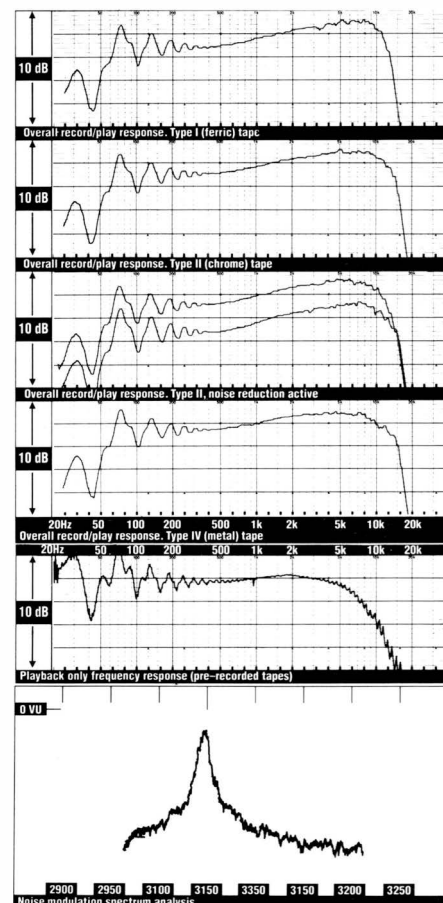
Conclusions

£149 is not a king's ransom (except maybe for a very impoverished king),

but a number of twin transport decks are available that cost about the same or less which perform a great deal better. The bottom line is short and quite inevitable: the Memorex SCT-5 is obviously one to avoid.

TEST RESULTS

Dolby Level reading on deck's meters	0dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	100Hz-14kHz
IEC Type II	100Hz-16kHz
IEC Type IV	100Hz-16kHz
Wow & Flutter – Peak DIN wtd/unweighted	1.3%/1.5%
Wow/Flutter – Peak DIN wtd	0.30%/0.42%
Speed error	+0.02%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	47.5dB 1.0%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	49dB 1.9%
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	46dB 3.2%
Noise Figure of Merit (Dolby level/noise Type II)	49dB
Crosstalk + Noise ref 0VU/1kHz	46dB
Line input sensitivity/overload	116mV/>13V
Mic input sensitivity/overload	0.4mV/14mV
Line output for 0dB/maximum	580mV/2.95V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	6.3%
Azimuth check R-L phase at 10kHz	(1) 1 degree/ (2) 120 degrees
VU indication at IEC 0dB	0dB
Dimensions (w x h x d)	42 x 11.8 x 42cms
Average wind/rewind time (C90)	3mins 45sec/v slow
Typical Retail Price	£150



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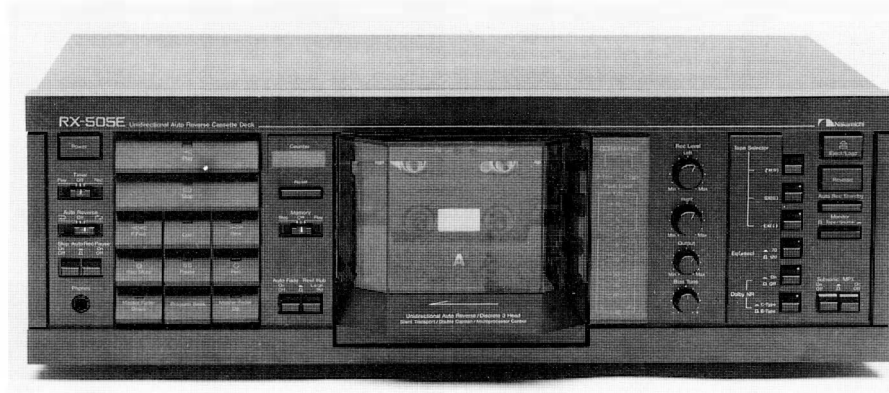
moth

 RISTON

Nakamichi RX-505E

Recommended

NAKAMICHI B&W (UK) LTD., MARLBOROUGH ROAD, CHURCHILL IND. EST., LANCING, WEST SUSSEX. TEL: (0903) 750750.



Every product category throws up the occasional eccentricity, and this even applies to cassette decks, the single most conformist category of them all. The eccentricity that is the subject of this review is from Nakamichi, it's called the *RX-505E* and it provides auto-reverse operation by reversing the whole tape instead of the head.

On the face of it, the idea is an impeccable one. The heads, capstans, tape guides and platform are built exactly as they would be in the case of a unidirectional deck. The only difference is that when side 1 runs out, Nakamichi provides a mechanical hand to pluck the tape out and spin it round. There are no cumulative azimuth errors to eliminate, and no special demands are made of the transport to facilitate two way working. And no compromises are demanded of the record or play heads because, again, they do only what they would do in a unidirectional deck (Nakamichi call this a unidirectional auto reverse deck!).

The *RX-505E* system is splendidly engineered. Direction change operates as the leader is approached using a hub sensor, the whole process taking about a second – with an optional fade out and back in when recording.

The deck is equipped with Dolby B and C, dual capstans and three heads, allowing off-tape monitoring. A range of secondary features includes variable speed wind, track search, cueing (including a rock & roll type transport cueing mode to find any required position with arbitrary precision) and punch-in recording. An auto-record standby feature will set up record/pause at the start of the current or the next side. The transport is genuinely slick, fast wind in particular being both incredibly fast and almost silent.

The only fly in the ointment (there's always one somewhere) is that the *505* perpetuates Nakamichi's idiotic manual

tape selection switching labelled with Nakamichi tape designations (IEC numbers in brackets), and a separate equalisation switch. Worse, like a number of the other switches in various other places on the complex fascia, they don't readily reveal their status.

Lab Report

There are now much cheaper commercial cassette decks from the likes of Sony and Pioneer for example, with transports that can match or even exceed the standards set by Nakamichi. But the *505* still produces magnificent figures and an ultra-clean wow & flutter spectrum analysis plot. Apart from an uncharacteristic trace of top end falloff in the record/replay frequency response plots, the measurements are all extremely fine and need no further comment.

Sound Quality

Sound quality is, in a word, excellent. The *RX-505E* is entirely in keeping with previous top end Nakamichis. All tape types are exploited well, but the deck really comes into its own with metals, which provide crucial extra dynamic headroom at high levels and lack of squash even at comparatively low recording levels. The Nakamichi's effective dynamic range is such that it is often possible to cope without noise reduction, but in contrast to many other decks, Dolby B here is all but completely transparent. Dolby C, however, tended to make recordings, especially those that didn't strain the outside of the *505*'s dynamic range envelope, sound oddly sterile.

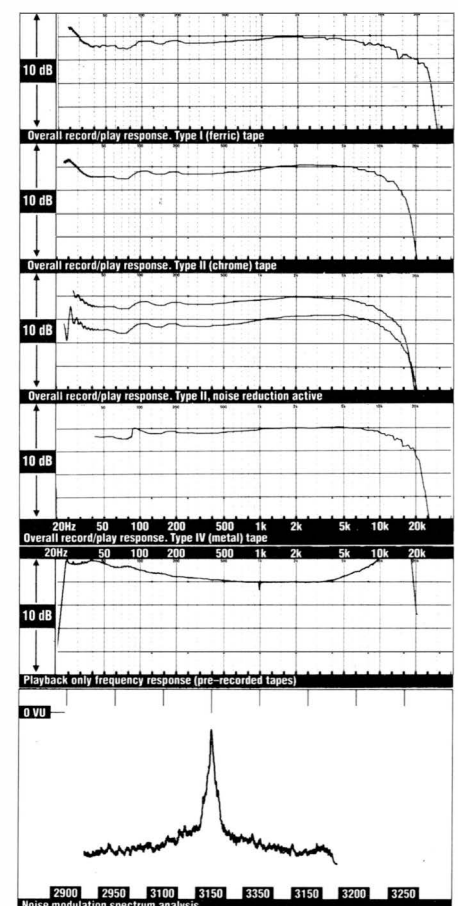
These minor points aside, what distinguishes this deck is its superior speed stability and resolving power. Low frequencies go deep but with superb control and impressive tunefulness; the top end too has an almost CD style solidity and stability.

Conclusions

The auto reverse system works brilliantly, and the deck is up to customary Nakamichi standards in other areas. An enthusiast's choice. Recommended.

TEST RESULTS

Dolby Level reading on deck's meters	3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz-22kHz
IEC Type II	<20Hz-16kHz
IEC Type IV	<20Hz-21kHz
Wow & Flutter – Peak DIN wtd/unweighted	0.06%/0.08%
Wow/Flutter – Peak DIN wtd	0.05%/0.075%
Speed error	-0.02%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	54dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	54.5dB
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	50.5dB
Noise Figure of Merit (Dolby level/noise Type II)	57.5dB
Crosstalk + Noise ref 0VU/1kHz	51dB
Line input sensitivity/overload	73mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	1.32mV/7.3V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.063%
Azimuth check R-L phase at 10kHz	60 degrees
VU indication at IEC 0dB	3dB
Dimensions (w x h x d)	45 x 14.4 x 30cms
Average wind/rewind time (C90)	1min 14sec/v fast
Typical Retail Price	£895



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Onkyo TA-2200

HI-FI MARKETS, BURREL ROAD, ST. IVES IND. EST., CAMBS PE17 4LE.
TEL: (0480) 496496.



This is an entirely characteristic model from one of the smaller Japanese brands. It is not heavily equipped by the standards of some of the decks in the same price area, but it is not necessarily the worse for that, and it is quite substantially built. Finish is good and the lack of front panel clutter adds several points to the ease of use scoring.

The TA-2200 is a two motor, two head deck, the record/playback head core being hardened permalloy. Noise reduction as usual is provided by Dolby B and C. A nearby switch removes the MPX filter from circuit if required. This deck also features Dolby HX Pro which, from the user's viewpoint, operates completely transparently.

Noteworthy features include well laid out 26dB record level meters and an electronic tape counter which helps to drive a block repeat function. Full side repeat is also possible, but Onkyo has omitted a potentially much more useful and basic feature in a classic case of cart before horse putting: counter zero memory stop. Fine bias adjust – thinly disguised by Onkyo as Accubias – is available for ferric and chrome bias (Type I and II) tapes – but not Type IV metals, a classic compromise which is normally a sign that the headroom in the record heads or amplifier is limited. The Onkyo is also missing any timer support.

The transport section is well laid out, and all commands are logic buffered which makes any sequence of commands perfectly safe. But operation is on the clanky side, and fast wind is accompanied by substantial motor whine. The poorly calibrated individual channel input level controls are perhaps the Onkyo's least happy feature. An intro-scan circuit is one of the best.

Lab Report

Signal/noise figures are satisfactory, but headroom is limited, especially with

metal tapes which at least on technical grounds are not really the Onkyo's forté. All the frequency responses are bright at the standard bias setting, and although the Accubias (bias) control can help iron the top end out when recording on ether ferric or chrome (Type I and II) tapes, there is no comparable method of dealing with metals. In contrast to this, the replay only response has a declining output trend except at the very highest frequencies.

High levels of flutter sidebands and what appears to be capstan wow are largely responsible for the poor measured wow & flutter figures and the rather unhappy looking spectrum analysis plot. Transport performance is also disappointing compared to the competition.

Sound Quality

The Onkyo turned out to be somewhat disappointing on audition. Recording first on metal tapes, despite an accurately realised midband and lower treble, the deck lacked analysis and sounded dynamically flat into the bargain. The declamatory trumpet passage that opens Purcell's *The Fairy Queen* overture lacked penetrating power and separation; switching in the less manipulative Dolby B circuit in place of Dolby C actually made matters worse, and high frequency hiss is too obvious to make the deck viable without Dolby. Whichever you prefer, you will hear the difference as this is not one of the most transparent Dolby installations.

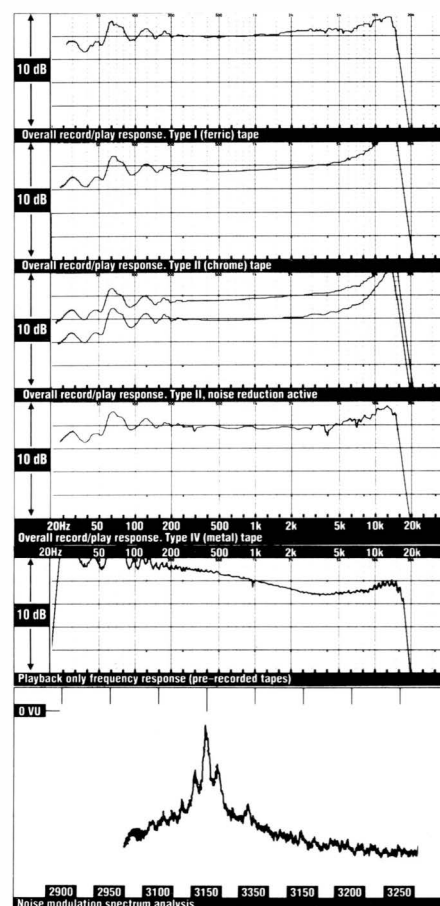
Pitch stability was not audibly suspect with most material, but a certain roughness and lack of focus in the sound was almost certainly a reflection of the highish flutter levels. Prerecorded material sounded heavy and slow, with some audible evidence of mild Dolby misalignment in the form of background instruments jumping forwards and back in the mix.

Conclusions

Sadly, this Onkyo is no match for the best in its price range. Technical shortcomings, especially in the transport section, are matched by modest standards of music making.

TEST RESULTS

Dolby Level reading on deck's meters	+1dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz-16kHz
IEC Type II	<20Hz-17kHz
IEC Type IV	<20Hz-27kHz
Wow & Flutter – Peak DIN wtd/unweighted	0.18%/0.55%
Wow/Flutter – Peak DIN wtd	0.08%/0.45%
Speed error	+0.2%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	53dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	56dB
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	56dB
Noise Figure of Merit (Dolby level/noise Type II)	57dB
Crosstalk + Noise ref 0VU/1kHz	50dB
Line input sensitivity/overload	70mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	634mV/3.77V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	3.55%
Azimuth check R-L phase at 10kHz	25 degree/
VU indication at IEC 0dB	3dB
Dimensions (w x h x d)	43.5 x 12.2 x 26.2cms
Average wind/rewind time (C90)	2mins 8sec/average
Typical Retail Price	£190



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Pioneer CT-337

Recommended

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



At £130, this new model is one step up from the bottom of the Pioneer hierarchy. The usual concessions are made to its modest pricing: the finish is somewhat plasticky and the transport section switches modes with clicks of such ferocious penetrating power, they threaten to raise the dead. Yet on the whole the deck is engineered to as good a standard as any of its obvious rivals.

This is a Dolby B/C recorder, without MPX switching for one, but with illuminated tell-tales to complement the switching. The CT-337 also boasts Dolby HX Pro (headroom extension) circuitry. Track search looks for and plays tracks numbered up to fifteen away from the present position. There are a couple of vaguely unusual features too: stereo microphone sockets and something called 'CD synchro' which helps funnel the contents of CDs onto tape with the press of a single button – but only when coupled to a Pioneer CD player.

Pioneer's new affordable cassette deck finally disposes of a long term anomaly: manual tape type selection. Stung by criticism in these pages and elsewhere of the perverse old manual switching arrangement, Pioneer recently told me the real reason for having stuck with it for so long. Pioneer's main European market is Germany, and in Germany a cassette deck without manual everything is apparently regarded as, well, sissy. There you go.

Lab Report

One look at the frequency response plots shows that this is a low cost deck. The bass is severely affected by head contour effects, and rolls away early (below 100Hz). High frequency output holds up adequately, but only by sympathetic turning of the various parameters, producing an output ringing (the 1dB approx treble peak in the response plots) which cannot be adequately cor-

rected by changing tape formulations. Signal/noise figures are average or, with lower bias formulations, below average. What saves the deck from mediocrity, however, is a surprisingly good transport which offers excellent speed stability in relation to price. Wind speeds are very slow however.

Sound Quality

The CT-337 sounded stable and true on audition, but at times also seemed rather slow and lazy. There was some smothering of fine detail and a loss of individuality and expressiveness with a wide range of material, notably female vocal, despite a trace of brightness. Bass quality wasn't the firmest or clearest around, but generally conspired to sound warm and attractive. Some coloration was also noted, but although this is not a deck you're likely to confuse with the original in A/B testing, its character is not unpleasant.

In some ways, the Pioneer was at its best playing prerecorded cassettes, some of which sounded surprisingly lively and even, on occasions tactile, as for example in the case of Tracy Chapman's first album which sounded pure and natural.

Clearly many of the limitations of the deck are on the record side of the circuit. One test orchestral piece (an excellent recording of Purcell Overtures played by the Bournemouth Sinfonietta on Chandos) was drained of much of its vitality and poise, and tended to sound muddled through the more complex passages. Pitch stability was just poor enough to sound a bit edgy, and the bell-like ringing attack of the instrument played forte was not fully realised.

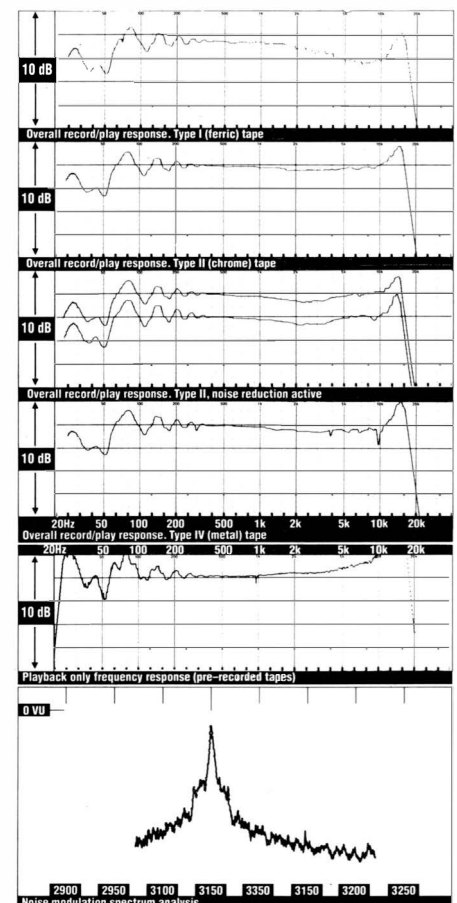
Conclusions

The trick in assessing this deck is in relating it to its price point. There are imperfections aplenty, but none that

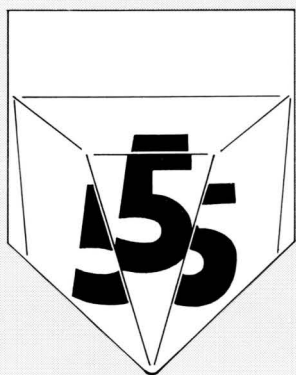
isn't entirely commensurate with price. In addition, the deck is easy to use and appears to be built to last. On balance then, and after examining it against other comparably priced decks, this is a strong candidate for Recommendation.

TEST RESULTS

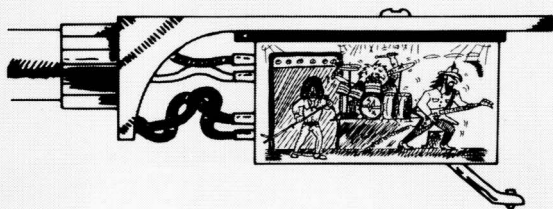
Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	50Hz-17kHz
IEC Type II	50Hz-18kHz
IEC Type IV	50Hz-18kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.11%/0.32%
Wow/Flutter - Peak DIN wtd	0.06%/0.39%
Speed error	+0.15%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	47.5dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	52dB
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	51dB
Noise Figure of Merit (Dolby level/noise Type II)	55dB
Crosstalk + Noise ref 0VU/1kHz	48dB
Line input sensitivity/overload	120mV/>13V
Mic input sensitivity/overload	0.88mV/23.5mV
Line output for 0dB/maximum	552mV/2.02V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	1.41%
Azimuth check R-L phase at 10kHz	0 degrees
VU indication at IEC 0dB	3dB
Dimensions (w x h x d)	42 x 12.6 x 27.2cms
Average wind/rewind time (C90)	2mins 36sec/v slow
Typical Retail Price	£130



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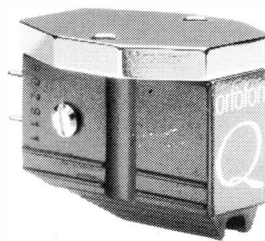
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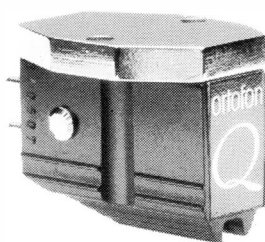
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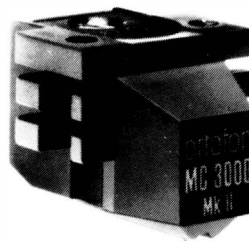
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Pioneer CT-447

Best Buy

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



A two head recorder, the CT-447 features Dolby B, C and HX Pro headroom extension circuitry. The 337's microphone sockets have disappeared, but in their place are all manner of minor but (in some cases) useful improvements. The list includes a control to adjust the headphone monitoring level, blank search, CD synchro circuitry, an electronic tape counter and much improved (and better illuminated) peak hold record level meters switchable to read from -20 to +8dB or -3 to +12dB (ref 0VU) in 10 steps. Why both couldn't be incorporated into one without the extra switching isn't immediately obvious.

The pièce de resistance, however, is something quite different. Perhaps uniquely for a deck in this price band, the Pioneer boasts a full bias, level and equalisation set up routine. Press one button with a blank tape inserted and the deck winds past the leader, makes the necessary adjustments and rewinds to the start point. Being a two head machine and consequently unable to monitor recordings in real time, and because equalisation is also included, the procedure is not quick - I timed it at exactly 30 seconds - but it would be looking a gifthorse in the mouth to complain about this, or the display graphics that accompany the procedure which are tacky beyond belief. The very complete nature of the set up routine however means that distortion can be minimised and the frequency response set flat, rather than optimising for just one or t'other.

Lab Report

With our normal TDK test tapes the auto tape set up routine produced the response shapes shown, which are in essence completely flat in the range 50Hz-5kHz or more, with high frequency deviations of the order of 1dB, depending on formulation. Bass 'woo-

dles' are almost completely absent, but at the far end of the audio spectrum Dolby C doesn't track correctly and a touch of EHF 'zing' and background noise can be expected (and was heard).

The combined weighted wow & flutter figure is exceptionally good for this class of product. Spectrum analysis shows a narrow peak and shoulders to the plot, indicative of relatively low levels of sideband energy, but a few discrete artefacts (wow and some presumed structural resonances with the transport) can be seen. Noise and distortion figures are better than the CT-337 all round and fast wind speed is usefully improved

Sound Quality

On audition, too, the CT-447 is obviously superior to its smaller relative. The slight dullness of that model is replaced by a far more articulate quality, especially with vocal material, Margo Timmins of Cowboy Junkies, for example, clearly enunciated lyrics which on the 337 sounded slightly disorganised and defocused, occasionally making it difficult to hear what was being sung (eg Misguided Angel/The Trinity Sessions). The focusing of the disparate elements of the music also make it more capable of reproducing spatial relationships.

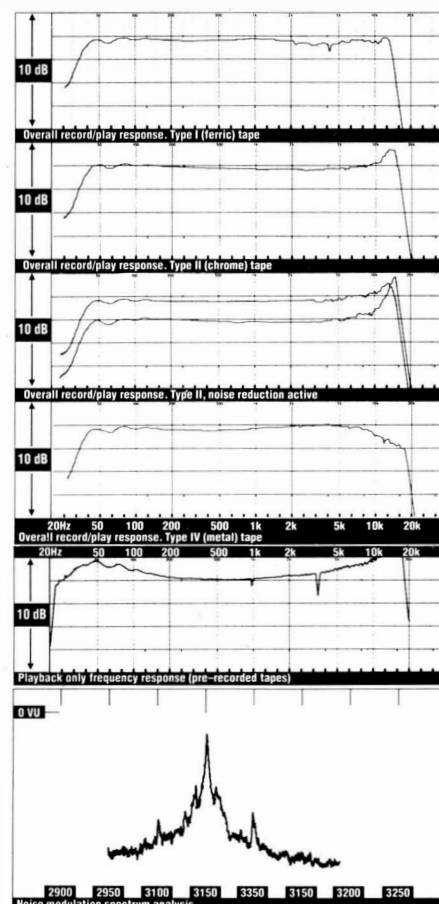
Previous experimentation had already demonstrated that the deck was at its best with Type II tapes such as TDK SA (or equivalent) and with Dolby B rather than Dolby C. There was little advantage to be had however from recording without Dolby altogether. Audible pitch precision was of a high order, and the bass was unusually well controlled and coherent for a deck in this price area. Prerecorded material sounded a little bright and close, but equally it turned out to be subtle and full of interest.

Conclusions

Best Buy for a superior and exceptionally capable £170's worth which has all the essential attributes necessary to make music accessible, not to mention enjoyable.

TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	30Hz-15kHz
IEC Type II	30Hz-16kHz
IEC Type IV	30Hz-18kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.08%/0.20%
Wow/Flutter - Peak DIN wtd	0.06%/0.35%
Speed error	-0.15%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	48.5dB / 0.75%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	52.5dB / 0.8%
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	53dB / 0.8%
Noise Figure of Merit (Dolby level/noise Type II)	55.5dB
Crosstalk + Noise ref 0VU/1kHz	50dB
Line input sensitivity/overload	9.3mV/4V
Mic input sensitivity/overload	0.56mV/24mV
Line output for 0dB/maximum	476mV/2.1V
M distortion 10kHz/11kHz 0dB peak, 1kHz product	0.94%
Azimuth check R-L phase at 10kHz	10 degrees
VU indication at IEC 0dB	3a2
Dimensions (w x h x d)	42 x 13 x 27.2cms
Average wind/rewind time (C90)	2mins 1sec/average
Typical Retail Price	£170



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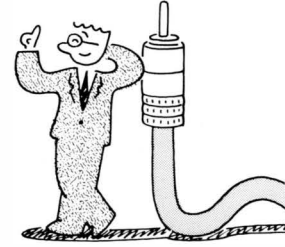
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Pioneer CT-959

Recommended

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



The CT-959 is no more nor less than a no-frills version of the outstanding CT-91a. The deep gloss, gold trim and glossy side cheeks have been dropped in favour of a less exotic and more European-looking casing which still bears the hallmarks of fine engineering. There are other changes: the cassette door cassette shell damper now uses a Sorbothane-like damping material. The tape bias and eq adjustments are still manual, but are aided by a 'match needle' display. One item that hasn't changed: Pioneer's customary excessive and in some cases redundant panel graphics.

The deck is sophisticated by any standards. Included are Dolby HX Pro, dual range meters, (the very thought of which seems silly, though the meters are excellent anyway), a real time tape counter (tell the deck the tape length, and the electronics work out the absolute tape position), record return, CD sync make this a supremely flexible design.

But the real story of the CT-959 is of the superb dual capstan diffused resonance transport and also to an extent the smooth, quiet transport controls which include a powered door which interfaces with the transport logic so that tapes can be ejected direct from any mode bar record mode. Touching a fast wind key closes the door and invokes that mode. A great deal of attention is paid to optimising signal path lengths, the type of critical audio components, resonance control and grounding.

Lab Report

The transport is amongst the finest I have ever come across - at any price. There is virtually zero sideband energy in the system and the combined wow & flutter figure is little over a quarter of what is achieved by other fine decks. The rather ordinary noise results are buoyed in practice by very low 0VU distortion and excellent headroom

which in practice makes it possible to squeeze more from most tapes than you might expect.

Curiously, the Pioneer blots its copy-book with the easy bits: some of the test frequency responses, and in particular those for metal tapes, which rolls off uncharacteristically early, and the playback-only one, which calls into question the setting up of the test sample. A second sample completely solved the metal tape shortcoming - the response shape was ruler flat, but it was too late to publish the new plot. The playback response shape however, was still in error and by a similar amount. The matter is currently under investigation by the manufacturer.

Sound Quality

Predictably, the deck sounded bright and thin with prerecorded material, but the palpable presence and the level of analysis was extraordinary.

Metal tape is the Pioneer's natural forte, and the wide available dynamic range makes it perfectly feasible to record without Dolby noise reduction, whilst its high levels of resolution renders the effect of even the Pioneer's very good Dolby installation obvious. Imagery is rock steady and bass has an authority rare at any price level from the humble compact cassette. With the Pioneer it was possible to identify the sound of instruments playing at low frequencies where other recorders simply reproduced an amorphous blurr of undifferentiated notes. Inevitably there was some tailing off of dynamics and image scale with lower bias tapes - Type Is and IIs.

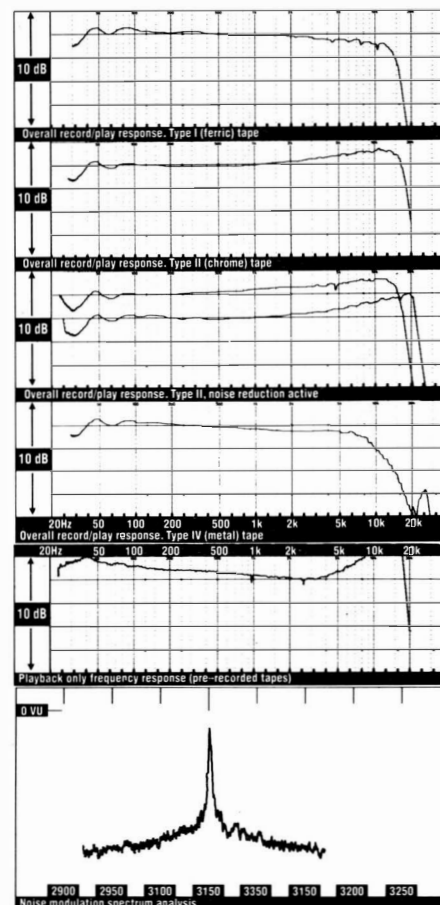
Conclusions

The CT-959 is a work of art under the lid, and has a transport which if anything is even finer than that of the CT-91a from which it is derived. It is

capable of magnificent recordings, but those interested in the Pioneer as a tool for playing prerecorded material should confirm before buying that the defect identified above has been cured. Subject to that caveat - highly Recommended.

TEST RESULTS

Dolby Level reading on deck's meters	3dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	20Hz-15kHz
IEC Type II	20Hz-18kHz
IEC Type IV	20Hz-13kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.025%/0.09%
Wow/Flutter - Peak DIN wtd	0.03%/0.08%
Speed error	+0.03%
Type I signal/noise CCIR/ARM 400Hz	48.5dB
& distortion 0VU	0.75%
Type II signal/noise CCIR/ARM 400Hz	54dB
& distortion 0VU	0.8%
Type IV signal/noise CCIR/ARM 400Hz	51.5dB
& distortion +3VU	0.65%
Noise Figure of Merit (Dolby level/noise Type II)	57dB
Crosstalk + Noise ref 0VU/1kHz	50.5dB
Line input sensitivity/overload	106mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	554mV/4.33V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.28%
Azimuth check R-L phase at 10kHz	5 degrees
VU indication at IEC 0dB	4dB
Dimensions (w x h x d)	42 x 13.5 x 37cms
Average wind/rewind time (C90)	1min 55sec/fast
Typical Retail Price	£450



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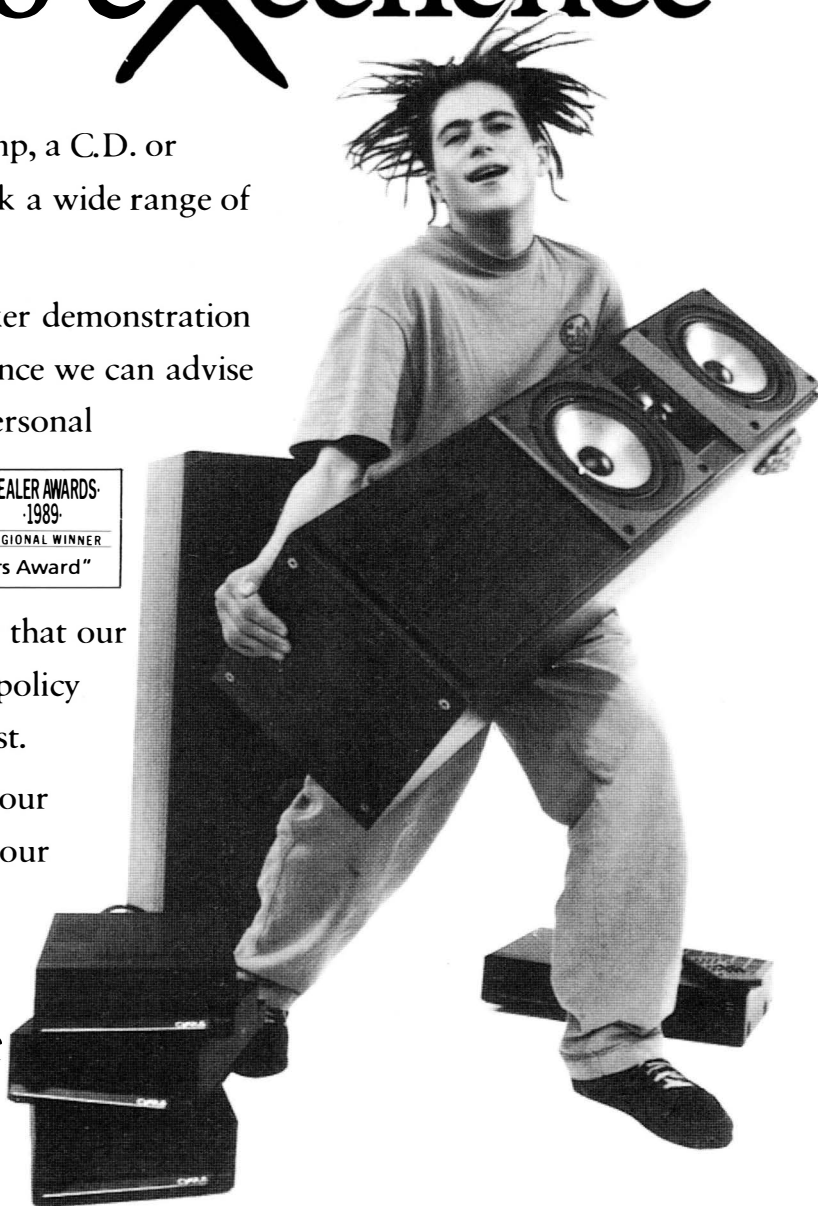
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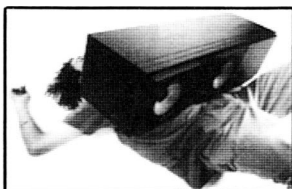
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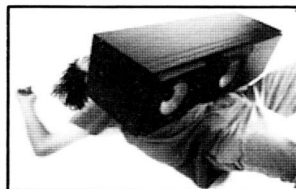
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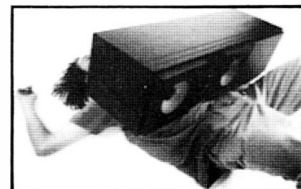
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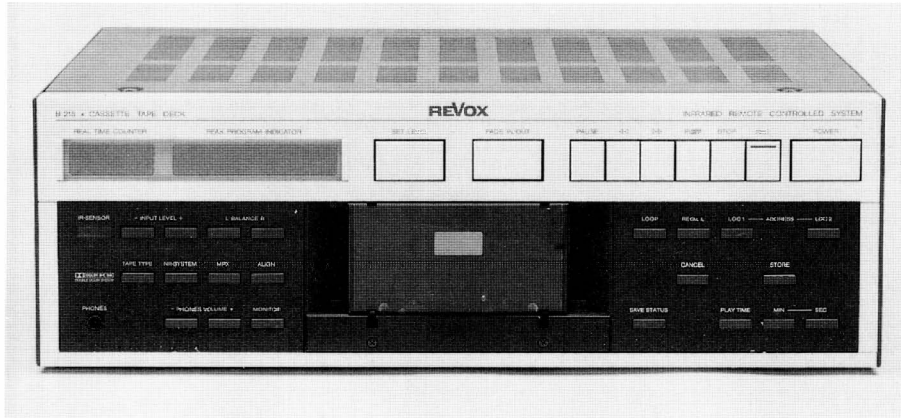
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Revox B215

Recommended

FWO BAUCH LTD., 49 THEOBALD STREET, BOREHAMWOOD,
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The B215 is beautifully engineered, ultra-conservative and a bit of a dinosaur, but will hold its performance (and value no doubt) for years and offers a standard of performance that can best be summed up as 'solid'.

Of course the Revox has three heads and a dual capstan transport which is a byword for silky smooth precision. Noise reduction is by Dolby B and C, and of course Dolby HX Pro is fitted to give a leg up to lower bias tapes. The other major components include an automatic tape set up routine, supplemented by a number of non-volatile memories (2, 3 and 1 for IEC Type I, II and IV respectively) so that alternative tape brands or grades can be accommodated without readjustment. The Revox has auto tape type selection (over-rideable) and monitor status (ditto). There is no cassette loading door however. The tape is inserted straight into the transport, and covered with a clip on cover if required.

In addition to these basics, the B215 offers a range of other minor features which extend from automatically controlled fades, block repeat, a transport 'inching' function which sets a (fixed) recording level, a real time tape counter, and the ability to address one or two arbitrary locations for subsequent access.

Naturally, £1727 doesn't leave a lot of leeway for fripperies, so the remote control (which is primarily a Revox system control) is an optional extra.

Lab Report

The elaborate transport section employs two direct drive capstan motors and two reel motors, all microprocessor controlled to provide ultra smooth and untraumatic tape handling. It's also a gift for test instruments, the wow & flutter meter scarcely moving its needle and the spectrum analysis plot being in the top three of this group.

The Revox is strictly a line level deck, and under some circumstances it is possible for both the input and the output amps to flip. Clearly Revox doesn't expect you to push say metal tapes to extremes, though it is hard to see why not. The frequency response traces are also slightly anomalous. Produced after tape alignment, all tape groups reproduced the characteristic treble signature shown suggesting that the tapes were being underbiased followed by equalisation to flatten the midband.

Sound Quality

By any standards this is a magnificent deck which is genuinely capable of pushing tapes almost to the limit of their abilities. In all cases recordings are impressively stable; imagery (given suitable source material) can almost match the standards of the source, and recordings, especially when made on high energy, high bias tapes, can sound lively as well as powerful.

Judged against the very highest standards, however, there is a trace of blurring around the edges and an almost imperceptible loss of focus, noticeable at low and higher recording levels alike. This could be the imprint of the many electronic logic switches in the circuit, but it's not possible to be certain of course, because they cannot be isolated. The Dolby circuits sounded a little more opaque than I remember of old (the otherwise identical black B-215S has already been reviewed in the pages) and overall the deck doesn't have quite the clarity or sure footedness with complex rhythmic material that is available from the RX-505E. But this is a subtle matter that detracts only marginally from a fine performance.

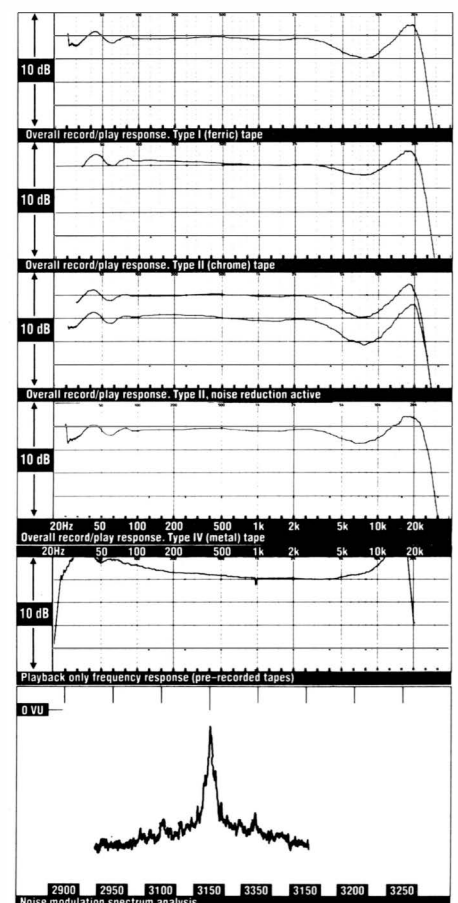
Conclusions

My guess is that the Revox B215 is not really aimed at the hairshirt fraternity.

But it is finely engineered, and is a consistent and a capable performer. It's utterly incapable of sounding uncouth. Recommended of course, but if it is to make financial sense you need to place a high price on intangibles, just as with a Rolls Royce. Recommended.

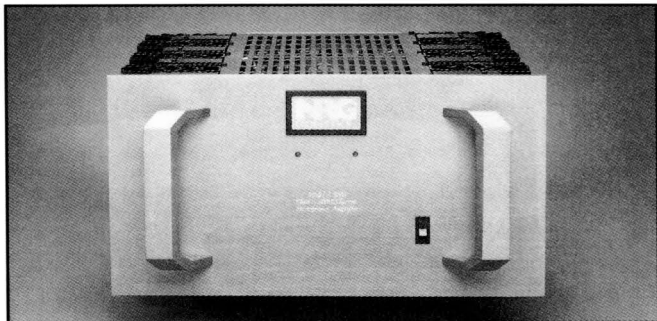
TEST RESULTS

Dolby Level reading on deck's meters	-1dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz-22kHz
IEC Type II	<20Hz-22kHz
IEC Type IV	<20Hz-23kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.05%/0.10%
Wow/Flutter - Peak DIN wtd	0.03%/0.10%
Speed error	+0.05%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	52.5dB 0.65%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	57dB 0.55%
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	50dB 3.0%
Noise Figure of Merit (Dolby level/noise Type II)	56dB
Crosstalk + Noise ref 0VU/1kHz	51dB
Line input sensitivity/overload	1.05mV/2.6V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	67mV/1.65V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.63%
Azimuth check R-L phase at 10kHz	35 degrees
VU indication at IEC 0dB	2dB
Dimensions (w x h x d)	45 x 15.3 x 33.2cms
Average wind/rewind time (C90)	1min 14sec/V fast
Typical Retail Price	£1727



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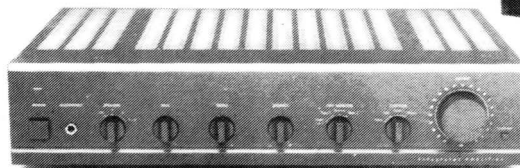
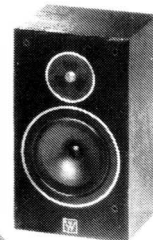
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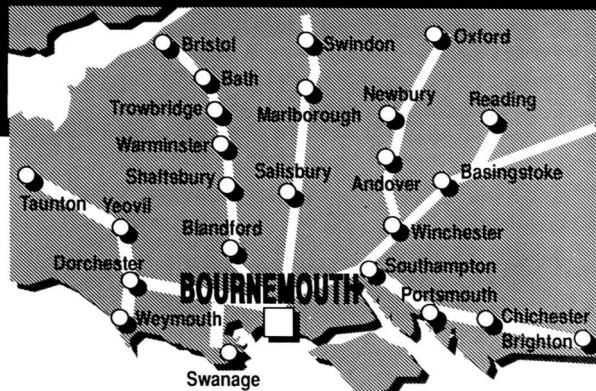
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Rotel RD-855

Recommended

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The RD-855 is basically a simplified version of the RD-865 (the 845 is quite different under the skin) and shares the same basic transport mechanism and circuit. The most substantive under the skin differences are comparable to those that distinguish, say, the Rotel RA820AX and 820BX4 amplifiers: namely fewer high grade audio components, though some remain. Dolby HX Pro has been omitted from this deck, and the display is a somewhat simpler design.

No new ground is broken on the facilities front. The deck is designed for basic recording purposes and (almost) everything is concentrated on that one goal, which helps explain the much greater than usual structural solidity and the workmanlike build quality found inside. Dolby B and C circuits are complemented by a switch to defeat the multiplex (MPX) filter, the preferred method of use except in those very few cases where enough pilot tone is left on a source FM signal to confuse the Dolby circuits. Tape search aids include a mechanical memory counter (again unilluminated) and a simple track search feature which will play from the start of the current or next track. Repeat and record mute functions complete the list. Note that this is one of the few decks in this price area without a headphone socket or a timer standby facility.

The RD-855 uses large controls and not too many of them; so it is extremely easy to drive. On the negative side, the transport has extremely noisy solenoid actuators and the bright level display completely drowns the unilluminated scale calibrations, through the readout changes from green to red at 0VU which removes most of the objections.

Lab Report

The transport measured well, but the spectrum plot showed some prominent narrow band effects close to the central

3150Hz test signal peak which is almost certainly due to a capstan being slightly out of true. The electronics are very quiet but 0VU distortion is fairly high with Type IV (metal) tapes, which are not fully exploited by this deck. Head alignment is near perfect, but only Type I tapes provided an accurate response shape and even here the bass is somewhat boosted.

Sound Quality

Prerecorded cassettes betrayed the measured balance by sounding distant in the midband, often affecting vocals. At the same time, a full bass and a prominent extreme treble favoured bass lines, cymbals and other instruments whose presence is felt mainly at the frequency extremes. The balance was far from natural, yet there was an underlying clarity and honesty that makes the deck engaging and informative.

As a recording tool, the strengths of the Rotel are no less obvious. The wayward frequency response with Type II tape was reflected in a slackening of tension and concentration. On the other hand, Type I and IV tapes which measure nominally flat actually tended to sound a little bright and edgy.

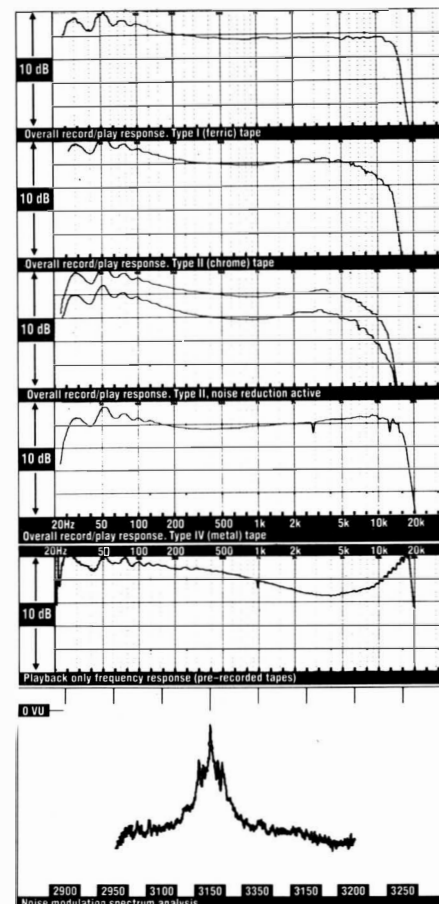
Irrespective of the tape type in use, however, the Rotel proved to be a surprisingly successful recorder. One of its particular strengths was fine sounding electronics – monitored in the tape loop of partnering amplifiers with the tape stationary. Compared to the majority of cassette decks in this price region, the Rotel sounds transparent and dynamic, the particularly strong sense of bass weight adding stability and scale to the music which on other recorders sounded insubstantial. The process of recording and playing back the music led to fairly obvious qualitative losses in various ways, but the fine electronics helps redress the balance.

Conclusions

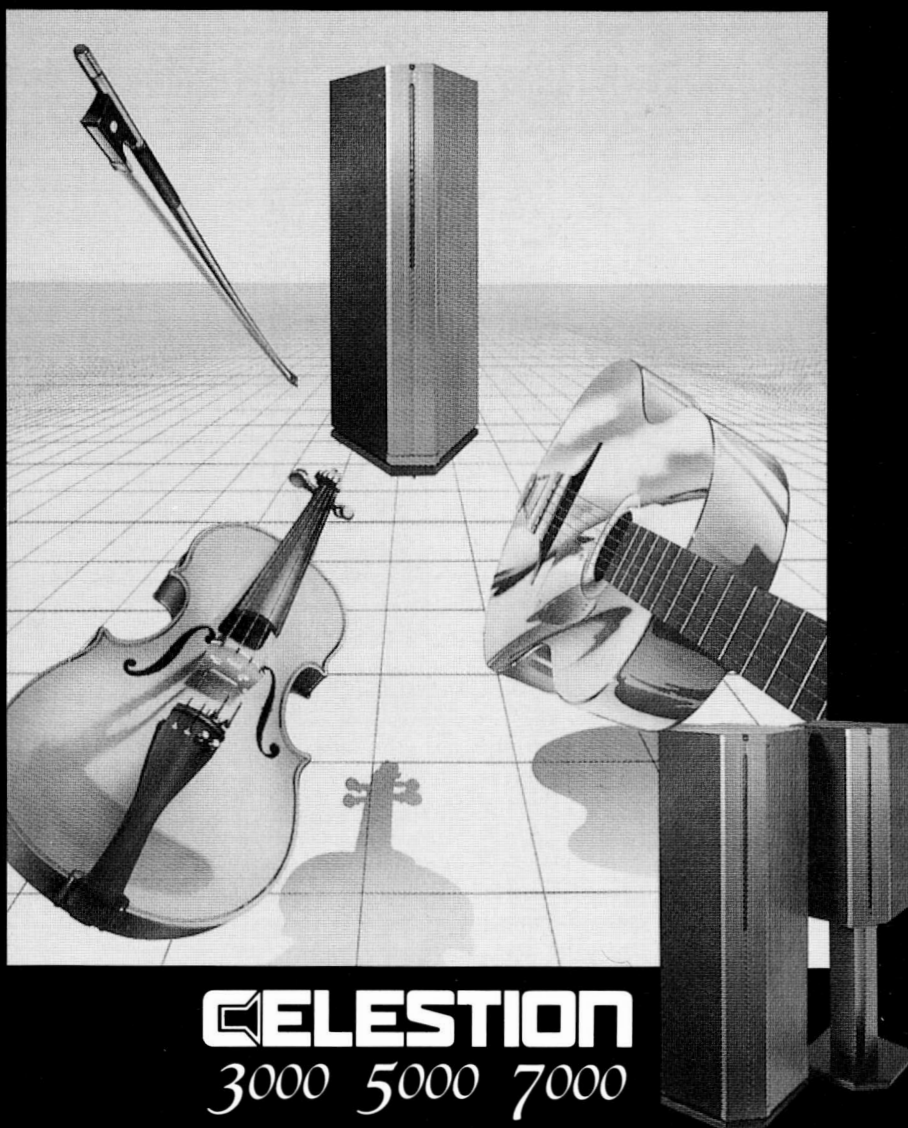
The tape (transport, head etc) section of the 855 is nothing special, but the record and replay amps allow the Rotel to exceed expectations. Recommended.

TEST RESULTS

Dolby Level reading on deck's meters	0dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	20Hz-16kHz
IEC Type II	20Hz-14kHz
IEC Type IV	20Hz-17kHz
Wow & Flutter – Peak DIN wtd/unweighted	0.09%/0.20%
Wow/Flutter – Peak DIN wtd	0.05%/0.23%
Speed error	-0.02%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	52.5dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	0.65%
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	57dB
Noise Figure of Merit (Dolby level/noise Type II)	50dB
Crosstalk + Noise ref 0VU/1kHz	3.0%
Line input accuracy/overload	51dB
Mic input sensitivity/overload	73mV/>>13V
Line output for 0dB/maximum	n/a
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	840mV/2.2V
Azimuth check R-L phase at 10kHz	1.12%
VU indication at IEC 0dB	5 degrees
Dimensions (w x h x d)	0dB
Average wind/rewind time (C90)	44.4 x 11.5 x 32.5cms
Typical Retail Price	2mins 22sec/slow £180



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Sherwood DS-1135C

Recommended

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



Despite the allusion in the name, Sherwood, a new brand to the UK, is about as authentically English as this prose is Chaucerian. In fact Sherwood was at one time a highly respected US brand, whilst the present company is based in Korea (I confess to have forgotten which A route that's on).

The DS-1135 costs 5p short of the ton, and in most respects is ultra straightforward. It has an assisted mechanical transport – the mechanically latching keys are light and positive in action, and autostop operates from all modes so there's no hardship – but tape type recognition is manual using two tiny mutually dependent switches. The tape counter is mechanical, the record level meters are about the length of a matchstick and cover 16dB in 5 steps.

What is unexpected in a £99 deck, however, is Dolby HX Pro, which is particularly welcome in a machine like this which is unlikely to be able to exploit the dynamic range of metal tapes to the full. The Sherwood also has Dolby C noise reduction and a mono microphone input. Build quality? Nothing special, but there's nothing obviously wrong either.

Lab Report

The measured performance of the baby Sherwood is strong enough to stand comparison with any other comparably priced deck, and some costing rather more. Wow & flutter figures are tolerable, and the spectrum analysis is basically clean, bar some flutter sidebands.

The playback only (prerecorded) response is flat and the record/replay ones are also good except that the Dolby C circuit is somewhat wayward (Dolby circuits are rarely lined up well with budget equipment) and metal tapes are incorrectly equalised, probably to give this tape type an artificial 'cutting edge' to help justify the price. There is not a

lot of headroom to spare: the 0VU point is set quite high on the Type IV and (to an extent) Type II saturation curves. The only real operational problem however is the seemingly interminable time it takes to wind a tape from end to end.

Sound Quality

Prerecorded material sounds a little plummy and unsteady by the best standards. The latter is partly due to the modest pitch integrity of the transport, but has more to do with what sounds suspiciously like an erratic tape path across the heads and guides.

As a recorder, this unprepossessing machine will turn a few heads. Inevitably it won't provide the consistency of more expensive hardware. There are some more obvious shortcomings too, such as a constant background drone which sounds like the imprint of the motor superimposing itself on the signal lines. Dolby C worked well enough except for a trace of dynamic squash, but recordings made with this noise reduction system were coloured with some unnatural decay products as notes died away, which suggests that the installation is a bit rough and ready. It's pretty comfortable with lower bias tapes – ferrics and chromes – and with Dolby B.

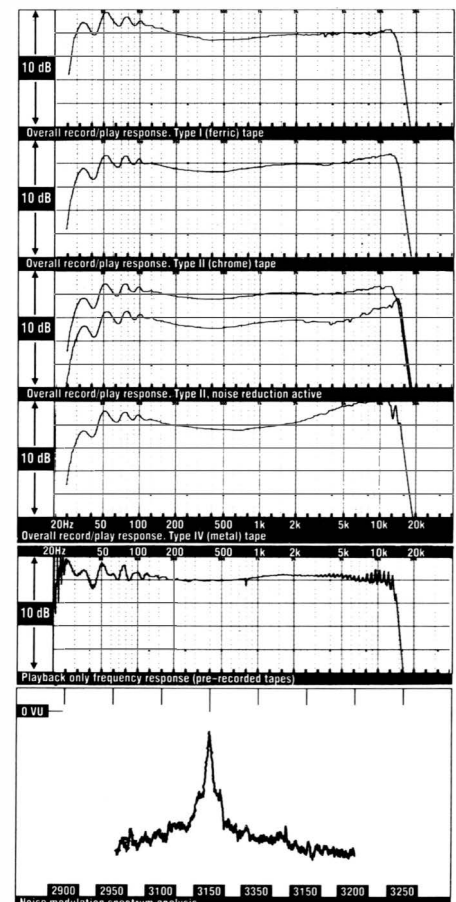
Conclusions

Manual tape type selection and the generally inconspicuous nature of the minor switching detract from the practicality of this design. Its simplicity and low cost might otherwise be expected to appeal to a much wider and less specialist constituency than most other cassette decks. But for a mere £100, you still get a purposeful, few-frills deck which unprecedentedly at this price level includes Dolby HX Pro to help make the most of lower bias tapes. There are plenty of objective limitations

to the Sherwood, but it clearly ranks as strongly Recommended, missing a Choice Best Buy ranking only because it doesn't quite meet all the requirements of a genuine high fidelity product.

TEST RESULTS

Dolby Level reading on deck's meters	0dB
Rec/replay response	-3dB ref 1kHz
IEC Type I	25Hz-15kHz
IEC Type II	25Hz-16kHz
IEC Type IV	25Hz-16kHz
Wow & Flutter – Peak DIN wtd/unweighted	0.13%/0.23%
Wow/Flutter – Peak DIN wtd	0.14%/0.21%
Speed error	+0.95%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	51dB 0.75%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	53dB 1.8%
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	51dB 3.3%
Noise Figure of Merit (Dolby level/noise Type II)	53dB
Crosstalk + Noise ref 0VU/1kHz	47dB
Line input sensitivity/overload	108mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	555mV/2.8V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	1.0%
Azimuth check R-L phase at 10kHz	80 degrees
VU indication at IEC 0dB	0d
Dimensions (w x h x d)	44 x 11.8 x 22.5cms
Average wind/rewind time (C90)	2mins 46sec/v slow
Typical Retail Price	£100



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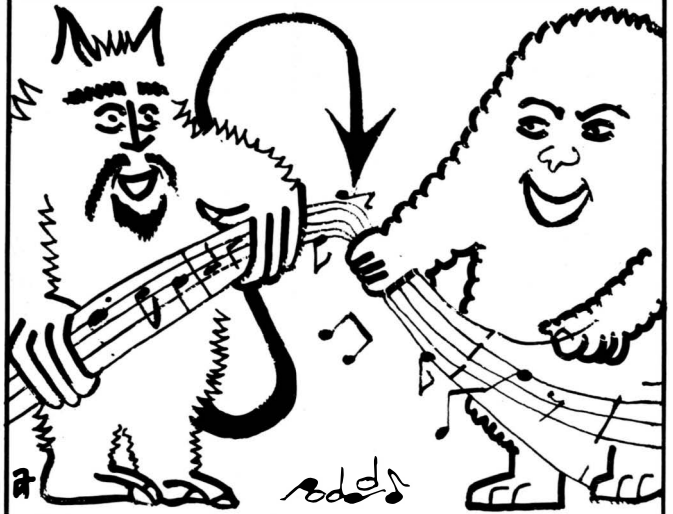
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Sherwood DS-7000R

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The value for money theme introduced in the DS-1135C (see review) is continued here, for this is a 3-head cassette deck costing just £230. Pricing of cassette decks is pretty fluid, but as I write the DS-7000R undercuts other starter three head decks (from Aiwa, Denon and Pioneer for example) by about £20. But it's important to bear in mind that three head decks have certain theoretical advantages over two head machines which are only apparent with very well engineered designs. Engineering considerations always take precedence.

At first sight the DS-7000R looks similar to the £100 DS-1135C with clean, blocky styling and a surprising absence of visual clutter. Clutter there is though: hidden away behind a flap which opens on command. Here we find headphone and (stereo) microphone sockets, a timer standby switch and Dolby B/C switching. Here also are fine bias (for Type I and II tapes only) output level and cross fader controls.

This is a Dolby HX Pro deck. Tape search aids include a memory counter and track search device with the capability of searching up to 20 tracks away from the current position. The electronic rolling number tape counter moonlights as a readout for the track search feature. Two colour record level meters cover 28dB with adequate resolution and although the transport keys look identical to those of the DS-1135C, these are in fact excellent light touch, full logic controls. An attractive if oddball package.

Lab Report

In stark and rather unfortunate contrast to the budget Sherwood 1135 also covered in this issue, this more ambitious product turns out to be full of Achilles heels. The basic record/replay responses with Type I ferric tape were sound, whilst Type II reproduced with a 1dB high end boost when measured with

TDK SA at the standard bias setting. The error with metal tapes was very much larger (of the order of 5-6dB) and cannot be corrected with the fine bias adjuster. In contrast, however, the play only response test was passed with flying colours.

More important than these points is the behaviour of the single capstan transport. The spectrum analysis shows that wow products are comparatively low in level, but that there are a number of discrete flutter sidebands and a fairly high level of background flutter energy largely contributed (no doubt) by mechanical resonances in the transport itself.

Sound Quality

Although prerecorded tapes are handled in textbook fashion according to the lab tests, they sounded universally awful. Tracy Chapman's voice lacked her customary slightly bitter undercurrents and fluidity; a Ravel piece (*La Valse*) valued for its nightmarish, almost chaotic quality, sounded stiff as a plank and was bought down to earth with a bump. The sense of soundstage presence collapsed, and it proved difficult to follow the myriad of incident and detail in the piece.

Matters were scarcely improved elsewhere. Metal tapes such as TDK MA and MA-X made some brilliantly lit but coarse and dropout prone recordings, which were not amenable to adjustment with the bias adjust control. Type IIs needed little adjustment to sound reasonably accurate, but the decks' propensity for crushing musical dynamics and pulling tonal colours towards a single homogeneous whole was remarkable for a £200+ design.

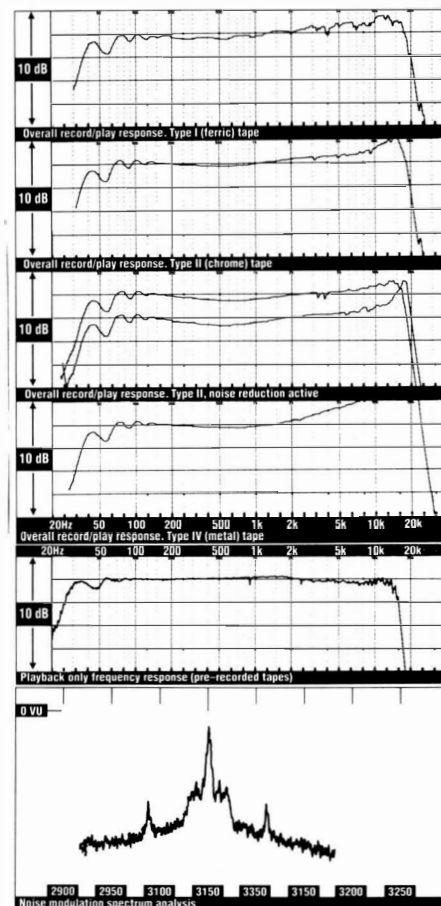
Conclusions

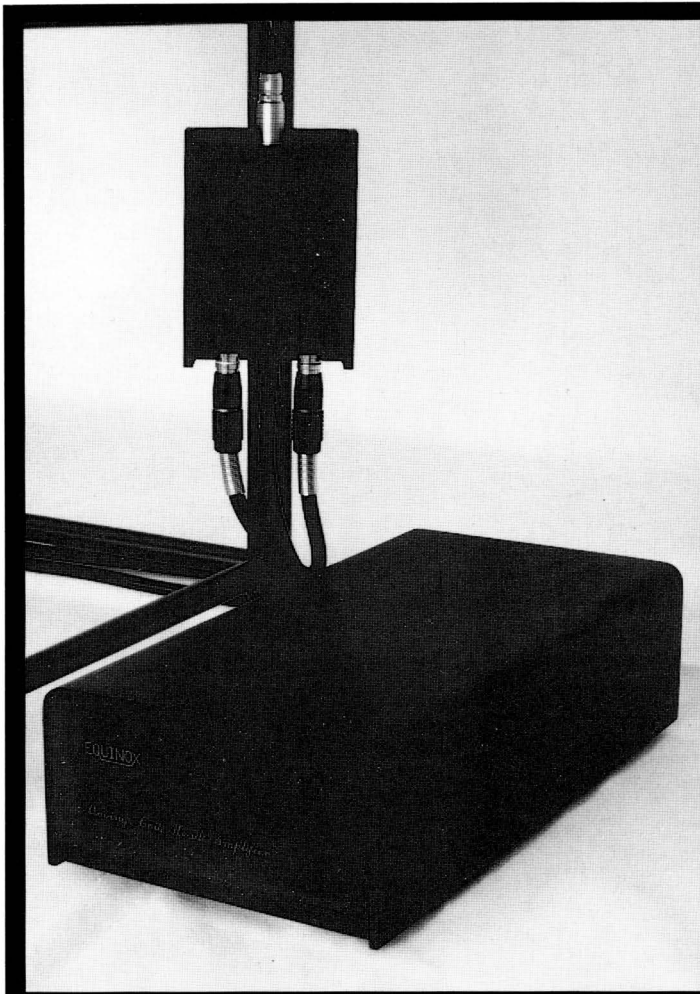
The DS-7000R presents as clear an example as I know of a product that throws it all away in a dubious pursuit

of the fullest list of features at the lowest practical price. Real time off tape monitoring is a blessing that turns into a liability when it provides the means to demonstrate, conclusively in this case, the extent to which the Sherwood corrupts the music signal.

TEST RESULTS

Dolby Level reading on deck's meters	0dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	33Hz-20kHz
IEC Type II	33Hz-20kHz
IEC Type IV	33Hz-22kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.11%/0.24%
Wow/Flutter - Peak DIN wtd	0.07%/0.23%
Speed error	+0.9%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	50.5dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	56dB
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	53dB
Noise Figure of Merit (Dolby level/noise Type II)	56dB
Crosstalk + Noise ref 0VU/1 kHz	50dB
Line input sensitivity/overload	80mV/2.16V
Mic input sensitivity/overload	0.55mV/16.2mV
Line output for 0dB/maximum	530mV/2.7V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	11%
Azimuth check R-L phase at 10kHz	40 degrees
VU indication at IEC 0dB	1dB
Dimensions (w x h x d)	44 x 12.5 x 28cms
Average wind/rewind time (C90)	2mins 36sec/v slow
Typical Retail Price	£230





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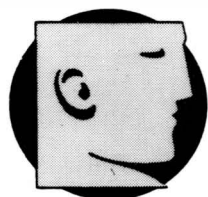
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Sony TC-K520

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Sony has been extremely active on the cassette deck front, with no less than ten new models. This is the top of the non-ES single transport designs, and it shows considerable evidence of clean sheet thinking in several areas. It's well equipped too.

The basics of the TC-K520 are that it is a 2-head deck built with a Dolby B and C (with defeatable multiplex filtering), Dolby HX Pro headroom extension circuitry, fine bias adjust, track search and a time counter with memory stop. This last is not a true real time counter; it simply tracks elapsed time from when it was last zeroed, or the deck was turned on or the tape inserted.

The display is well designed and wide ranging (-30 to +8dB), but in a surprising departure it can be switched off, leaving either a completely blacked out display or just the tape counter illuminated. Eliminating the fluorescent display reduces internally generated noise potentially improving sound quality. It also reduces a prominent source of visual distraction when playing music.

Styling is blocky with emphasised transition lines, for example between the display window and the fascia, and prominent shock absorbing feet. The overall impression is high tech but clear control dispositions and restrained graphics mean it is more approachable than many.

Lab Report

Superbias is Sony's name for its bias frequency oscillator which operates at 210kHz, double the frequency used in older Sony decks, to reduce downband intermodulation. A laminated laser-amorphous head helps reduce HF losses in the head core, but the decks' frequency responses are not particularly wide, and with Type I and II tapes especially they're not very well controlled. The rather lumpy output shape casts

doubt on the integrity of the contact between tape to head, one of the most critical areas of any cassette deck design, which might be compromised by insufficient back tension in the tape or by the detailed design and geometry of the various guides that touch the tape. The bass is slightly uneven too, though it does provide the necessary bandwidth.

Pitch integrity is good enough with a clean spectral analysis. Although the signal to noise figures are good too, they're achieved at the cost of rather high 0VU distortion levels, especially in the IEC Type II bias slot. The moral of the story is not to push recording levels too far into the red.

Sound Quality

With prerecorded material, the Sony provides a slightly soft-edged sound, but with a powerful bass and a strong sense of presence. Here at least, the Sony can be counted an overall success.

It is also a considerable success as a recorder, though predictably Type I and II formulations tended to sound soft and laid back, a tendency that could be addressed with careful rebiasing. Metal tapes are handled accurately without rebiasing, but the deck is borderline for use with type IVs which offer a degree of extra top end clarity at the cost of sounding frazzled when driven too hard. As so often in the past, Dolby B offers the optimum blend of freedom from noise and good sound quality with a wide range of music types.

Try as I might, I consistently picked the counter on/main display off condition as sounding best of the three display mode options. Interpreting like mad, I think this means there's no appreciable difference.

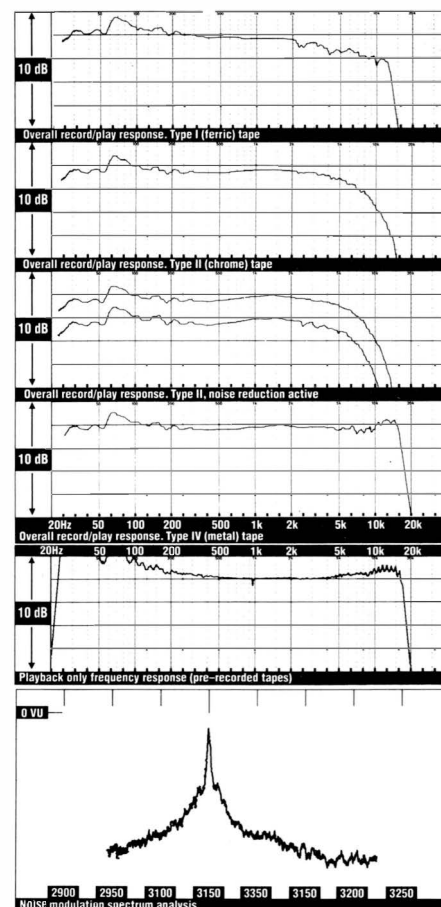
Conclusions

Sony's rethink of its cassette deck range

has been far reaching and successful, at least on the evidence provided by the TC-K520. Whatever rough edges it may have (and what cassette deck doesn't at £170?), this is an excellent performer. Best Buy.

TEST RESULTS

Dolby Level reading on deck's meters	-1 dB
Rec/replay response -3dB ref 1kHz	
IEC Type I	<20Hz-13kHz
IEC Type II	<20Hz-10kHz
IEC Type IV	<20Hz-17kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.09%/0.15%
Wow/Flutter - Peak DIN wtd	0.07%/0.13%
Speed error	+0.1%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	52dB / 0.6%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	56dB / 2.5%
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	55.5dB / 1.3%
Noise Figure of Merit (Dolby level/noise Type II)	55dB
Crosstalk + Noise ref 0VU/1kHz	51dB
Line input sensitivity/overload	117mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	704mV/3.2V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	6.4%
Azimuth check R-L phase at 10kHz	20 degrees
VU indication at IEC 0dB	0dB
Dimensions (w x h x d)	43 x 12.3 x 28.5cms
Average wind/rewind time (C90)	2mins 10sec/average
Typical Retail Price	£170



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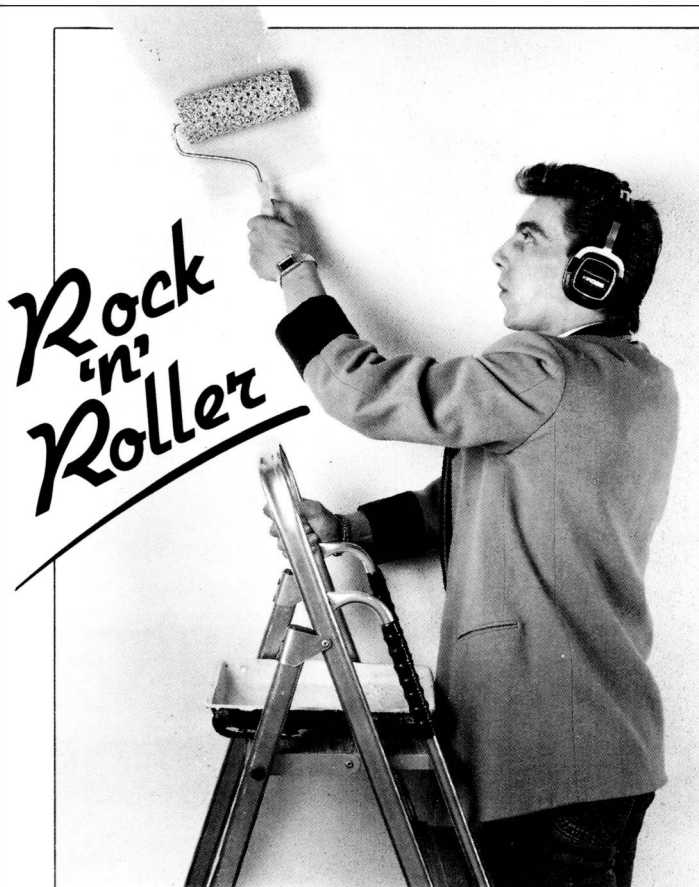
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Sony TC-K850ES

Recommended

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



The penultimate machine in a range of no less than four new ES models (and six others) from Sony this year, this, as they say in the movies, is one serious piece of the old clobber. Given the £400 price tag, it's no surprise that this Sony is a full 3-head machine equipped for real-time off tape monitoring and – given Sony's track record – a dual closed loop dual capstan deck into the bargain. Manual record bias and sensitivity can also be set to close tolerances using a simple match pointer scheme.

Physically massive and heavy, the TC-K850ES is not short of the odd button or three. Centrepiece of the front panel is a wide ranging (50dB) high resolution record level meter of considerable length, with suggested maximum recording levels for each tape group clearly marked. Included in the same display area are a number of function indicators and of course the tape counter, a simple elapsed time device with memory stop and some related auto search and play options.

The most remarkable feature of the display, however, is that in common with some of the other models in Sony's new series this one has a switch which cuts the display off entirely, or, optionally, leaves the tape counter alight. The payoff being audible (see later) and of course visual.

Build quality is of a high order, and the transport is extremely slick, though little slicker than the TC-K520 for example which is even better in relation to price. But the sheer number of controls, and the comparatively artless way in which they've been disposed makes this a somewhat messy proposition ergonomically.

Lab Report

The three motor transport with a quartz-locked direct drive capstan motor is a superb example of the type,

with vanishingly low wow figures and a combined wow & flutter figure beaten by only three other models in this test. The spectrum analysis is as clean as a whistle. Each frequency response was set up using the tape alignment feature, but the correct biasing point still left the equalisation errors shown, which with Type II and IV tape stock results in a significant loss of HF energy. The playback-only response is near perfect however, and the distortion and noise figures are truly excellent.

Sound Quality

In contrast to the TC-K520, whose display off switch appears to make little obvious contribution to sound quality, the TC-K850 appears to benefit disproportionately.

Pre-recorded tapes sounded nothing less than remarkable. One of the test tapes used throughout this project – Tracy Chapman's seminal first album – revealed a previously unexpected depth and tunefulness right down to the lowest frequencies. What had sounded previously like an amorphous instrument resolved itself into a palpably real sounding bass guitar, whilst the percussion took on a remarkably vivid life of its own. The level of information extracted from this tape was simply extraordinary.

This almost corporeal sense of presence was reduced when recording its own, especially with the Dolby C active, the action of which tends to mask some of the fine detail. I'm less convinced that switching out Dolby HX Pro is of any benefit, even with Type IV tapes, whilst Type IS which stand to benefit most, sound clearly more lively with HX Pro active.

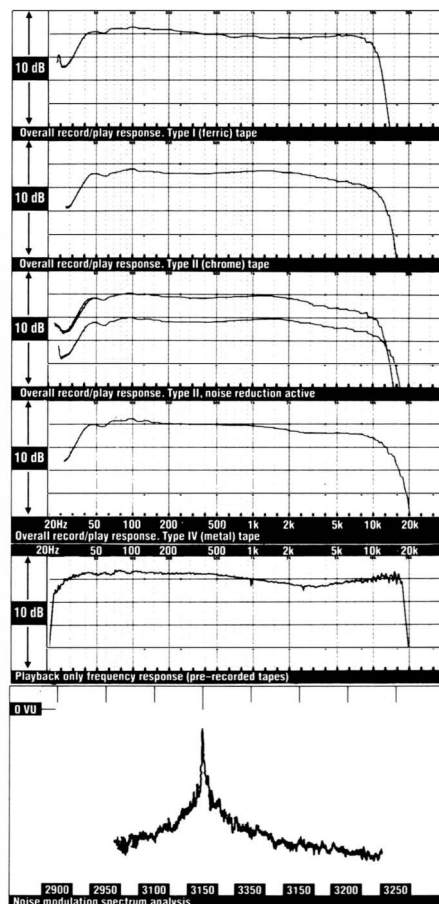
Conclusions

Remarkably, there were times when the Sony scarcely betrayed its presence in circuit at all. As a playback machine it is

almost without peer, as a recorder it is less good but still excellent. Unless you're willing to pay silly money, the TC-K850 is only seriously rivalled from within our group of 20 by the £450 Pioneer CT-959. Strongly Recommended.

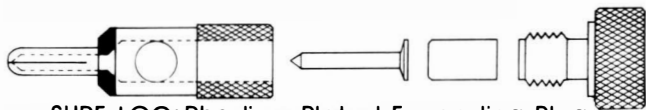
TEST RESULTS

Dolby Level reading on deck's meters	-20dB
Rec/replay response	-3dB ref 1kHz
IEC Type I	30Hz-12kHz
IEC Type II	30Hz-13kHz
IEC Type IV	30Hz-15kHz
Wow & Flutter – Peak DIN wtd/unweighted	0.04%/0.10%
Wow/Flutter – Peak DIN wtd	0.02%/0.09%
Speed error	-0.03%
Type I signal/noise CCIR/ARM 400Hz	51dB
& distortion 0VU	0.6%
Type II signal/noise CCIR/ARM 400Hz	56.5dB
& distortion 0VU	1.1%
Type IV signal/noise CCIR/ARM 400Hz	55dB
& distortion +3VU	0.7%
Noise Figure of Merit (Dolby level/noise Type II)	55.5dB
Crosstalk + Noise ref 0VU/1kHz	55dB
Line input sensitivity/overload	102mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	680mV/4.5V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.18%
Azimuth check R-L phase at 10kHz	90 degrees
VU indication at IEC 0dB	2dB
Dimensions (w x h x d)	43 x 13.5 x 33cms
Average wind/rewind time (C90)	2mins/average
Typical Retail Price	£400



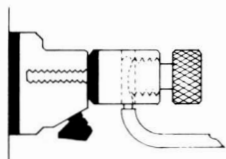
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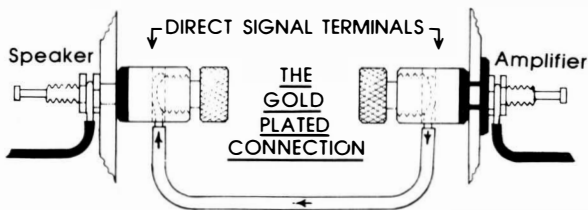


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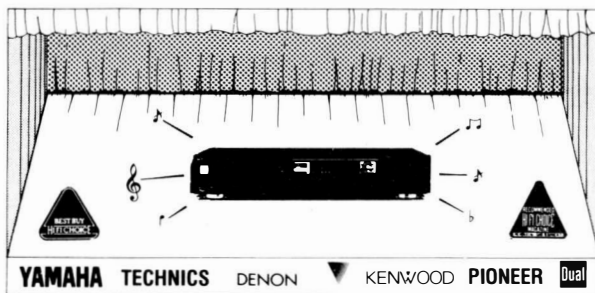
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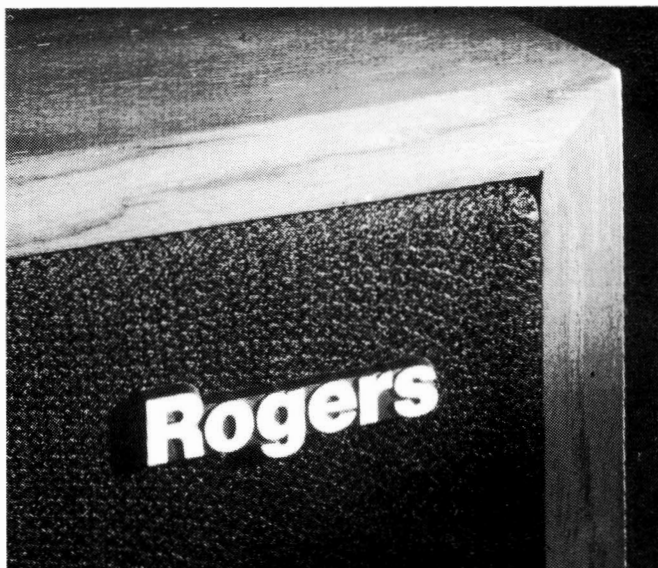
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Technics RS-TR265

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



Most readers will be familiar with the general advice that at any specific price point a single transport cassette deck invariably offers superior audio performance to a dual transport deck. But I'm also aware that giving this advice can be about as welcome as advising a prospective car owner to buy a mid-engined sports car on the grounds of improved handling. It may be true as far as it goes, but it's hardly the point. . .

Of course there are sound reasons for buying twin transport decks, most of which come under the heading of convenience (most of them also contravene the copyright laws). Take this Technics model: the Dolby B/C/HX Pro RS-TR265, one of the latest in a long and generally well received line, has convenience writ large. The transport mechanisms are capable of full auto-reverse operation, though in common with most twin decks, only one is capable of recording and neither has optical end of side changeover, which means a long 10 second silence in the middle of long recordings. Both sides of a tape can be dubbed in one operation, at normal speed (the second method should generally be avoided), and there are also various play and record modes, some involving linked operation of two cassettes, and some the use of a compatible CD player coupled to the deck via a hard wire 'synchro edit' link on the rear panel. Many of these operations can be invoked with just one or two controls.

Lab Report

Auto-reverse cassette decks tend to offer poorer performance than their unidirectional counterparts, and the Technics' figures are some two-three times worse than comparably priced single transport/unidirectional decks such as Technics' own RS-B665 reviewed separately. Spectral analysis shows few dominant modes however, which ame-

liorates the picture a little, but the wow only figure is particularly high, a fact that is likely to be difficult to ignore on audition. And that is how it turned out. . .

The various frequency responses are remarkably fine on the whole and the other figures are satisfactory. Indeed the Type II working dynamic range is almost freakishly good for this class of product.

Sound Quality

For £170, and given the nature of the competition, the Technics is about as good as they come. Even so, the RS-TR265 is barely musically adequate on two counts. The first and most serious is the pitch problem already referred to. On recording after recording, instrumental pitch could be heard to waver, apparently erratically but always with a fairly long time constant. With certain types of music, the wow problem may not be apparent at first, but it is so different from what the ear expects that once identified on critical listening, it is hard to ignore. The situation was partly ameliorated with prerecorded tapes, but it was made worse when dubbing from tape to tape, in both cases for reasons that should be obvious to all.

The second and much less serious qualitative shortcoming was an oddly splashy midband and treble, noticeable mainly with Dolby C and probably associated with a misalignment of the Dolby circuits - or simple Dolby mistracking.

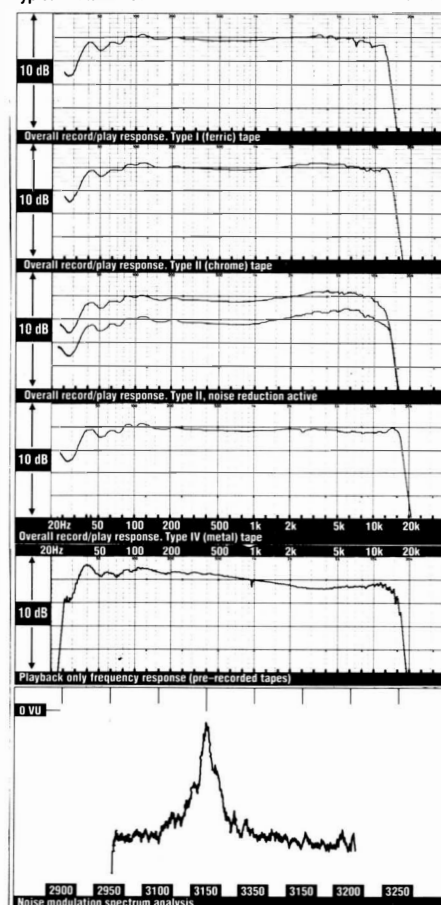
In other respects the Technics proved satisfactory or better. The two transports performed similarly, and on the whole reproduction quality was firm, outgoing and detailed, though not comparable to a good similarly priced single transport deck. No perceptible advantage was to be had from metal tapes.

Conclusions

Technics' latest dual transport deck is powerfully endowed and, bar the unilluminated markings in the display area, extremely easy to use. Despite Technics' best efforts, however, performance is quite severely compromised.

TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response	-3dB ref 1kHz
IEC Type I	30Hz-14kHz
IEC Type II	30Hz-15kHz
IEC Type IV	30Hz-18kHz
Wow & Flutter - Peak DIN wtd/unweighted	0.29%/0.38%
Wow/Flutter - Peak DIN wtd	0.21%/0.29%
Speed error	+0.05%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	48.6dB 0.75%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	54dB 0.8%
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	50.5dB 0.9%
Noise Figure of Merit (Dolby level/noise Type II)	57dB
Crosstalk + Noise ref 0VU/1kHz	49dB
Line input sensitivity/overload	144mV/9.1V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	632mV/2.22V
IM distortion 10kHz/1kHz 0dB peak, 1kHz product	5.0%
Azimuth check R-L phase at 10kHz	1=25deg fwd/0deg rev 2=40deg fwd/80deg rev
VU indication at IEC 0dB	3dB
Dimensions (w x h x d)	43 x 13.6 x 29cms
Average wind/rewind time (C90)	2mins 36sec/v slow
Typical Retail Price	£170



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Technics RS-B665

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The RS-B665 is another of those children of a big hi-fi multinational whose evident aim in life is to leave the observer reeling with the completeness of its conception. The range of features is wide, the engineering comprehensive and evidently well conceived – at least from the outside. And all for just £199 and no cereal packet tops. . .

Operating features first. The eye is initially drawn to the large and complex display area whose master . . . I mean centrepiece is a peak hold record level meter which normally covers the -30dB to 16dB range with fine (best case 2dB) resolution, and which, utterly redundantly, can be switched to a read between -7 and +8dB in 1dB steps. In common with some other Technics cassette decks, peaks can be retained indefinitely and moved around with the input level control as an aid to setting up record levels. The usual Dolby triumvirate – B, C and HX Pro – are present and correct, and the list continues with an elapsed time memory tape counter, track search, repeat play, and bias adjust. Microphone inputs are provided on this deck, and so is a volume control for the headphone socket.

The most noteworthy aspect of the transport is the use of a high grade direct drive, quartz referenced capstan motor. A second motor deals only with the reels. Particular design effort has been expended on the record and play amplifiers to reduce phase shifts due, for example, to head inductance. High grade capacitors are specified for use in critical areas.

Lab Report

Measured wow is moderately low, but flutter energy is quite high, and the spectrum analysis indicates quite scrappy behaviour with a lot of side-band energy (represented by the area under the curve) and some structural

effects causing the very high level side-band peaks. Tape alignment, however, was generally good. Prerecorded tapes and standard Type IIs are handled near perfectly, but Type II and IVs both suffer some top end lift (2dB at 15kHz). Noise and distortion figure are mediocre, but the high Type II figure (which was rechecked) is probably unrepresentative.

This is not a deck that seems particularly well suited for use without Dolby. Head azimuth alignment is excellent though, and intrinsic headroom in the record electronics is good, implying suitability for metals.

Sound Quality

There were some obvious shortcomings with this deck. Pitch stability clearly wasn't quite right, with uncertain tone obvious on one particular recording of French classical flute (Alain Marion/Denon). The instrument also has an odd, slightly feathery tone and breath noises were exaggerated at the normal bias setting. Correcting the bias alleviated but didn't eradicate the symptoms, and after auditioning the deck with the tape stationary in the tape monitor loop of the test amplifier, it was apparent that the decks' electronics are culpable. Although crisp and detailed, there was a trace of glare and opacity obviously caused by the electronics, in addition to which the bass sounded a little slow and heavy.

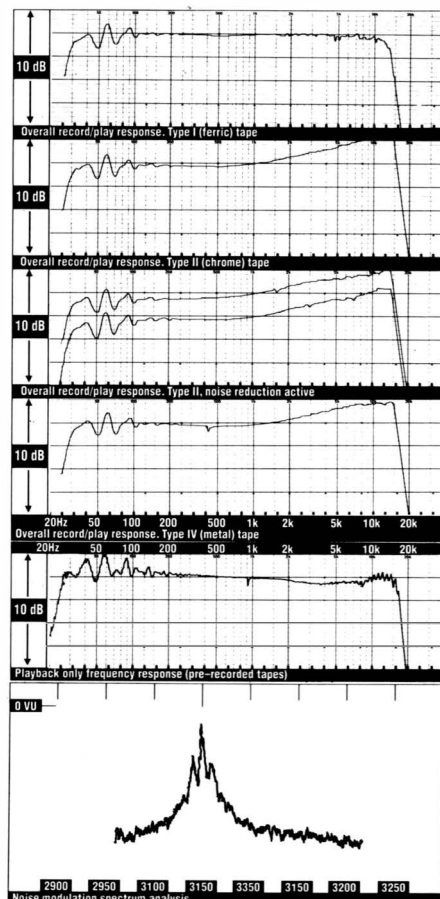
On the whole, all tape groups were handled consistently. Ferrics didn't sound too obviously like the poor relation, and indeed it was ferric tapes that provided the most accurate frequency responses and the most naturally balanced sound. But despite this, prerecorded tapes tended to demonstrate some of the shortcomings already mentioned, namely an unwieldy bass and an opaque, coloured mid and top.

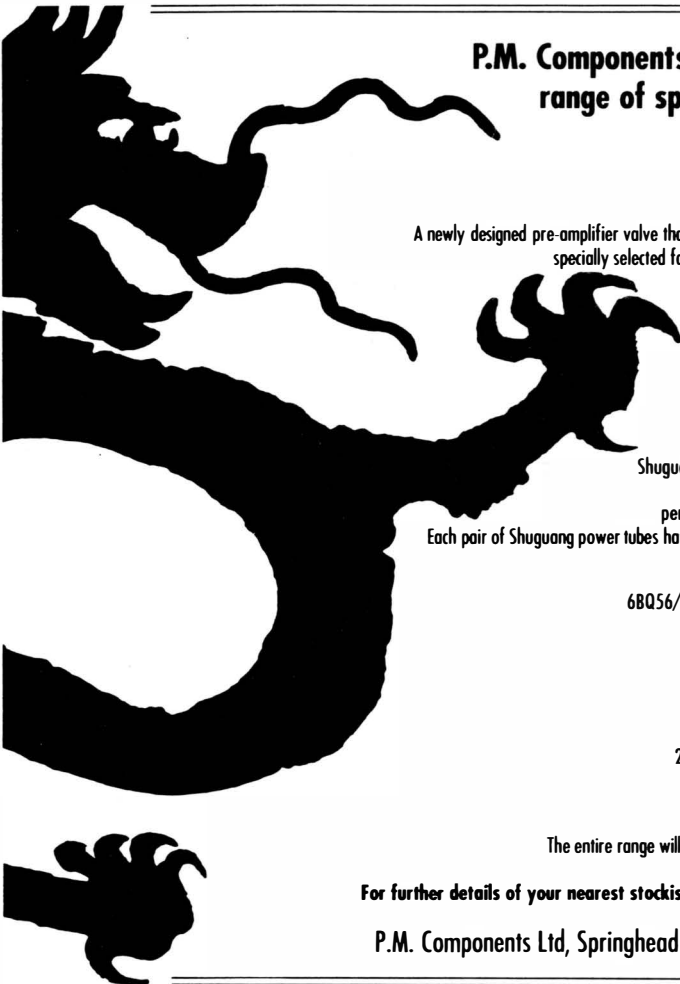
Conclusions

All the ingredients appear to be right, yet when push comes to shove, this straightforward deck from the usually consistent Technics stable fails to deliver.

TEST RESULTS

Dolby Level reading on deck's meters	4dB
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/unweighted	0.10%/0.16%
Wow/Flutter – Peak DIN wtd	0.065%/0.15%
Speed error	0%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	50dB 0.9%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	51dB 3.2%
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	52dB 0.8%
Noise Figure of Merit (Dolby level/noise Type II)	55dB
Crosstalk + Noise ref 0VU/1kHz	50dB
Line input sensitivity/overload	144mV/10V
Mic input sensitivity/overload	0.365mV/120.5mV
Line output for 0dB/maximum	627mV/3.1V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.50%
Azimuth check R-L phase at 10kHz	8 degrees
VU indication at IEC 0dB	4dB
Dimensions (w x h x d)	43 x 13.5 x 29cms
Average wind/rewind time (C90)	2mins 31sec/v slow
Typical Retail Price	£199





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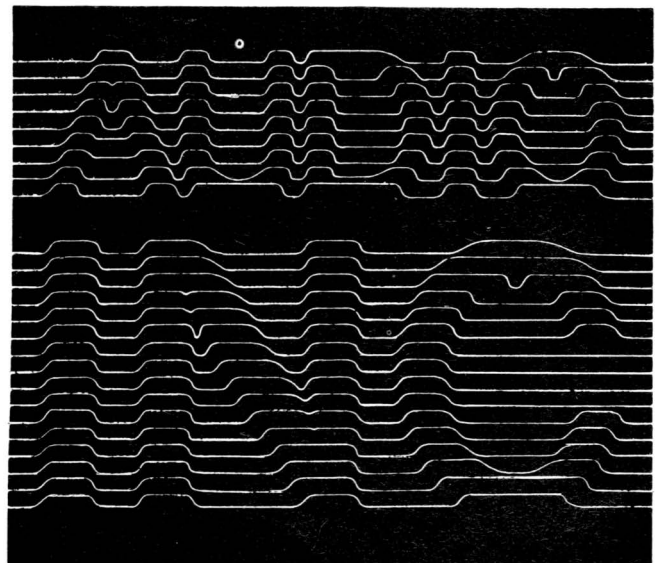
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Yamaha KX-330

Recommended

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



This well endowed new design, available in black or titanium finishes, is a direct replacement for the *KX-300*, and mates a new corporate front panel scheme to a range of features even wider than that of its predecessor. The design of the front panel – if design is the right word – makes extensive use of small and cramped controls, most of which are rotaries. Panel graphics are jumbled and the display is of high quality but again rather cramped. But whatever shortages there are of style are easily made up by what the deck offers.

The list includes a logic controlled transport with well designed controls and dedicated intro scan keys, Dolby B and C noise reduction with an MPX defeat option and the additional benefit (as an estate agent might put it) of Dolby HX Pro headroom extension circuitry. Track search is available too.

Manual fine adjustment of bias, available with all three tape groups, allows a range of different formulations to be matched correctly. This is supplemented by play trim (carried over from the *KX-300*) which adjusts replay equalisation before the Dolby replay circuitry, so that tapes recorded on a different and perhaps slightly misaligned deck can be corrected. Equalisation takes place before Dolby encoding so that the circuit can be used to correct Dolby tracking errors, though not independently of any treble loss due, for example, to azimuth misalignment. Usually though the play trim adjustments will put both to rights.

The record level meters cover a 32dB range with adequate resolution, peak hold and a display showing the maximum suitable record level setting for the tape group in use. A beautifully clear electronic tape counter is now used by Yamaha with memory stop and block repeat features. The deck will also return to the start of a recording with a single command. A remote control

handset is also available.

Lab Report

Measured performance standards are about right at this price level. The transport is comparatively stable, though some (presumed) capstan wow is evident. Frequency responses are all well maintained into the deep bass and treble regions, but they're all dished, with a broad, shallow depression in the middle frequencies. Being broadband, this can be expected to reflect in the listening results. 0VU noise and distortion are satisfactory, but the HF intermodulation figures shows that headroom is limited in this region.

Sound Quality

This is a good-to-excellent cassette deck, clearly one of the better sounding decks in its price range with an emphasis on powerful dynamics and a crisply defined sense of detail. There was plenty of drive but also some roughness at times, mainly with voice tone, but also noticeable with woodwind and strings. I detected little benefit in the use of metal tapes either, but on the whole there was little to complain of with the sound of Type IIs, such as TDK SA, on this deck as long as the bias level was increased a little to reduce the treble excess.

The general rule of thumb with cassette decks is that the two Dolby circuits tend to mask fine detail, dynamics and stereo soundstaging in the process of clearing up the hiss, but the losses were less marked here than in some competing decks. On the whole, the Yamaha *KX-330* is one of those decks that sound better with Dolby than without, though dense, loud music which masks noise can tip the balance.

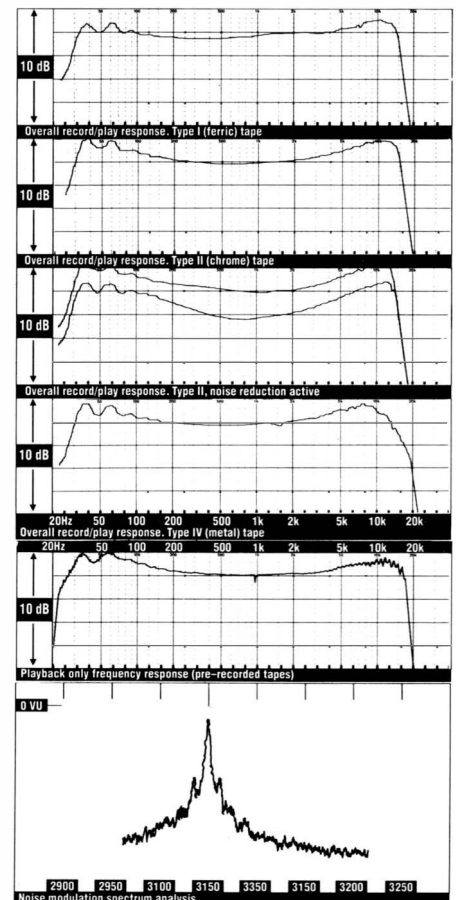
Conclusions

This deck for the most part sounds sta-

ble and clean, with strong dynamics and a solid bass. There is a degree of roughness at times, but nothing that isn't commensurate with price. Not quite Best Buy material, but a strong recommendation is in order.

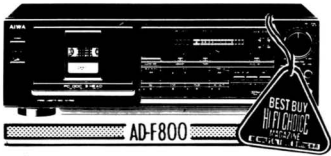
TEST RESULTS

Dolby Level reading on deck's meters	2dB
Rec/replay response	-3dB ref 1kHz
IEC Type I	25Hz-16kHz
IEC Type II	25Hz-17kHz
IEC Type IV	25Hz-18kHz
Wow & Flutter – Peak DIN wtd/unweighted	0.09%/0.13%
Wow/Flutter – Peak DIN wtd	0.09%/0.12%
Speed error	+0.06%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	48dB 1.2%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	50dB 1.2%
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	50.5dB 0.8%
Noise Figure of Merit (Dolby level/noise Type II)	52dB
Crosstalk + Noise ref 0VU/1kHz	49dB
Line input sensitivity/overload	106mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	537mV/3.57V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	3.9%
Azimuth check R-L phase at 10kHz	40 degrees
VU indication at IEC 0dB	4dB
Dimensions (w x h x d)	43.5 x 11.7 x 27.3cms
Average wind/rewind time (C90)	2mins 20sec/slow
Typical Retail Price	£170
+ remote control optional extra – £20	



The Hi-Fi Showroom

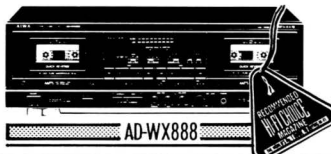
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Yamaha KX-530

Best Buy

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In common with the *KX-330*, the *KX-530* uses a hyperbolic profile 12 layer amorphous record/playback head, advantages of which include improved saturation performance needed by many high energy tapes. A smoother low frequency performance is also claimed, partly determined by head shape. The *KX-530* also features a low noise, direct coupled playback op-amp and a high current record amp to help drive the tape fully. The transport drive system employs three motors and includes a dedicated DC capstan motor.

The complex control system includes everything already mentioned in connection with the *KX-330* – play trim, variable bias, intro scan, track search, the usual Dolby amenities and so on – and more besides. Highlights include a volume control for the headphones, a master fader control in addition to the individual channel level controls (this allows correctly channel matched fades), and a tape counter with remaining time display (you supply tape length data, it works out the rest).

Remote control is an option with this recorder. The handset costs around £25, and allows direct access to tracks up to 99 away from the current position, and random programming of a more down to earth nine tracks. This could prove useful, but the attempt to make a cassette deck that thinks it's a CD player comes up against reality when waiting patiently for the tape to shuffle its way slowly from one track to the next at the other end of the tape, or where the deck thinks a new track has started in the middle of a Beethoven piano sonata. Which happens. . .

Lab Report

The *KX-530* behaved well on the test bench. The main frequency responses are finely engineered, though not without a suggestion of waywardness in the

case of the Type II response and playback only responses which tend to favour the bass.

The transport delivers a fine set of numbers on the whole, but there is a fair amount of wideband flutter visible in the spectrum analysis which shows in the raw flutter figure of 0.40 per cent. Signal/noise results are excellent all round when the very low distortion figures at which they're achieved is taken into account. In practice it is possible to drive the Yamaha substantially into the red with suitable tapes (metals especially), though the IM test shows that very high level high frequency might get recordings into trouble.

Sound Quality

This is a lucid and articulate design, which has a sure-footed quality with complex material, a wide dynamic range and a richly varied range of tonal colours with which to paint the music. Compared to the *KX-330* it provides a more solid and meatier style, and greater presence and analysis which in the real world translates into greater access to and clearer audibility of complex material. Stereo imagery also benefits. It is large in scale and firmly positioned in space, especially in the depth plane.

The *KX-530* is also good enough to extract something extra from metal tapes which generally sounded sharper and more dynamic, with a purer, more penetrating treble. Yet treble quality remains good: penetrating in this context does not mean aggressive or nasty. Dolby noise reduction was well engineered, with Dolby B providing a near optimum blend of transparency and freedom from tape hiss.

Prerecorded cassettes also sounded good, but with a strong suggestion of the bass bloom and slightly distant perspectives implied by the frequency

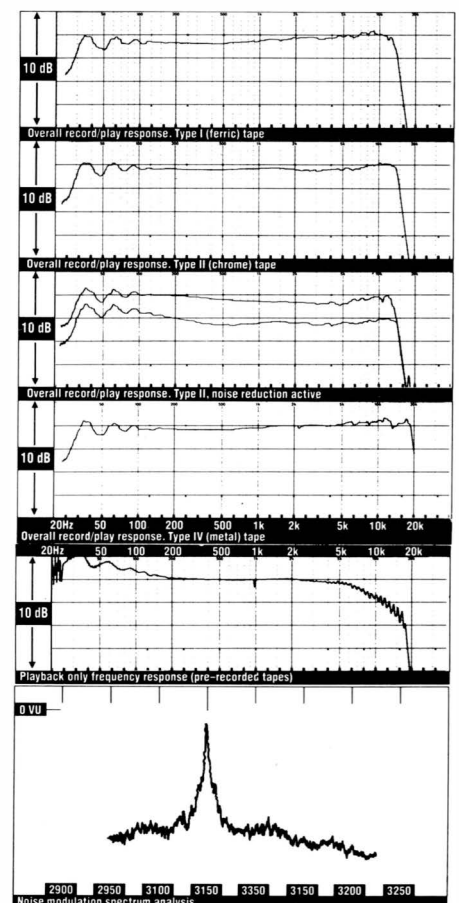
response plot shown below.

Conclusions

An excellent all rounder, the *KX-530* is fast, articulate and assured, especially with metal tapes. Best Buy.

TEST RESULTS

Dolby Level reading on deck's meters	+2dB
Rec/replay response	-3dB ref 1kHz
IEC Type I	25Hz-14kHz
IEC Type II	25Hz-15kHz
IEC Type IV	25Hz-20kHz
Wow & Flutter – Peak DIN wtd/unweighted	0.095%/0.25%
Wow/Flutter – Peak DIN wtd	0.05%/0.40%
Speed error	-0.03%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	48.5dB / 0.1%
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	53dB / 0.1%
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	51dB / 0.7%
Noise Figure of Merit (Dolby level/noise Type II)	55dB
Crosstalk + Noise ref 0VU/1kHz	48dB
Line input sensitivity/overload	92mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	573mV/3.72V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	2.51%
Azimuth check R-L phase at 10kHz	24 degrees
VU indication at IEC 0dB	4dB
Dimensions (w x h x d)	43.5 x 93 x 26.7cms
Average wind/rewind time (C90)	1min 56sec/average
Typical Retail Price	£230





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Yamaha KX-930

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



£400 is serious money for a cassette deck, and by any standards the Yamaha KX-930 is a serious cassette deck. It looks almost identical to the KX-530, but has a different transport mechanism with dual capstans for improved transport consistency, and independent amorphous record and playback heads with PC-OCC coil windings.

The KX-930 differs from its lesser cousins in other ways too. It has a circuit which automatically fine tunes bias and sensitivity. The procedure is no more taxing than selecting record/pause and pressing a button called 'auto tape tuning'. The whole procedure takes no longer than a newt takes to sneeze – an astonishing four seconds, and only slightly longer if the tape is at the wrong end of the leader. A manual fine bias control is available as well, but if the circuit does its job well (see later) this feature would become redundant in this application.

Other features are as for the KX-530 except that the remote control available as an option with the 530 is included as standard. In brief, the long feature list includes such highlights as track, index search, a number of repeat modes, a real time tape counter with time remaining readout (you programme the tape length first), Dolby HX Pro and more.

Lab Report

The measurement programme posed no insuperable problems for the Yamaha, but it didn't provide much of an opportunity for the deck to shine either. The basic frequency responses with Type I and IV tapes were essentially ruler flat, but the auto tape tuning circuit slipped up a little with Type II tape, and both the Dolby circuits added a little flourish to the proceedings, the substantial Dolby B top end boost indicating some misalignment. Tape head geometry is good however, as seen in the favourable

low frequency response. Prerecorded tapes are also handled extremely accurately.

Had the other measured parameters equalled the foregoing, the Yamaha would have scored much higher here, but the dual capstan transport produced only average figures. The spectrum analysis, which is far more of a fingerprint of transport behaviour than the wow & flutter figures could ever be, shows no dominant effects, but the fact remains that both cheaper Yamaha decks in this project produced better results.

Sound Quality

Measured shortcomings often mean little when the time comes to listen, as this machine proved. There was never the slightest doubt about pitch accuracy, even with music that shows such problems at their clearest – sustained piano notes, woodwind and so on. The Yamaha has plenty of other points in its favour – including freedom from a range of typical cassette style shortcomings. The bass doesn't waffle and stereo soundstage reproduction has a genuine sense of stability and precision, often in all three dimensions, unlike much of the competition.

What was apparent, however, was a certain loss, a feeling of uncertainty and clutter associated with the midband and treble that diminished some of the more subtle but important qualities of good music making. There was also an occasional feeling of high frequency distortion, as though the electronics were being overloaded, which clearly wasn't the case.

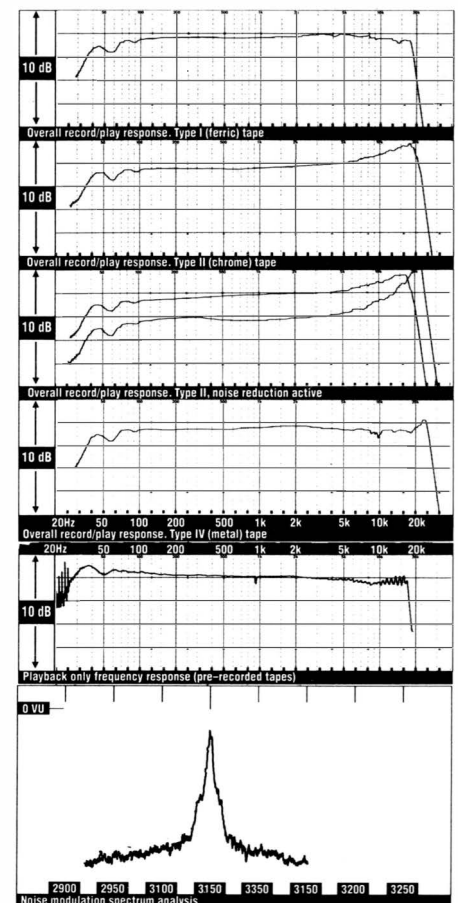
Conclusions

On the face of it, the Yamaha is a fine, modern deck with a soundly conceived transport design and a range of powerful features, all at a price that is far from outrageous. In use however the controls

seemed fiddly, and recordings sounded dry and undemonstrative in the manner of modern mainstream electronics. It makes clean dubs of compact discs, but suppresses the scale and fire of real music making.

TEST RESULTS

Dolby Level reading on deck's meters	+3dB
Rec/replay response	-3dB ref 1kHz
IEC Type I	35Hz-19kHz
IEC Type II	32Hz-22kHz
IEC Type IV	32Hz-24kHz
Wow & Flutter – Peak DIN wtd/unweighted	0.12%/0.15%
Wow/Flutter – Peak DIN wtd	0.07%/0.14%
Speed error	-0.5%
Type I signal/noise CCIR/ARM 400Hz & distortion 0VU	48.5dB
Type II signal/noise CCIR/ARM 400Hz & distortion 0VU	53dB
Type IV signal/noise CCIR/ARM 400Hz & distortion +3VU	50.5dB
Noise Figure of Merit (Dolby level/noise Type II)	56dB
Crosstalk + Noise ref 0VU/1kHz	50dB
Line input sensitivity/overload	107mV/>13V
Mic input sensitivity/overload	n/a
Line output for 0dB/maximum	600mV/3.8V
IM distortion 10kHz/11kHz 0dB peak, 1kHz product	0.35%
Azimuth check R-L phase at 10kHz	20 degrees
VU indication at IEC 0dB	4dB
Dimensions (w x h x d)	43.5 x 12.2 x 27.5cms
Average wind/rewind time (C90)	1min 48sec/fast
Typical Retail Price	£400



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Tech Talk

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

At the outset let me acknowledge the help I received from Chris Bryant, who did the sensitivity, overload, azimuth, intermodulation and VU indication at IEC 0dB measurements. All the remaining machine tests and 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; errors cancel out on replay.

Lab testing

Dolby Level. Dolby level 20nW/mm as indicated on cassette deck meters, using Teac test tape. Note limited resolution of some meters can give reading errors.

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). The accuracy of this test has been improved for this issue.

Signal/noise ratios are quoted with CCIR/arm weighting. The test frequency is 400Hz, the distortion is shown at the same point (0VU on the deck's meters) for each of the three tape types.

Noise 'Figure of Merit' like signal/noise but referred to as constant magnetisation level, ie Dolby level Type II tape used.

Channel separation is measured with reference to a 1kHz signal at 0VU on the deck's meters – and includes noise. The accuracy of this test has been improved for this issue.

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 10kHz. 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. Average wind/rewind time is timed in both directions using a C90.

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 if they were run at the traditional –20dB.

Also included are similar, comparable plots showing the effects of the noise reduction systems in the frequency domain. The playback only plots were also run in exactly the same way, giving an indication of the frequency response available with prerecorded material. For these tests, thanks to Sony and Pioneer, we were able to run with official IEC 120µS replay sweep test tapes from ABEX. The tapes used were TCC- 162B (20Hz to 18kHz) and TCC- 162 (31.5-18kHz).

We also performed spectrum analysis tests to investigate the mechanical behaviour of each of the decks, though space prevented the publication of more than one of these. The

noise modulation spectrogram graphically illustrates the mauling endured by a 3150Hz sinewave when recorded and replayed by the deck under test – there are close parallels with a similar analysis carried out in last year's edition. The central peak should be as fine and as thin as possible, any problem here being heard as a lack of pitch stability.

Response runs were also made using the high speed dub option, but have not been reproduced for space reasons. With auto-reverse decks, all data refers to Side 1, but the reverse side was checked in the same way, and again discrepancies were reported as they arose. In the case of decks with automatic tape alignment, the alignment procedure was followed, and where a bias adjustment facility was fitted, the setting recommended for TDK, AD, SA and MA was used if available. Otherwise the central setting was adopted.

Listening tests

Listening was divided into two sections. The first involved using each deck in turn in a system which included a Meridian 208 plus 203 CD player (the preamp section of the 208 was bypassed for this application), NAD 1300 and Musical Fidelity A370 pre/power amps, Stax *Lambda ELS* headphones and Tannoy *DC2000* loudspeakers. Much routine and all functional testing was done with this system.

Finally, and most important of all, each deck was auditioned in a high grade loudspeaker based system. Equipment used included DNM and Threshold preamplifiers, Musical Fidelity A370/II and Threshold power amplifiers, a Roksan/*Artemiz/ Shiraz* record player, the Meridian CD player already mentioned and Apogee *Caliper* loudspeakers, all wired with solid core cable from DNM and Mission.

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Hi-Fi Choice - Reader Survey

Dear Reader,

It is our policy to continually update and improve Hi-Fi Choice and to assist us in this we would like to know a little more about you and what you think of us. Please help us by taking a few minutes to fill in the form below.

YOUR HI-FI SYSTEM

1. How much did your current system cost?

- Under £399
- £400-699
- £700-999
- £1,000-1,499
- £1,500-2,000
- Over 2,000

2. Where did you purchase your system?

- Department Store
- High Street Chain
- Discount warehouse
- Specialist hi-fi dealer
- Second hand

3. How long is it since you last bought some hi-fi equipment?

- 1-2 years
- 2-3 years
- 3-5 years
- Over 5 years

4. Approximately how much do you think you have spent on your existing system?

Amount.....

5. Which items do you intend to update this year?

- Turntable
- Arm
- Cartridge
- Amplifier
- CD Player
- D/A converter
- Cassette Deck
- Tuner
- Loudspeakers
- Stands
- Cables
- Midi System with CD

SOFTWARE

6. Which software do you buy most frequently?

- CDs
- LPs
- Cassettes

7. Approximately how many of the following have you bought in the last year?

- | | | | |
|-----------|-------|-------|---------|
| CDs | | | |
| 1-15 | 16-30 | 31-49 | Over 50 |
| Vinyl | | | |
| 1-15 | 16-30 | 31-49 | Over 50 |
| Cassettes | | | |
| 1-10 | 16-30 | 31-49 | Over 50 |

THE MAGAZINE

8. Do you find the reviews:

- Too technical
- Not technical enough
- Just right

9. Would you like to see:

- More reviews
- More features
- You're happy with the balance

10. Which areas of *Choice* do you find most interesting? Please mark in numerical order of importance. (1-high, 10- low)

- News
- Sessions
- Aspirations
- Perspectives
- Letters
- Statements
- Competitions
- The Craftsman
- Reviews
- Directory

11. How long have you been a reader of *Choice*?

- Under a year
- 1-3 years
- 4-10 years
- Over 10 years

12. Do you purchase *Choice* specifically to buy equipment?

- Yes
- No

If yes how much do you intend to spend?

Up to £.....

13. How do you rate *Hi-Fi Choice*?

- Excellent
- Very good
- Good
- Average
- Poor
- Very poor

14. Do you think *Choice* is good value for money?

- Yes
- No

15. How many people read your copy?
.....

16. Which other hi-fi magazine do you read on a regular basis?

- What Hi-Fi?
- Hi-Fi News
- High Fidelity
- Audiophile
- Hi-Fi Review
- Gramophone
- None

ABOUT YOU

17. How old are you?

- 18-24
- 25-34
- 35-44
- 45-55
- Over 55

18. What is your annual income?

- Under £7,000
- £7,001-£9,999
- £10,000-£14,999
- £15,000-£19,999
- £20,000-£25,499
- Over £25,000

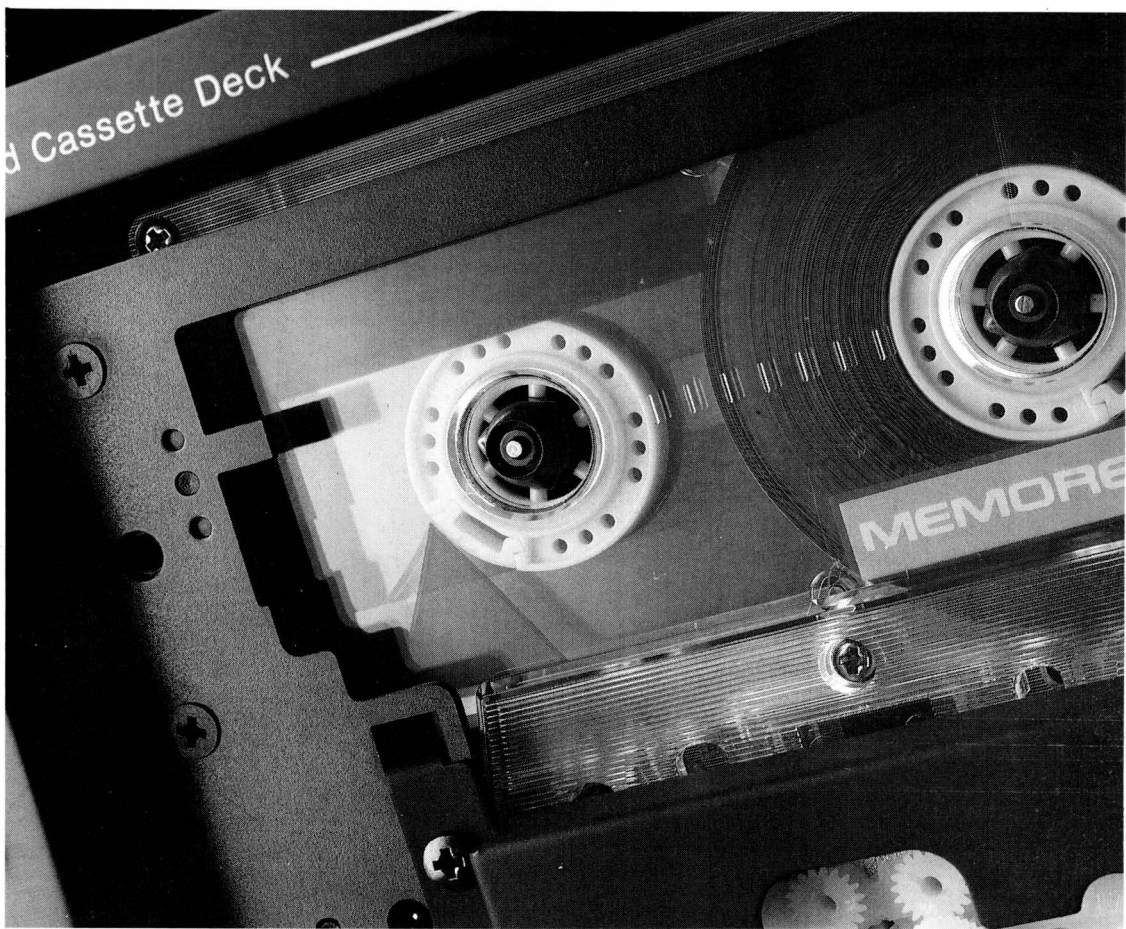
19. Which of the following best describes your occupation?

- Self-employed
- Student
- Retired
- Unemployed
- Professional
- Managerial/Senior technical
- Technical/Clerical

20. Which area do you live in?

- London
- South East
- South West
- East Anglia
- West Midlands
- East Midlands
- North West
- North East
- Wales
- Yorkshire
- Scotland
- Ireland

Thank you for helping us with our survey. Now please fold as indicated on the reverse of this form and return to us (no stamp required).



Conclusions, Best Buys and Recommendations

Alvin Gold rounds up this month's cassette deck reviews, highlighting the best models.

Compact cassette continues to live, even thrive, on borrowed time, and looks set to continue to do so for a while yet. A year ago DAT was depicted as 'the future that never happened'. Well, it's another year down the road and DAT still hasn't happened. There are persistent rumours that Japanese manufacturers are about to do something serious about relaunching DAT, meanwhile Philips is floating another completely incompatible system called DCC, a kind of half way house to DAT based on the compact cassette itself.

Last year we were expecting to see the first Dolby S recorders; this hasn't happened. About the time you read this the very first

models from Harman/Kardon should become available, but these will be early decks not based on the final integrated ICs, and there will therefore be a cost penalty.

So where does the future lie amidst all these stories in progress? Only a brave (or foolish) person would make any firm assertions at this stage. The fact is that nobody knows. Perhaps the future of home taping will be on some variant of recordable/erasable compact disc?

Probably not; the technology is now in place to do the job, and recordable CD is attractive because of the other existing applications for CD-like media, but the price is likely to be too high for a long time to come. But it would be

foolish to treat this thought experiment as a firm prediction.

Meanwhile, the cassette deck market carries on as before, with very little in the way of discernible equipment trends to report except for the presence of a brand new name on the scene – Sherwood, a predominantly budget oriented brand from Korea.

Best Buys

Three Best Buys have been awarded this month, two of which are at the same £170 price point: the **Pioneer CT-447** and the **Sony TC-K520**. Both are representative models from very strong ranges recently introduced by the two companies, and both hit their

target squarely. The Pioneer model is chiefly remarkable for its fully automatic tape alignment procedure for record bias, sensitivity and equalisation, which is no easy task with a two head deck like this one. The Sony has no such major selling feature, but in common with the Pioneer it is well thought through and well engineered, and has the odd surprising feature itself, for example a most welcome switch to kill the display lighting which improves the appearance of the deck even if sound quality isn't greatly affected.

The final Best Buy in this group is the £229 **Yamaha KX-530**. A deck with a very full range of features, it can even be programmed like a CD player if used with an

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- Revox
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- Stax

EXAMPLE SYSTEMS:-

Illustrated

Linn Axis Turntable (with Akito)	£435.00	Linn Sondek LP12 Turntable	£598.00
Linn K9 Cartridge	£81.00	Linn Akito Tonearm	£149.00
Quad 34 Pre-Amp	£299.00	Linn K9 Cartridge	£81.00
Quad 306 Power Amp	£265.00	Arcam Delta 90 Amplifier	£399.90
Quad CD Player	£449.00	Arcam Delta 80 Tuner	£299.90
Epos ES14 Speakers	£385.00	Arcam Delta 70 CD	£599.90
Total Price	£1914.00	Monitor Audio MA1200 Speakers	£899.00
		Total Price	£3026.70

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Rega Planar 3 Turntable	£207.00	Rega Planar 2 Turntable	£155.00
Rega Elys Cartridge	£74.00	Audio Technica At110E Cartridge	£21.00
Naim Nait Amplifier	£389.85	Creek Cassette 4040 Amplifier	£179.00
Rega ELA Speakers	£405.00	Denon DRM 400 Cassette deck	£139.95
Total Price	£1075.85	Monitor Audio MA7 Speakers	£169.90
		Total Price	£664.85

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optional remote control handset. Gadgets aside, this is nevertheless an extremely well engineered middle price model, with a performance standard towards the top of its class.

Recommendations

In ascending price order, the Recommended models start with the first of the two designs from Sherwood, the £100 **Sherwood DS-1135C**. If the price had been as much as £10 higher this model might have missed Recommended status altogether, but as matters stand the *DS-1135C* offers a lot for the money – including Dolby HX Pro – in a package offering near hi-fi performance (which is as much as you're entitled to expect at this price) even with low bias tapes. Shortcomings include poor minor switching and some repetitive background noise. For £30 more, the **Pioneer CT-337** (£130) is a much more assured package with basic facilities well implemented, including auto tape type selection, eliminating a long term complaint of Pioneer's budget decks.

The next worthwhile step

Which cassette decks made the grade this month?

up the ladder takes in the **Yamaha KX-330P** (£169), which can be identified from a distance by its bold fascia populated with tiny controls. The Yamaha can be had with an optional remote control and black or titanium finishes. One intriguing feature is 'play trim' which helps match tapes recorded on other decks (including commercially recorded cassettes) to the playback machine. Technically, Play Trim is a bodge rather than a corrective measure since it restores HF losses due to azimuth errors, but increases noise and distortion in the region pro rata. Still, the deck sounds good, which after all is the point of the exercise. Ditto with the **Rotel RD-855**, a plain Jane of a deck with virtually no features of note and only modest standards of alignment, but sound quality is surprisingly good due to the use of fine quality electronics.

Class Acts

The next group of really interesting decks starts at a far higher price level – £400

for the **Sony TC-K850ES** and £450 for the **Pioneer CT-959**. These are both 3-head decks, engineered to a very high standard. The Sony is an excellent recorder and an even better choice for playing prerecorded material, a task for which it seems to have a natural affinity. Two samples submitted of the Pioneer suffered similarly bright replay responses, a matter the manufacturer says will have been put right well before this appears in print. The *CT-959* has a wholly remarkable transport which in many respects may be the finest commercial transport available today. The rewards in extra resolving power are obvious.

At almost double the price of the Pioneer is the **Nakamichi RX-505SE**, a very sophisticated auto reverse cassette deck that physically turns the tape over at the end of side, leaving the heads and transport intact. This technique overcomes traditional purist objections to auto-reverse, and the deck performs faultlessly, the only operating snag being that

tapes have to be loaded upside down. At about double the price of the Nakamichi, the **Revox B215** sounds slightly more detached than the obviously more visceral Nakamichi. It lacks auto-reverse too, but remains a superb deck with almost every other useful operating feature known to man. It is superbly built too, but costs £1,727.

Finally, for those interested in using tape creatively away from home, the **Marantz CP430** (£400) is an astonishingly 'complete' portable. The size of a decent novel, it includes three heads, Dolby B, dbx (which functions much like an auto-level control without the gross compression or hiss) and full battery operation, via rechargeable battery packs which are available at extra cost if required. The Marantz, which has been available for the best part of a decade, is primarily an amateur machine, though it has been bought by many professional users. And despite certain objective limitations, it offers real hi-fi sound quality in places where most cassette decks can't reach.



GLOSSARY

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

AM: Amplitude modulated; see 'Medium Wave'.

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

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

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

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

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

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

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

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

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

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

BASS: Lower part of the frequency spectrum.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

FARAD: Measure of capacitance.

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

FARAD: Measure of capacitance.

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

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

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

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

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

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

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

HF: High frequency.

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

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

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

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

IEC: An international standards body.

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

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

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

KILO (k): prefix meaning one thousand.

LED: Light Emitting Diode; an indicator light.

LF: Low frequency.

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

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

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

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

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

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

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

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

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

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

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

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

magnetic coding on a tape.

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

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

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

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

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

NOISE: Random unwanted low level signals.

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

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

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

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

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

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

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

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

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

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

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

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

PRESENCE: A quality of forwardness or immediacy in a sound balance, generally related to an upper-middle frequency response boost.

PRINT-THROUGH: A pre- or post-echo of a loud signal created by magnetisation occurring from one layer to an adjacent layer after the tape has spooled or been recorded.

Q: A measure of the magnitude and shape of a resonance; the higher the Q, the sharper and more severe in amplitude the resonance.

REFLEX: a system of bass loading (using port or ABR) which offers improved efficiency and bass power handling at the expense of subsonic control compared to a sealed box.

RUMBLE: The low or medium frequency sound produced mechanically by any moving parts in a turntable, mainly the motor and platter bearings.

SENSITIVITY: The volume of sound output for a specific electrical voltage input.

SEPARATION: As between the two channels of a stereo pickup; see *crosstalk*.

SHIBATA: A special stylus extending the elliptical to a 'line-contact' type of profile.

SIDE-THRUST: A force acting on cartridges in pivoted (ie not parallel tracking) arms, due to the stylus/vinyl 'friction' acting along the line of the offset angle; hence bias or side-thrust compensation.

SIGNAL-TO-NOISE, SIGNAL/NOISE, S/N: The difference in total output when an applied signal is removed.

STYLUS: The specially shaped piece of diamond in contact with the groove and connected to the cantilever.

SUBSONIC: Below the audible range, ie below 20Hz.

SQUARE WAVE: A signal which consists of a fundamental plus a (theoretically infinite) series of odd (3rd, 5th etc) harmonics in a precise phase and amplitude relationship. It is useful for examining transient performance, symmetry, resonance control and 'ringing'.

THD: Total harmonic distortion.

TRACING: The following of the groove modulations by the stylus; hence for example tracing distortion, caused by the inability of a spherical stylus to trace the high frequency inner grooves on a disc.

TRACKABILITY: The ability of cartridge to cope with large amplitude modulations (or of the arm and cartridge to follow the groove itself properly).

TRACKING ERROR: The discrepancy between the truly tangential angle at which a record is cut and the slightly off-tangential angle at which it is tracked by a stylus on a pivoted arm during some parts of the arm's travel.

TRANSIENT: Signal of very short duration.

TREBLE: Upper part of frequency spectrum, typically above about 3kHz.

TWEETER: A small drive unit designed to operate over the high frequency range.

ULTRASONIC: Frequencies above audibility, ie greater than 20kHz; also *supersonic*.

VERTICAL TRACKING ANGLE (VTA): The angle at which the plane of motivation of the stylus is set with respect to the vertical when viewed from a side elevation of the cartridge. Should match the 20° cutter standard.

WEIGHTING: A factor or function that is applied to a measurement to increase its relevance and usefulness.

WOOFER: A drive unit that operates over the bass portion of the audio range.

WOW AND FLUTTER: Low and high frequency pitch variations (from poor tape transport of turntable platters with speed drift).

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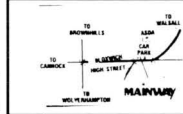
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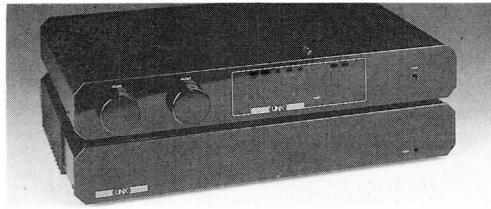


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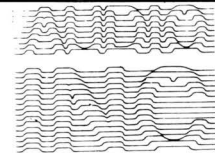
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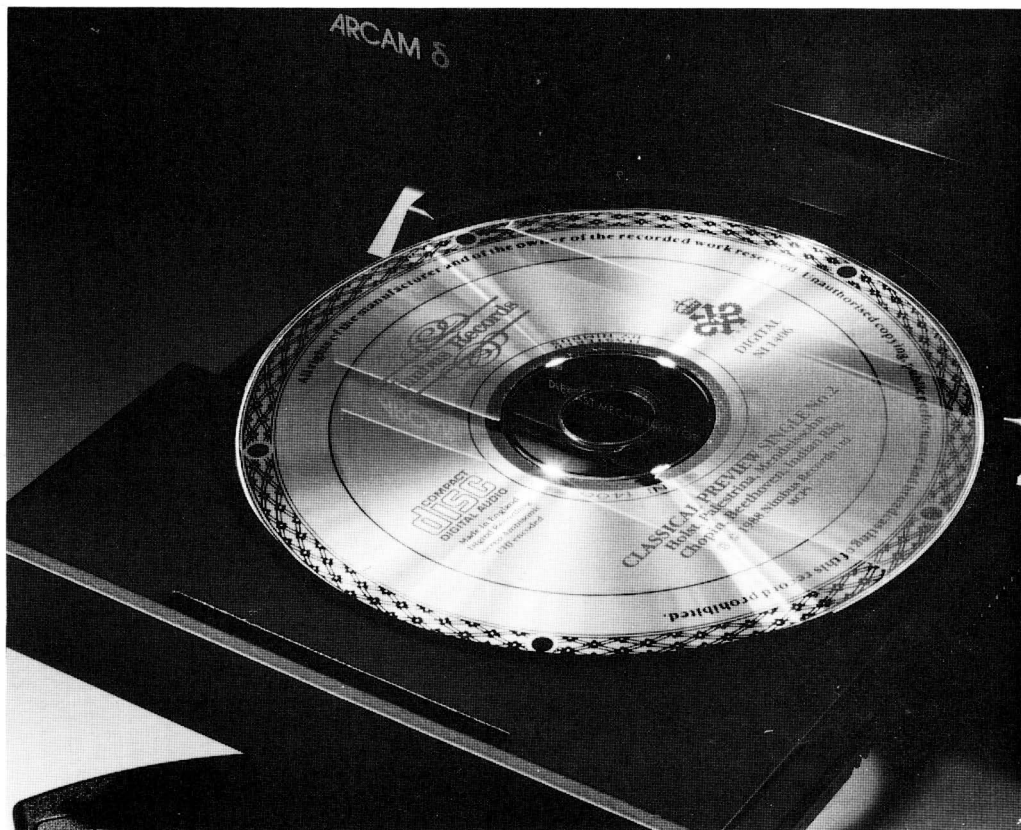
Choosing and Using . . . CD Players

CD players are now the most popular component in the hi-fi chain. For the uninitiated, John Bamford and Alvin Gold outline the compact disc format, and paint in the background to this month's small batch of reviews.

Compact disc has come a long way in six years, and is now starting to represent a significant percentage of hardware and disc sales (particularly by value). Rather surprisingly, the UK has proved one of the slower growing markets, though this partly reflects a greater difference in price between a CD and its LP or musicassette equivalent than in some overseas markets. Whereas disc prices have only reduced slightly since the format was launched (one or two budget labels notwithstanding), player prices have dropped to a third of those charged when the system was first launched. £200 is now a typical budget price, some machines cost as little as £130, and cheap mechanisms are built into systems and portables.

CD certainly has a number of advantages over its rivals. It is inherently rugged and unaffected by playing, free of surface and background noise and wow and flutter effects, while signals kept in digital form are theoretically immune from degradation. This said, a book could be written on how the theoretical incorruptibility of digital signals has proved to be something of a red herring. Regular observers of the hi-fi scene will be well aware of the 'discovery' that in CD replay even changing the interconnect cable used to transmit digital data between disc transport and standalone D-to-A converter can alter the perceived sound.

The addition of data channels allows complex pre-programming and accessing, while other CD applications include adding video (CD-Video), interactive A/V (CD-I) and the CD-ROM computer software format. In-car, portable and personal players are in the shops, though there is still the nagging doubt that tape is inherently more



immune to the shock and vibration of such applications, while the wide dynamic range and inaudible background noise can be almost an embarrassment in a noisy environment. Doubters notwithstanding, the format clearly is here to stay, which is an achievement in itself when one notes the enormous historic difficulties encountered by those trying to create a successful new domestic format, not to mention the current problems facing DAT, touted as the tape equivalent to CD. Indeed, DAT may well be a total non-starter now that CD-R (recordable CD) is just around the corner.

The Discs

Only five inches in diameter and attractively silvered, the compact disc currently costs up to twice the price of an LP or musicassette (in the UK)

and should resist damage or wear. It can carry more than an hour of music and comes packaged in an irritatingly fragile and awkwardly designed 'jewel case', containing additional printed 'sleeve' information.

For record companies in particular, establishing a brand new format is an exceedingly difficult task, in view of the vast inventory needed to represent a play-only format effectively, and in this instance, the technical problems of pressing with necessarily great precision. Inevitably there was a learning curve in the disc manufacturing processes, and full quality potential is still not reached in many cases. However, the range of titles available on CD has grown spectacularly, now exceeding those available on vinyl as more and more LPs are being deleted, emphasising the

commitment of the record companies to the format.

From the general consumer's point of view, price is still a key factor. While early CD users were clearly prepared to pay a 100 per cent premium, the pricing of CDs has now become something of a political issue as consumer pressure groups are becoming incensed at the lack of freedom of choice. History has shown that the broad base of recorded music sales is very price-sensitive but not especially quality conscious – musicassette purchasers who were attracted by the convenience of that medium were not deterred by sound quality substantially inferior to LP.

The Players

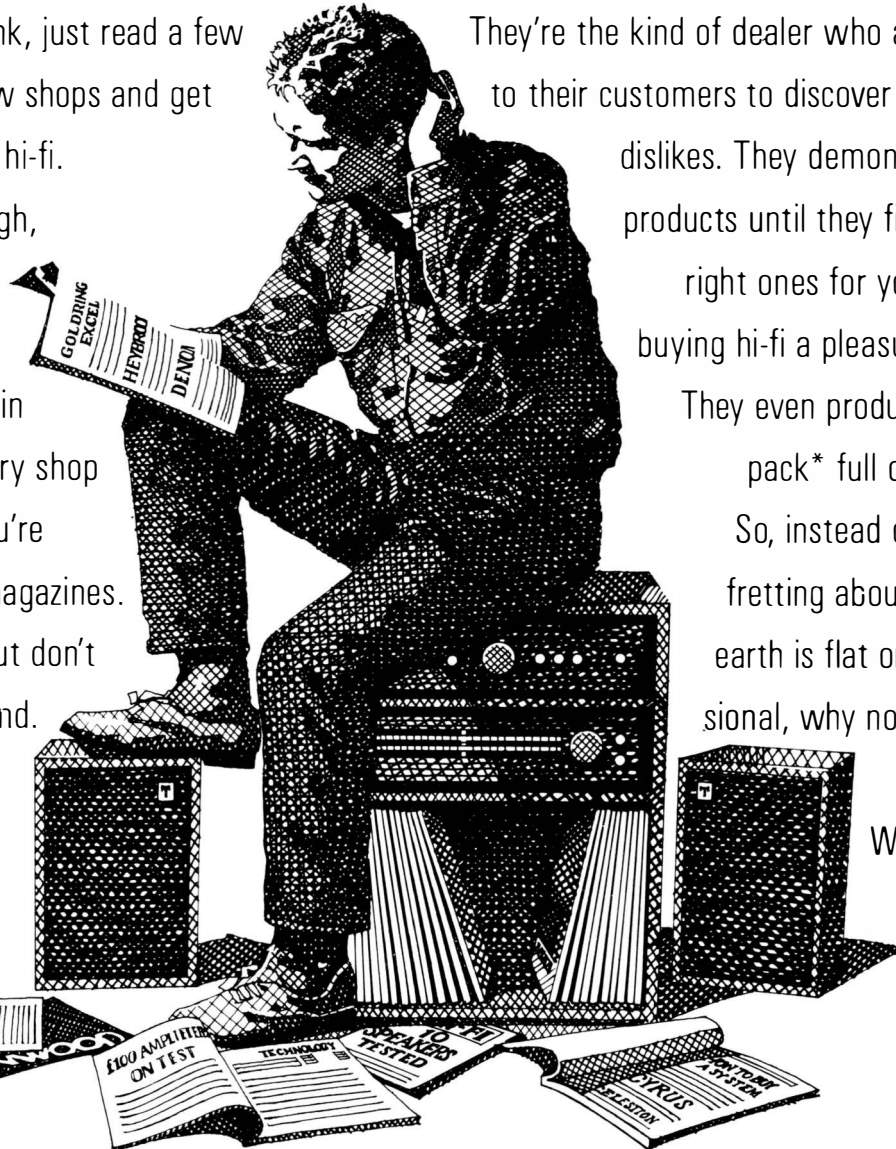
The conventional CD player may simply be plugged into any hi-fi system, as one would a tuner or cassette

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deck. The amplifier's 'aux', or 'tape' inputs will be perfectly adequate, though the results might be a little loud through the speakers, and require a lower volume control setting than usual. Many more recent amplifiers have a 'CD' input, and this may have a more appropriate sensitivity. Some specialist amplifiers have taken the trouble to connect the CD input directly to the preamp volume control, so as to minimise interference of the signal.

There is also a mild risk that a CD user will find his amplifier no longer seems to go as loud. The reason for this is that the digital CD medium is better at preserving the high loudness peaks in music which analogue systems 'squash' downwards. Consequently for the same peak output, the mean (average) output from CD with the same recording will be slightly lower than before. One can of course compensate by cranking up the volume, but if an amplifier is already being used close to its limits, the CD peaks could cause premature 'clipping', for which the only solution is a bigger amplifier.

The prospective purchaser faces a wide range of choice at wildly varying prices, starting below £150 and going up to above £2,000. Players are available for in-car use, are incorporated in large portables, and exist as tiny personals, with some doubling as unconventional domestic machines. The mains models can be manual or remote controlled, and simple or complicated in terms of ergonomics and programmability.

Autochanger variations can accept and play from a caddy of half a dozen discs, selected and programmed remotely. For enthusiasts looking for top quality performance, there is now a preponderance of 'two-box' players, where the disc transport and complex digital-to-analogue circuitry are physically separated and have independent power supplies.

Despite protestations of

'perfect' sound, CD players show significant audible and measurement differences, and these are discussed in detail in our reviews. That said, most machines measure very competently, showing occasional weakness at the cheapest end of the market and among low voltage portable machines. Though correlation with measurement still proves elusive, listening tests prove quite capable of consistently distinguishing between the different decks. While the poorer examples can make the new medium sound quite unpleasant, the best can provide eminently satisfactory results with refreshing repeatability and the promise of longevity.

This month's reviews

For this issue Alvin Gold has tested a batch of six components: four CD players and two standalone D-to-A converters. Regular readers will appreciate that Martin Colloms is our regular CD player reviewer, but we have not tested any Radford or Ariston machines in the past because MC worked as a consultant in the design of these players, and so it would have been unethical for him to write about them.

Not wanting to ignore these players, we consequently asked Alvin to review them – and threw in the Rotel RCD 865, Meridian 203 and Cambridge CD3 for good measure. As we go to press, MC is currently finalising reviews on another 20 new CD players for next month's issue of *Choice*. Don't miss it!

Alvin sums up. . .

It is a curious coincidence that all six units reviewed on the following pages employ Philips technology of one type or another, in four cases multi-bit, and the other two 'bitstream' but based on two different converter ICs and circuit topologies. As such the group is less than fully representative of the market as a whole, but some key



A handful of machines tested this month. More CD player reviews follow in next month's Choice.

trends are illustrated. One is the emergence of 1-bit conversion, not just at high prices as in the case of the Meridian 203 (a standalone D-to-A converter) but also near the cheap 'n' cheerful end of the market as exemplified by the Rotel RCD 865.

The Ariston and two Radford units are multi-bit, based on the TDA1541 chip set which has demonstrated extraordinary development potential throughout its lifetime having been used in the player sections of £300 midi systems and in two-box players costing in excess of £2,000 without appearing to

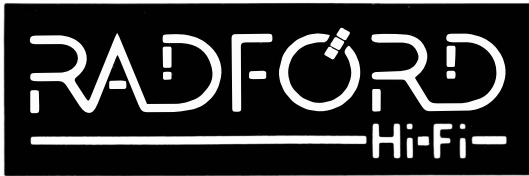
be out of its depth. The Cambridge Audio CD3, however, is perhaps the most unusual application for this converter so far, though the rest of the player is much more pedestrian.

One point that emerged definitively this year that has not been quite as obvious in the past is that the best of CD is now moving out of the 'flawed but serviceable' category and making deep inroads into enthusiast-hi-fi territory, albeit in fits and starts. This, in a sense, marks the coming of age of compact disc. The Meridian 203 is quite clearly on the right side of this almost intangible divide, and some of the others are very close. This is something that should make any music (as opposed to hi-fi) lover rejoice given the rapidly diminishing availability of newly recorded material on black vinyl.

Listening for this month's reviews was conducted in two rooms using two separate systems, in each case only after a thorough running in period of just under a week during which each player was run with a disc inserted and auto-repeat selected. Meridian 208 and Marantz CD94/II CD players were used as electronic goalposts, and other auditioning equipment used included Musical Fidelity, DNM and Threshold amplification, Apogee, Tannoy and Celestion loudspeakers, and Stax headphones.

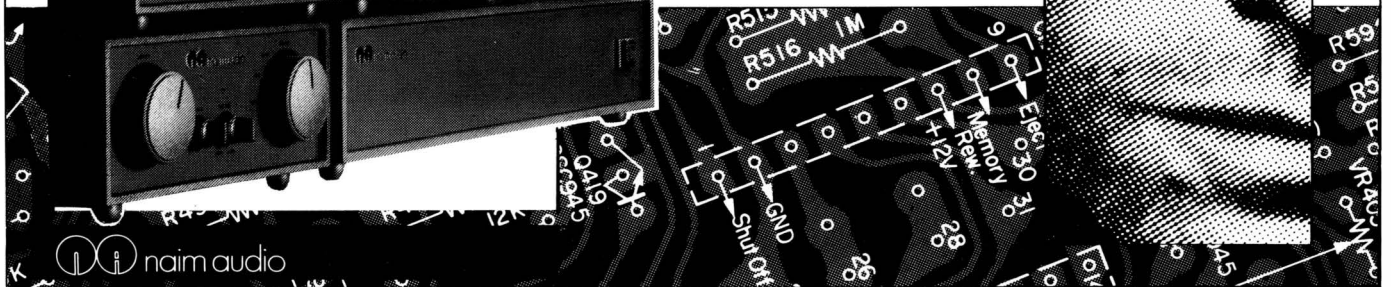
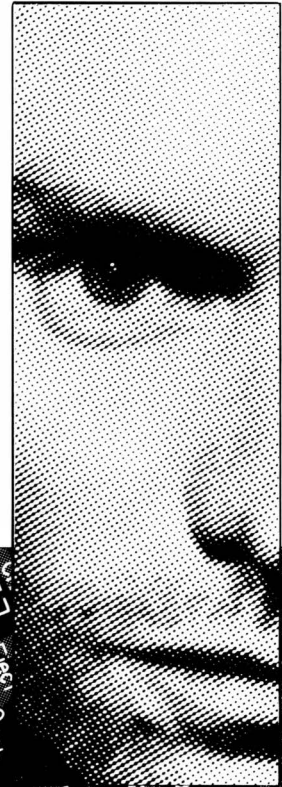
'Despite protestations of 'perfect' sound, CD players show significant audible and measurement differences, and these are discussed in detail in our reviews.'

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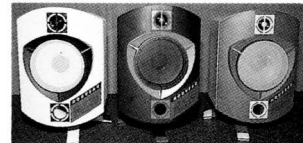
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The Ariston is another in a long line of first CD players built around kits of Philips components, in this case the familiar and well liked 16 bit, 4x oversampling chipset, with peripheral electronics courtesy of Ariston themselves. What separates the *CD1* (original name) from many of its peers is that by 'tweaked' player standards it is very reasonably priced.

Aesthetics are original too. The player is compact – it would even look at home in some midi systems – with an absolutely flat black mirror-finish Perspex front panel. The drawer is similarly finished and perfectly aligned with the fascia panel on the two samples I've seen, which must have caused a few production headaches.

Front panel controls are limited to play, bi-directional track skip, pause and stop, plus the obligatory open/close and power switches. With such a low control count, there's little scope for operating errors, yet the lack of prominence given to the play control is disappointing. The display however, is a first class time and track number jobbie. It springs to life behind the fascia without any sign at all of the hardware that makes it run.

A stick type remote handset is provided. It adds usefully to the basic player with a random access control keypad, programming keys and cueing keys, all of which obey the usual Philips conventions. The rear panel is equipped with analogue outputs (at fixed level), a coaxial digital output and a detachable figure-of-eight mains lead. As usual, it's worth trying the two plug polarisations and sticking with the one that sounds better. It shouldn't make a difference, but it does.

Lab Report

The *CD1* (now where have I heard that name before?) uses the improved linear-

ity version of the Philips *TDA1541* dual channel D/A converter in a standard configuration, but with Ariston's own de-emphasis and filters.

Resolution is an adequate 15.7 bits, with noise, distortion and effective dynamic range figures about par for the course, whilst the linearity test shows that the player remains almost perfectly linear well down into noise. Error correction is powerful and shock resistance is good too, yet tracing ability turned out to be a little uncertain on marked discs that played happily in a range of other players. The de-emphasis network was slightly out of kilter though, and the frequency response curves show some response truncation at both frequency extremes, the more significant figure here being the -0.5dB output at 20kHz.

Sound Quality

Sound quality is highly distinctive in the sense that it showed strong signs of having been effectively sanitized, presumably to make it acceptable to ears more accustomed to analogue record sources.

The deck sounds extremely smooth and polished. Strings tone is refined and silky, the bass warm with an attractive 'bloom', whilst recorded ambience tends to be emphasised. At the same time, the bass lacks real deep down grip and power, despite the apparently weighty and sometimes even plump balance. The measured treble rolloff is only too apparent as a truncation of upper harmonics which reduces upper band differentiation and airiness. What you won't hear from the Ariston however, is grain or glare. In every sense it's far too polite to be caught out that way.

Stereo imagery is a little diffuse laterally but shows considerable depth differentiation, the deck appearing capable of placing an image in front of the lis-

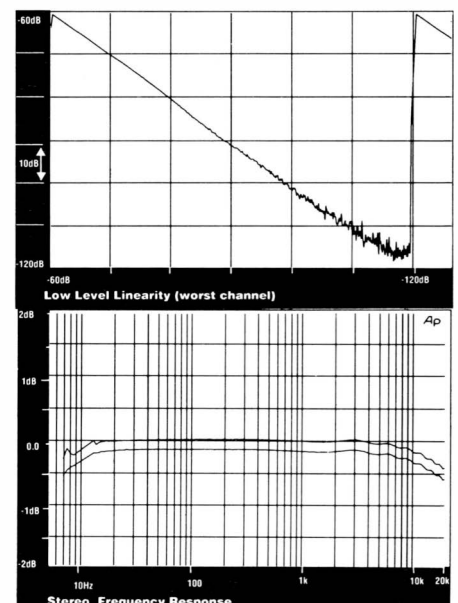
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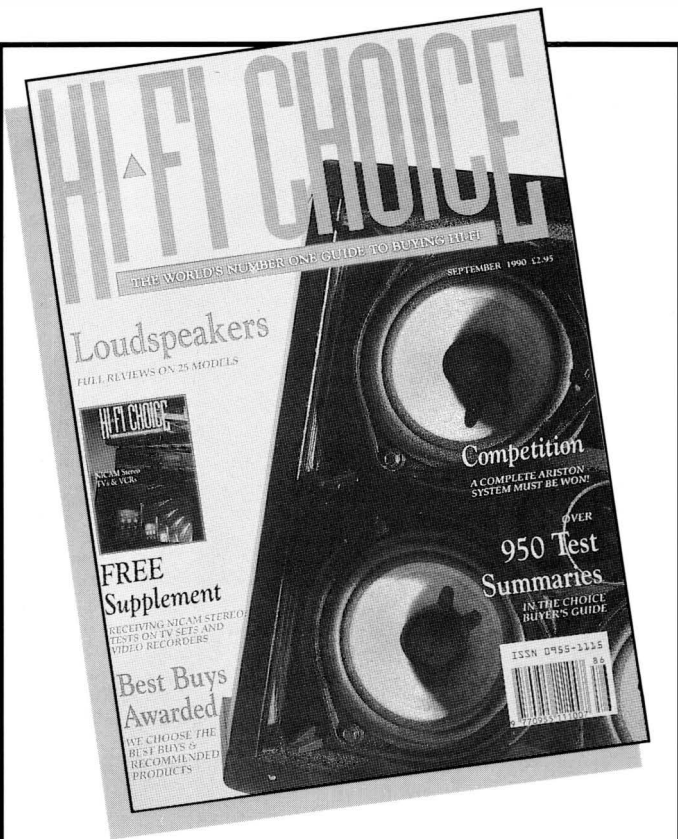
Conclusions

For £345 all in, the Ariston *CD1* has a lot going for it. Anyone who finds CD harsh or thin will like this player a lot more than most. It is warm and attractive in presentation and it won't frighten the horses. By the same token, however, quite a lot goes unsaid by this player, and whilst it can stir the emotions, it may fail to engage the intellect. Cautiously Recommended as good value for money.

TEST RESULTS

Test resolution (L/R av)	15.7 bits		
Output level, dB rel 2V, Source 2.0V	0dB, 100ohms		
Effective dynamic range	107dB		
Harmonic Distortion	20kHz	1kHz	20kHz
Ref 0dB	-93dB	-86dB	-89dB
(20kHz in-band products only)	0.0022%	0.005%	0.0036%
at -70dB encode + dither	-36dB, 1.58%		
Stereo separation	130dB	123dB	87dB
Stereo balance L/R	0.14dB	0.14dB	0.17dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.4dB		
High frequency intermodulation	-102dB or 0.00079%		
Electrical noise (CCIR/ARM, 1kHz)	-102dB CCIR/ARM 1kHz		
Mechanical noise	low		
Ultrasonic noise	-98dB		
Error correction	4mm gap*		
Shock/vibration resistance	very good		
De-emphasis	±10.3dB to 16kHz		
Track finding speed (15, YEDS2)	3.5 secs		
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* click at start			





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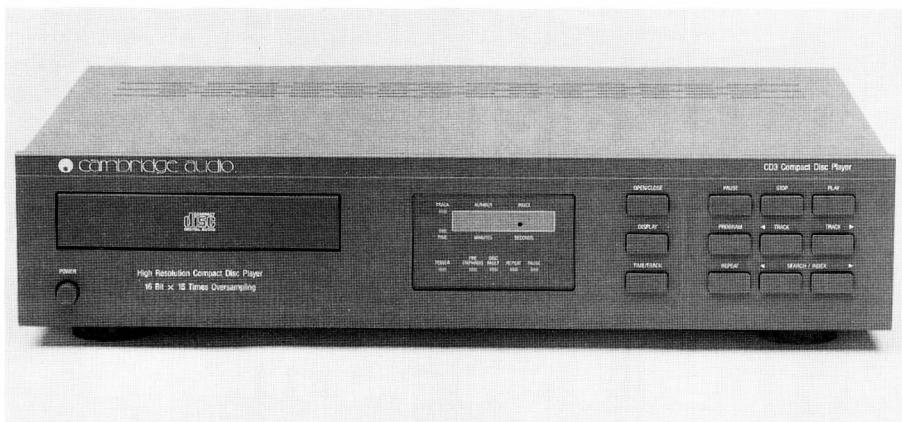
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Cambridge Audio CD3

CAMBRIDGE AUDIO SYSTEMS, BURREL ROAD, ST. IVES IND. EST.,
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The CD3 replaced the CD2 when the company changed hands about, oh, 12 months or so ago. The original design, which was the first Cambridge Audio one-box player, has been re-laid out internally, and some components have been replaced with higher grade alternatives, but the main intention was to improve assembly quality and reliability. The first has obviously been achieved, and my local Cambridge Audio stockist confirms the second. But then he would, wouldn't he?

Equipment levels are rudimentary. Standard Philips-style play, search and programming functions are complemented by an old-fashioned looking display which shows timings or track/index numbers, plus pre-emphasis detection, interpolation level, pause and repeat status and so on. There is no headphone socket, but the player does offer electrical and optical outputs from its Philips derived transport mechanism. A simple remote control handset is also included, but it doesn't stretch to random track access.

Lab Report

The CD3 has a unique internal architecture. Based on Philips hardware but quite un-Philips like in topology, the CD3 employs 16x oversampling and subsequent conversion using four TDA1541A 16-bit DACs operating on a time shared basis to achieve the necessary extra throughput needed for 16x oversampling. The output from the DACs is summed and then fed to the outside world via a blocking capacitor, which provides the only post-DAC filtering the signal receives. The mechanism is a diecast one from the Philips range with bearings that sound as though they've been salvaged from a supermarket trolley.

Resolution is a disappointing 15 bits, linearity errors build up at low levels, as

the output drops more sharply than the data would have it. Frequency responses are gently rolled off at the frequency extremes, and the de-emphasis network is well out of tolerance ($\pm 0.65\text{dB}$ at 16kHz). Noise and distortion figures are satisfactory to good, despite some asymmetry between channels, and the admittedly severe intermodulation tests threw up higher figures than normal.

Sound Quality

Sound quality is good, going to excellent. The CD3 was compared closely to the other units in this group, and in particular the Radford CD player and a Marantz CD94II, both of which sell at a slightly higher price. The comparisons mostly favoured the Cambridge, irrespective of the music being played. It has a quick, lively and flowing performance well suited to a wide variety of music types. The CD3 excelled in fast moving, densely scored orchestral music where it achieves a remarkable blend of analysis without stridency or emphasis, preserving the menacing undertones of Ravel's *La Valse* in one example whilst laying bare the musical parts.

The CD3's midband resolving power and excellent timing helped the test system sound more on top if its task than usual, but the bass end was a little dry and there was a suggestion of loss of high frequency harmonics with woodwind and other HF rich instruments. All in all, a well balanced performance which in some ways is better as a whole than is suggested by the detail findings, which underlines how ahead of its time the player was when originally launched as the CD2. Even so, in designs like the Meridian 203, the CD3 more than meets its match. The Meridian powered by, say, an Arcam transport front end provides a real improvement in consistency and clarity.

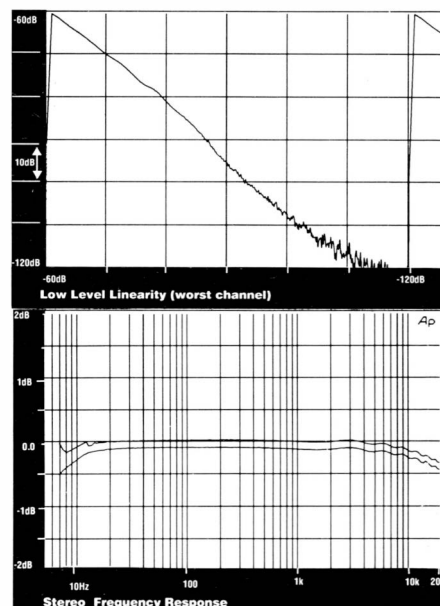
Conclusions

Clearly time is not on the CD3's side. In its current guise it looks more professionally put together than the old CD2, and a number of niggling points have been attended to. But the display remains primitive and (more important) ugly, and the switch matrix is stiff and uncommunicative under the fingertips. Build quality is good, and sound quality holds up well, with a particularly unsynthetic and fluid midband and excellent resolution of fine detail, but it's beginning to look dated. Worth considering then, but the CD3 no longer meets the stricter requirements for recommendation at this price level.

TEST RESULTS

Test resolution (L/R av)	15 bits		
Output level, dB rel 2V, Source 2.83V	3.0dB, 540ohms		
Effective dynamic range	100dB		
Harmonic Distortion	20kHz	1kHz	20kHz
Ref 0dB	-86dB	-86dB	-81dB
(20kHz in-band products only)	0.005%	0.005%	0.0089%
at -70dB encode + dither	-40/32dB, 1.0/2.51%		
Stereo separation	112dB	96dB	65dB
Stereo balance L/R	0.11dB	0.11dB	0.13dB
Frequency response (ref 1kHz) 20Hz to 20kHz	$\pm 0.3\text{dB}$		
High frequency intermodulation	-65/75dB or 0.56/0.017%		
Electrical noise (CCIR/ARM, 1kHz)	> -110dB		
Mechanical noise	low		
Ultrasonic noise	-110dB		
Error correction	3mm gap*		
Shock/vibration resistance	very good		
De-emphasis	$\pm 0.65\text{dB}$ to 16kHz		
Track finding speed (15, YEDS2)	3.5 secs		
White noise overload test	very slight clip		
Size (w x h x d)	43 x 10.5 x 29.5cms		
Typical price inc VAT	£650		

* slight click at start





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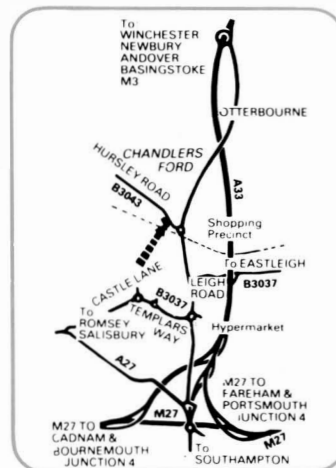
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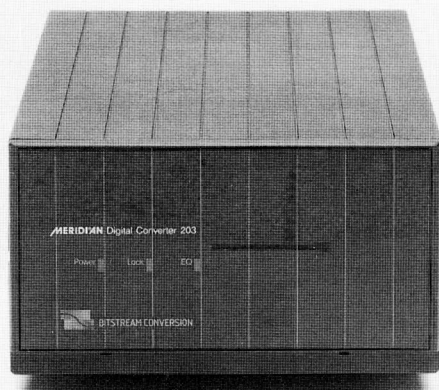


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Meridian 203

Recommended

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



In one sense the Meridian 203 was wholly predictable. The 208 CD/preamplifier, which was always primarily a front end for Meridian's active loudspeakers, has been a surprise hit in the components market where it is seen as an ace CD player with quite a nice preamplifier attached. The 203, which is basically the converter stage of the 208, is also Meridian's coming out product: the first in a long time that's aimed squarely at the component hi-fi market. My hope is that the 203 will be followed soon by a transport, since in many ways that was the most remarkable part of the 208.

The 203 is minimalism personified – but without sacrifice to the good aesthetics associated with this marque. The converter inhabits a deep extruded box with a very small fascia. There are no front panel controls, but on the back there's an IEC mains socket and switch-plate as an encouragement to leave the converter switched on, along with the various signal connections. These comprise a phono based electrical digital input, an EIAJ optical input and a single pair of phono outputs sockets. The front panel is bare apart from an array of three LEDs, one for power, one for signal lock and the final one to indicate that de-emphasis is in operation.

Absolute phase change – available on the 208 via the remote control – is not available here. The converter will cope with any standard format signal from 32kHz to 48kHz automatically.

Lab Report

Based on Philip's single bit ICs, the 203 like the 208 offers full differential common mode noise cancellation using two converters per channel, with proprietary integrated circuitry performing phase inversion of one converter on each channel and other housekeeping tasks. Passive differential analogue

filtering reduces out of band output which could intermodulate with the audio signal, and the output is fed from a differential amplifier, which again offers cancellation of common mode noise and distortion. The input of the 203 has a phase locked loop detector to reduce clock timing pulse jitter. The circuit is built onto a computer grade four layer PC board offering a full ground plane, an unusual if not unique sophistication at this price.

So far, the 203 is pure transplanted 208 technology. Where it differs is by virtue of its dedicated design which means that the power supply is further optimised and inter-stage screening is improved.

The lab tests were passed with flying colours. Resolution is 15.9 bits, only noise apparently getting in the way of a perfectly straight line in the test plot. The frequency response is held very flat in the treble with some low level filter ringing apparent. The player overloaded somewhat when presented with full level white noise (a known Philips 'bitstream' characteristic) and noise figures are only moderate (ditto), but distortion is low.

Sound Quality

One curious fact beginning to emerge about 'bitstream' players is that they appear to demand unusually long burn-in times. The 203 improved dramatically over the first day or two (interestingly, it never sounded 'cold' even when new), and it continued to improve so that by the end of a week, previously documented comparisons had been completely superseded.

Even fresh from the box, the 203 is a remarkably sweet, articulate sounding machine, and a subtle improvement over the 208. After a few days, however, the 203 driven from the optical output of the Meridian was leaving my 208

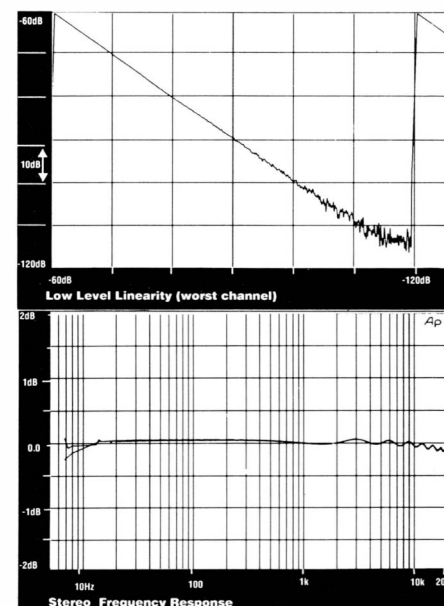
sample well behind. To the classic 208 virtues of an almost uniquely easygoing clarity, explicit three-dimensional imagery and consistency, the 203 contributes a new sense of power and dynamism. The bass is a little more forceful, and whilst even the 203 doesn't aspire to Wadia style solidity and architecture, the shortfall is only really obvious in a side by side comparison.

Conclusions

The 203 is a state-of-the-art converter at a price that should prove irresistible to owners of high quality systems. Offering exceptional performance and value, it is clearly highly Recommended.

TEST RESULTS

Test resolution (L/R av)			15.9 bits
Output level, dB rel 2V, Source 2.34V			1.34dB, 13ohms
Effective dynamic range			115dB
Harmonic Distortion	20kHz	1kHz	20kHz
Ref 0dB	-90dB	-89dB	-89dB
(20kHz in-band products only)	0.0032%	0.0036%	0.0036%
at -70dB encode + dither		-47dB, 0.45%	
Stereo separation	127dB	117dB	96dB
Stereo balance L/R	0.02dB	0.03dB	0.04dB
Frequency response (ref 1kHz) 20Hz to 20kHz			±0.15dB
High frequency intermodulation			-109dB or 0.0035%
Electrical noise (CCIR/ARM, 1kHz)			-97dB
Mechanical noise			n/a
Ultrasonic noise			-99dB
Error correction			n/a
Shock/vibration resistance			n/a
De-emphasis			±0.35dB to 16kHz
Track finding speed (15, YEDS2)			n/a
White noise overload test			some clip
Size (w x h x d)			16 x 9.6 x 34cms
Typical price inc VAT			£495



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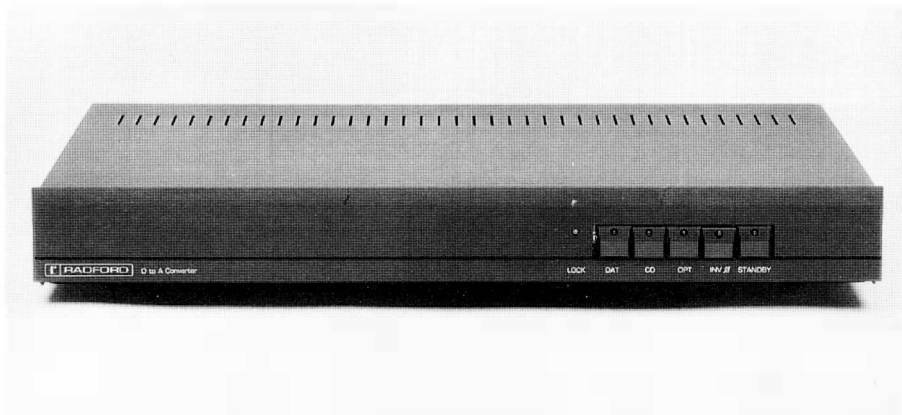
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Radford DAC1

WOODSIDE ELECTRONICS, KIMBERLY ROAD, CLEVEDON, AVON
BS21 6QJ. TEL: (0272) 877611.



Radford is best known to the audiophile as a one-time West Country manufacturer of valve amplifiers, but the 1990's incarnation of the Radford name appears on the products of a company called Woodside Electronics, which has licensed the title. About a year ago, Radford released a CD player, the *WS1*, based on Philips multibit technology and costing a little over a grand. The *WS1* is also reviewed in this issue. The *DAC1* is a spinoff from that model, being little more nor less than a reboxed version of that player's electronics in virtually unchanged form.

Housed in a full width, slimline box with a smart but essentially utilitarian textured front panel, the Radford provides a full range of standard facilities via a row of self-indicating (and rather noisy) microswitches. Aside from power on/off, these include separate DAT and CD inputs, an optical input and an invert switch for absolute phase. This is a latching switch, and therefore stays in whatever assignment is desired, which is not the case with such controls of most CD players. A separate LED indicates signal lock. All three standard sampling frequencies (32, 44.1, 48kHz) are supported, and a digital output is fitted, which should provide enough forward compatibility to see the unit through the next few years.

Lab Report

Radford explained to me that it had access to early 'bitstream' converters at the design stage for their current digital electronics, but that they were rejected in favour of the *TDA1541* 16 bit 4x oversampling converter, used here, on sound quality grounds. Technically the Radford is on familiar territory, but few corners have been cut, witness the use of no less than 11 separate regulated power supplies for different functional areas of the circuit. A built-in delay is

incorporated on the output to allow circuit voltages to stabilise.

Linearity measures 15.6 bits, but the plot is a little wayward. The repetitive nature of the waveform below -90dB or so may relate to clock jitter, hum or perhaps a microprocessor trying to lock on. The measured frequency response is almost flat – there's some minor reining in of the extreme treble and bass – and de-emphasis tailoring is none too accurate. The other figures vary between good and very good all round, and on balance seem reasonably consistent with the nature and cost of the product.

Sound Quality

The Radford sounded very similar to the player from which it was derived, though the separation of transport from output stages has resulted in a somewhat livelier and more engaging standard of performance in extremis when driven by the Radford *WS1*.

In common with all too many CD players and D/A converters, the Radford sounds best fed through the electrical link, which seemed slightly more detailed. In this form and after a prolonged burn in and warm-up period, the Radford impressed as one of the better Philips clones. Most of the usual Philips qualities were present: the explicit, solid and three-dimensional presence of the sound, the pointed sense of detail and the sharp but occasionally fuzzy treble. It sounded consistently a little cleaner and sharper than the *WS1* – or a Marantz *CD94II* – which remains an excellent yardstick in this area of the market despite its relative antiquity (nearly two years, isn't it?).

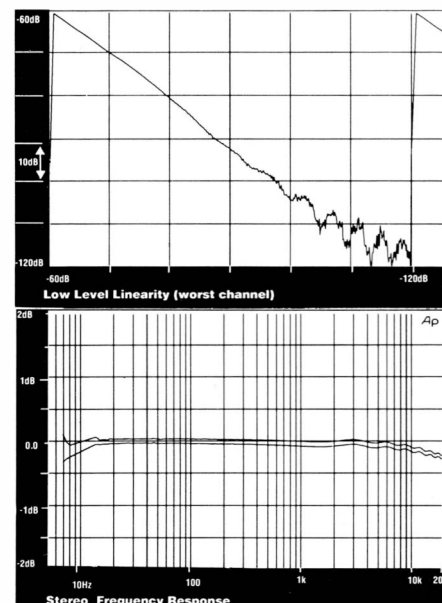
Conclusions

I was somewhat disappointed that Radford should choose to pin an £890 price tag on the unit, making it £200 cheaper than the equivalent *WS1* CD player, and

roughly twice the price of comparable converters from Arcam (the *Black Box*) and Meridian (the *203* – see separate review, this issue). Performance is in fact very good, and a year or two back this product would have received a much more enthusiastic reception, but unfortunately it's not a front runner, and is not quite good enough to overcome cost based objections.

TEST RESULTS

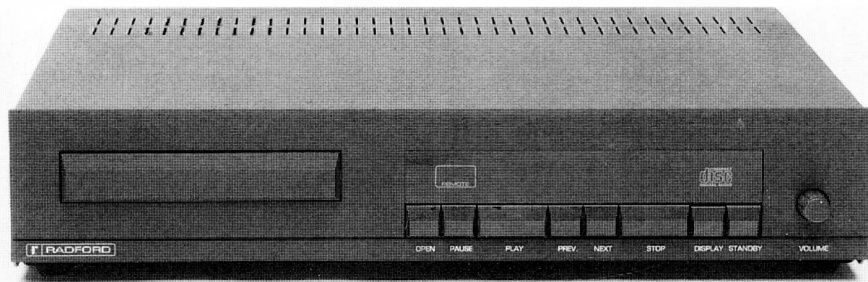
Test resolution (L/R av)	15.6 bits		
Output level, dB rel 2V, Source 2.13V	0.61dB, 600ohms		
Effective dynamic range	108dB		
Harmonic Distortion	20kHz	1kHz	20kHz
Ref 0dB	-93dB	-87dB	-90dB
(20kHz in-band products only)	0.0022%	0.0045%	0.0032%
at -70dB encode + dither	-4.1dB, 0.89%		
Stereo separation	99dB	96dB	82dB
Stereo balance L/R	0.07dB	0.07dB	0.05dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.22dB		
High frequency intermodulation	-100dB or 0.001%		
Electrical noise (CCIR/ARM, 1kHz)	-103dB		
Mechanical noise	n/a		
Ultrasonic noise	-111dB		
Error correction	n/a		
Shock/vibration resistance	n/a		
De-emphasis	±0.7dB to 16kHz		
Track finding speed (15, YEDS2)	n/a		
White noise overload test	very slight clip		
Size (w x h x d)	43 x 6.2 x 27cms		
Typical price inc VAT	£890		



Radford WS2

Recommended

WOODSIDE ELECTRONICS, KIMBERLY ROAD, CLEVEDON, AVON
BS21 6QJ. TEL: (0272) 877611.



The WS2 is a picture. Dressed in a well built alloy box with a slightly overhanging aluminium fascia, the control layout is an ideal blend of practicality and simplicity. The display is a simple time, track and index type, and a remote control from the Philips parts bin is supplied. The range of features includes the usual - 20 track programming (including programming by time), random track select, index search, A-B repeat and intro scan. Without the handset, you are limited to play, pause and track skip functions, but you can douse the display. A standby switch keeps essential circuits powered, the main power switch being on the rear.

It was only when I pressed the standby switch in error whilst playing a disc that I discovered that it is possible to enter 'standby' whilst playing a disc, which disables all the transport controls and displays and the remote control receiver, but leaves the deck playing the disc until it reaches the end. Not surprisingly, this lightens the load on the power supply and improves sound quality further than just defeating the display. Once play has started then, 'standby' is the preferred method of operation. It's not dramatically better, but it is better.

Also fitted to the front panel (and the only item to detract from its good looks) is a volume control. Unpowered and therefore not responsive to the remote control, it is stepless and cuts the output completely at the lowest setting, and in principle could be used in a simple CD player/power amp system. Fixed and variable analogue outputs are fitted, as is an electrical digital output.

Lab Report

The familiar technology referred to above is Philips powered in the form of a 16 x 4 bit TDA1541 converter. The main PC board is a straight Philips item,

and the transport is its diecast CDM1. Radford's contribution to this Philips salad lies in the output stage and the power supplies. Early Radfords were capacitor coupled to the load, but current production is DC coupled with a servo to prevent offsets. The capacitors and resistors used are all high grade, tight tolerance items, and the power supply is particularly sophisticated. There are two transformers, one each for the digital and analogue sections of the circuit. These are divided down into thirteen separate regulated supplies to help reduce mutual interference.

High frequency separation is rather low, though this is of largely academic interest (this doesn't apply to the nature of the crosstalk residual), but the Radford otherwise escapes this test with a clean bill of audio health. Noise, distortion, linearity and more - all meet expected standards for this type of player.

Sound Quality

This is not the first time I've examined the Radford WS2. Returning to it after a short but eventful period for CD (the Meridian 203 was on hand for this second look) I could not help but be struck by the way it is beginning to date. In many ways the player is a superb example of the type: it offers strong dynamics and excellent transient response. It's a hard hitting player and a detailed one, but there is a lack of grace and colour that made it appear somewhat relentless, and there was more than a hint of the upper midband glare, characteristic of the Philips chipset, even after it had been run in.

Not long ago, the WS2 would have been an obvious front runner at the price. Now it is in imminent danger of being superseded. Even the long standing Marantz CD94II offers a perhaps better overall blend of virtues, without

necessarily equalling the Radford where it is at its best.

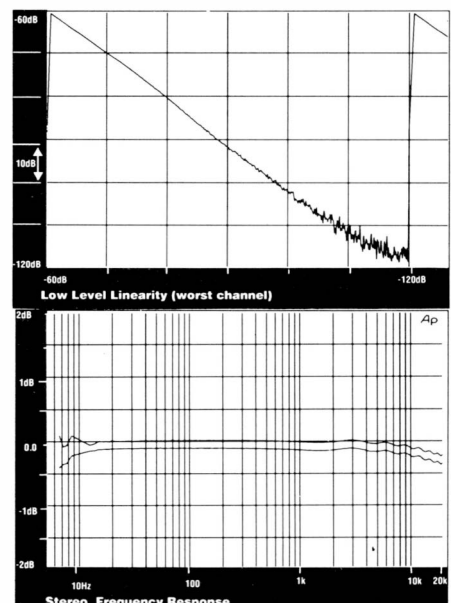
Conclusions

Radford has followed a time honoured route to making its mark in the CD arena, and whilst it hasn't been able to completely transcend the self-imposed limitations, the WS2 is a remarkably accomplished 16-bit clone which does most of the important things right. It is certainly more than good enough to warrant a Recommended tag. Take note, however, that it is not an especially sympathetic player and it can sound a little edgy under certain circumstances.

TEST RESULTS

Test resolution (L/R av)	15.7 bits		
Output level, dB rel 2V, Source 2.21V	0.92dB, 600ohms		
Effective dynamic range	107dB		
Harmonic Distortion	20kHz	1kHz	20kHz
Ref 0dB	-93dB	-85dB	-90dB
(20kHz in-band products only)	0.0022%	0.0056%	0.0032%
at -70dB encode + dither	-37dB, 1.41%		
Stereo separation	99dB	95dB	76dB
Stereo balance L/R	0.11dB	0.11dB	0.12dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.22dB		
High frequency intermodulation	-106dB or 0.0005%		
Electrical noise (CCIR/ARM, 1kHz)	-103dB		
Mechanical noise	very low		
Ultrasonic noise	-110dB		
Error correction	4mm gap*		
Shock/vibration resistance	very good		
De-emphasis	±0.21dB to 16kHz		
Track finding speed (15, YEDS2)	3.5 secs		
White noise overload test	very slight clip		
Size (w x h x d)	43 x 9.3 x 36.5cms		
Typical price inc VAT	£1095		

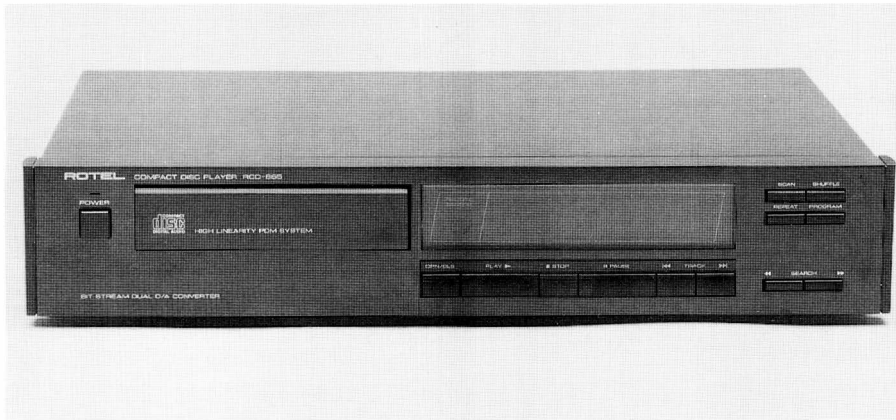
* slight click at start



Rotel RCD-865

Recommended

GAMEPATH LTD., 25 HEATHFIELD, STACEY BUSHES, MILTON KEYNES
MK12 6HR. TEL: (0908) 317707.



The RCD-865 was amongst the first 'bitstream' players, and is still one of the cheapest. How Rotel managed to get in on the act so early is quite a story, one that speaks volumes for the scale of the Philips operation which apparently allowed one arm to make plans for a simultaneous 'bitstream' launch with Meridian and A&R Cambridge (and others) several months down the road, whilst another division had been freely supplying Rotel for months with 'bitstream' ICs for a much earlier launch of its own. . .

Operating features and appearance are identical to the earlier multibit RCD-855. Housed within an adequately built but plain black box with a plastic fascia and featuring the most yawn-worthy of styling, the RCD-865 is in fact extremely easy to get to grips with, thanks to an attractive and modern looking display showing time and track data with some function telltales, and a simple range of major control keys. The most important control keys are granted special prominence. A remote handset is supplied, and play features are limited to normal play, skip, program and cue modes, with some of the more specialised features only on the handset. Significantly for some potential users, the Rotel has no headphone socket.

Lab Report

This player is based closely on the multibit RCD-855 except that the digital output has been deleted because an interface chip, the 7220, would have been needed, which would have raised the price. The conversion was effected very simply by building the 'bitstream' chip onto a small piggyback board, craftily arranging for the connectors to plug straight into the holes vacated by the original TDA1541 DAC. The 'bitstream' chip chosen is the early 7320 single ended IC, which is used with no

additional buffer amp stages. Instead the converter is wired to the output sockets through a coupling capacitor, a Black Gate BGF which is a high grade device used extensively elsewhere. Non-differential working drops theoretical maximum output to 1V, but the top dB or so is deliberately shed to improve top end distortion, which is inevitable with the 5V power source specified in this application.

Rotel notes that the 7320 has a different out of band noise signature to the more common 7321. It is dithered at a much higher frequency, and this facilitates a choice of gentler anti-aliasing filters or reduced intermodulation. This is a case where the measured noise figures (the 7321 is superior, especially in differential mode) don't tell the whole story.

What they do tell, however, is that frequency and de-emphasis responses are perfectly flat with mild ripple due to out of band filtering. Output voltage at 0.8V is much lower than normal (see above), which is not a problem unless you forget to allow for it when comparing the Rotel to other players. Resolution measures no better than 15 bits however. The linearity plot is lost in noise at low levels, but ever higher up the errors are increasing. Both in and out of band noise figures are high.

Sound Quality

First impressions are of a bold, outgoing style of musical presentation, especially in comparison with other 'bitstream' and low bit players, with richly variegated tonal colours and a prominent, well projected treble. Stereo presentation is also large scale with explicit positioning, especially laterally: the deck is a little too upfront to excel at placing images very far back in the soundstage. Indeed a certain dynamic and spatial flatness is very much part of the deal, along with a lack of subtle low level

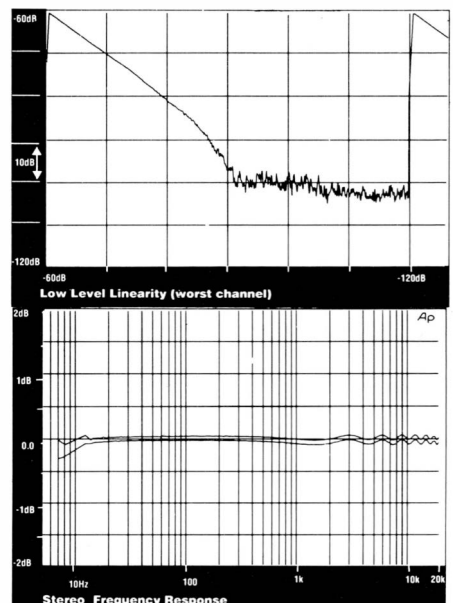
interplay that detracts from vocal expressiveness and ambience reconstruction. Nevertheless, the Rotel settled down in long term listening, turning out to be very easy to hear through and to live with.

Conclusions

This cool, detached sounding player is a difficult product to assess, its schizophrenic character embracing outright excellence in some specific areas and almost equally obvious shortcomings in others. It's too interesting and too cheap not to shortlist though, so, throwing caution to the winds - Recommended.

TEST RESULTS

Test resolution (L/R av)	15 bits
Output level, dB rel 2V, Source 0.8V	-7.96dB, 150ohms
Effective dynamic range	98dB
Harmonic Distortion	20kHz 1kHz 20kHz
Ref 0dB	-88dB -90/83dB -88dB
(20kHz in-band products only)	0.004% 0.0032/0.007% 0.004%
at -70dB encode + dither	-26dB, 5.01%
Stereo separation	0.06dB 0.06dB 0.08dB
Stereo balance L/R	86dB 90dB 97dB
Frequency response (ref 1kHz) 20Hz to 20kHz	±0.15dB
High frequency intermodulation	-90dB or 0.0036%
Electrical noise (CCIR/ARM, 1kHz)	-86dB
Mechanical noise	low
Ultrasonic noise	-85dB
Error correction	4mm gap*
Shock/vibration resistance	very good
De-emphasis	±0.1dB to 16kHz
Track finding speed (15, YEDS2)	3 secs
White noise overload test	some clipping
Size (w x h x d)	44.4 x 8.7 x 31.7cms
Typical price inc VAT	£300



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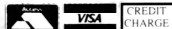
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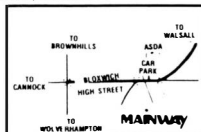


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NORFOLK

BASICALLY SOUND, The Old School, School Rd, Bracon Ash, Norwich NR14 8HE. (0508) 70829. Arcam, Linn, Naim, Denon, Spendor, Exposure, Audio Technica, Creek, Rega, Epos, etc. 2 comprehensive dem rooms. Home trial. Free installation. Visa, Access. HP facilities. Tues-Sat 9.30-1, 2-5.30.

SOUND APPROACH, 161 Unithank Road, Norwich. (0603) 622833. Kuzma, Ariston, Castle, Denon, Exposure, Ion, Royd, NVA, Roksan, Ruark, etc. etc. Dem and home trial facilities. Mon-Sat 9-6.30. Free installation. Credit to £1,500. Visa, Access, Diners Club. Service dept.

NORTHAMPTONSHIRE

CLASSIC HI-FI + VIDEO, School Lane, Kettering, Northants. (0536) 515766. Cambridge Audio, Marantz, Creek, Trio Kenwood, Harman Kardon, Onkyo, Kef, Celestion, Bose, Wharfedale and many more. Home trial, free instal, service dept. Access, Visa, credit facs. 9.30-5.30pm.

THE AUDIO SHOP, Coffee Tavern Court, High St, Rushden. (0933) 56651. Audio Technica, Denons, Goodmans, Rotel, Tannoy, Ion Systems, Thorens, Gale, BLQ, Royd. Dem room. Home trial and free installation. Mon-Sat 9.30-5.30 (Thurs 9.30-2). Service dept.

NOTTINGHAMSHIRE

CHANTRY AUDIO, Chantry Walk, 18a Eldon Street, Tuxford, Newark, Notts NG22 0LH. (0777) 870372. Pink Triangle, Royd, JPW, Rotel, BLQ, NVA, Michell, Art Audio (valve), Kelvin Labs, Thorens, + much more. Single speaker dem room. Appts preferred. Home trial, free installation. Access, Visa + credit facilities and mail order. Mon-Fri 10am-4.30pm. Sat 9.30-5.30. Sun home dem by appt. Closed Weds.

DEFINITIVE AUDIO. (0602) 813562. Voyd, Audio Innovations, Snell, Helius, Systemdek, Revox, Deltec, JPW, Pirate, Loewe Audio Visual plus more. Home dems throughout Notts and E. Mids. Free install. 10-7, 7 days. Tel: (0602) 813562 for further info + appt.

WEST MIDLANDS

ALTERNATIVE AUDIO Ltd, 93-95 Hobs Moat Rd, Solihull. (021) 742 0254 (sales), 0248 (service). The widest range of quality hi-fi and CD in the West Midlands. Tues-Sat 10-6. **3000**

AUDIO CENTRE MAINWAY, Sharing Asda Car Park, High Street, Bloxwich, Walsall, W. Midlands. (0922) 473499. Linn, Ariston, Aura, Arcam, Cambridge Audio, Linn, Denon, Musical Fidelity, Rogers, etc. The Midlands most exclusive Hi-Fi Centre with private listening studio. Open evenings by appointment. Home trial. Free install. Own service department. Inst. credit, Chargecard. Interest free. Access, Barclaycard. Mon-Sat 9-5.30.

BRIDGE HI-FI, 3 Tudor House, Bridge St, Walsall. (0922) 640456. NAD, Dual, Yamaha, Kenwood, Technics, Pioneer, Mission, Celestion, Denon, Mordaunt Short. Appts required. Home trial & free install. Access, Visa, Diners, Amex. Credit to £1,000. 9.15-5.30 Mon-Sat. Service dept. FIVEWAYS HI-FIDELITY LTD, 12 Islington Row, Edgbaston, Birmingham. (021) 4550667. Alphason, Arcam, Denon, Meridian, Musical Fidelity, Quad, Revox, Spendor, TDL, Thorens, etc. Dem facilities. Tues-Sat 9.30-6. Free installation. Access, Visa. Service Dept.

FRANK HARVEY HI-FI EXCELLENCE, 163 Medieval Spon Street, Coventry. (0203) 525200. All major agencies. Free inst. Service dept. Part ex. 3 dem rooms. Mon-Sat 9.30-5.30. Wed 'til 8pm.

GRIFFIN AUDIO LTD, 94 Bristol Street, Birmingham. (021) 692 1359/(021) 622 2230. Castle, Creek, Cyrus, Denon, Linn, Marantz, Naim, Quad, Rega, Rotel. Tues-Sat 10-6. **3000**

HORTON ELECTRONICS (1987) LTD, 8-9 Lower Temple St, Birmingham B2 4JD. (021) 643 0972. Aiwa, Dual, Marantz, Goodmans, JVC, Mission, Sony, Technics, Wharfedale, Sennheiser. Dem facilities. Credit to £1000. Access, Visa. 9-5.30 Mon-Sat. Service dept.

MIDLAND RADIO SUPPLIES, Maypole Lane, Birmingham B14 4PG. (021) 430 7817. By appointment only - listen quietly and hear everything through Croft valve amplifiers and Tannoy speaker systems.

MUSICAL APPROACH, 37 High Street, Aldridge, Walsall, W. Mids. (0922) 57926. Linn products, Arcam, Creek, NVA, Revolver, Onix, Epos, Marantz, Rotel, Quad & more. Dem facs. Home trial. Service dept. Credit facs available. Access, Visa. 9.30-5.30 Mon-Sat. 9.30-1 on Thurs.

OXFORDSHIRE

ASTLEY AUDIO LTD, 3 Market Place, Wallingford. (0491) 39305/34349. Technics, Panasonic, Pioneer, Kenwood, Sony, Yamaha, Denon, Dual, Mission, Tannoy. Home trial, free installation. Service dept. Access, Visa, Amex, Diners. Instant credit. Tue-Fri 9-5.30, Sat 9-5. Records & CDs stocked.

HORNS OF OXFORD LTD, 6 South Parade, Summertown, Oxford. (0865) 511241. Alphason, Ariston, B&W, Celestion, Marantz, Nakamichi, Pink Triangle, Quad, Sony, Technics. Free installation. Service dept. Access, Visa. 9-5.30. Closed Thurs. **3000**

OXFORD AUDIO CONSULTANTS LTD, Cantay Hse, Park End Place, Oxford OX1 1JE. (0865) 790879. Oxford Acoustics, Audio Research, Krell, Magneplanar, Apogee, Aragon, Stax, Marantz, Wharfedale, Cambridge Audio. Home trial and free installation. Instant Credit. Access, Amex, Visa. 10-6 Tues-Sat. Service dept.

WITNEY AUDIO & VIDEO, 28 High St, Witney, Oxford. (0993) 2414. A&R, Aiwa, Akai, Bose, Denon, Dual, Goldstar, JBL, Mordaunt-Short. Dem facilities. Mon-Sat 9-5.30. Free installation, credit to £1,000. Access, Visa. Service dept.

SHROPSHIRE

AVON HI-FI, 12 Barker Street, Shrewsbury, Shropshire SY1 1QJ. (0743) 55166. NAD, Quad, B&W, Arcam, Kenwood, Aiwa, Bose, Nakamichi, Revolver, Onkyo. Dem. room. Home trial. Free Install. Service dept. Access, Visa. £1000 instant credit. Mon, Tues, Wed, Fri, Sat. 9-5.30.

CREATIVE AUDIO, 9 Dogpole, Shrewsbury. (0743) 241924. Marantz, Meridian, Linn, Naim, A&R, Mission, Nakamichi, Revolver, Castle, Audio Technica. Dem room. Home trial and free installation. Credit to £1000. Access, Visa. Tues-Sat 9.30-5.30. Service dept.

MID SHROPSHIRE AUDIO, 2 Holland Court, High Street, Dawley, Telford, Shropshire. (0952) 630172. Cambridge Audio, Marantz, Onkyo, Rubric, Tannoy, Alexander, Appolo, Ion Systems, Audio Innovations, SD Acoustics. 2 dem lounge. Home trial. Free Installation. Service dept. Access, Visa. Credit facilities available. Instant credit subject to status. Mon-Sat 10-5 evenings/Sunday by special arrangement.

SOMERSET

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

STAFFORDSHIRE

ACTIVE AUDIO, 29 Market Street, Tamworth, Staffordshire. (0827) 53355. Arcam, Ariston, Celestion, Denon, Heybrook, Kef, Cyrus, Musical Fidelity, Marantz, Revox,



Rotel, Rogers, etc. etc. The only BADA Member in Staffordshire. Full dem. & home trial facs. Account and credit cards. Ring for opening times and free 'Fact Pack'.

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GRANGE HI-FI LTD, 153 Branston Road, Burton-on-Trent DE14 3DQ. (0283) 33655. Audio Innovations, Arcam, Creek, Systemdek, Snell, Spondor, Rotel, Pink Triangle, Quad, Voyd, etc. 2 dem rooms. Mon, Tues, Thurs, Fri, Sat. 9-6. Closed Wed. Free installation. Credit facilities. Visa. Access. Service dept. Open 9-5.30

MUSICAL APPROACH, 137A Newport Road, Stafford (above Royal London Insurance). (0785) 55154. Linn Products, Arcam, Creek, NVA, Revolver, Audiotec, Onix, Epos, Marantz, Rotel and more. Home trial. Free installation. Service dept. Credit facilities available. Access, Visa. 9.30-5.30 Mon-Sat.

SUFFOLK

EASTERN AUDIO 41 Bramford Rd Ipswich. (0473) 217217. Quad Audio Lab Denon Dual Marantz Mission NAD Nakamichi Technics Arcam. Mon-Sat 9.30-6. **BADA**

SURREY

DATASOUND, 23 South Street, Dorking, Surrey RH4 2JZ. (0306) 882897. Arcam, Celestion, Denon, Dual, Marantz, Mission, Musical Fidelity, NAD, Rotel, Tannoy. Dedicated listening room. Free Install. Service dept. Up to £1000 instant credit subject to status. 9.30-5.30 6 days.

PJ HI-FI - the Hi-Fi Shop, 3 Bridge Street, Guildford, Surrey GU1 4RY. Tel: (0483) 504801. 9-6 Mon-Sat. Linn, Meridian, Creek, Arcam, Quad, Revox, Musical Fidelity, Rotel, NAD, Nakamichi, Marantz. **BADA**

ROGERS HI-FI, 13 Bridge Street, Guildford (0483) 61049. Ariston, Acoustic Research, Akai, Denon, JPW, Mordaunt-Short, Marantz, Onkyo, QED, Tannoy etc. Mon-Sat 9.30-6. Dem. facilities. Instant Credit. Access, Visa. Service dept.

SPALDINGS HI-FI, 352-4 Lower Addiscombe Rd, Croydon, Surrey. (01) 654 1231. 3 dem rooms + home dem. Free installation, credit. Mon-Sat 9-6, Tues to 8. Closed Wed. Service dept. **BADA**

SURBITON PARK RADIO, 48 Surbiton Rd, Kingston-Upon-Thames, Surrey. (01) 546 5549. Quad, Dual, Denon, Kenwood, Nakamichi, Rotel, Pioneer, QED, B&W, Tannoy. Dem and home trial facilities. Access, Visa. 9.30-5.00 Tues-Sat. Service dept.

TRU-FI SOUND AND VISION, 2 Central Parade, Redhill, Surrey. (0737) 767404/766128. Aiwa, Audio Technica, B&W, Nakamichi, Mission, Mordaunt-Short, Nakoaka, Sony, Technics. Dem. facilities. Free installation. Service dept. 0% finance. Access, Visa. Mon-Sat 9.30-6.

TRU-FI SOUND & VISION, 10 Church St, Leatherhead, Surrey. (0372) 378780. Sony, Technics, Panasonic, Mitsubishi, Ferguson, Aiwa, Pioneer, Sanyo, B&W, Mission. Free installation. Credit facilities. Access, Visa. 9.15-5.30 Mon-Sat. Closed Wed. Service dept.

UNILET HI-FI, 35 High St, New Malden, Surrey KT3 4BY. (01) 942 9567. Kef, Mission, Musical Fidelity, NAD, Nakamichi, Quad, Rotel, Tannoy. Dem. Amex, Access, Visa, etc.

SUSSEX (EAST)

DEFINITIVE AUDIO BRIGHTON, 8 Dyke Road Mews, 74-76 Dyke Road, Brighton BN1 3JD. (0273) 208649. Voyd, Systemdek, Audio Innovations, Helius, Audionote, JPW, Snell, Pirate Stands, Goldring etc. Home dems throughout Sussex. Credit facilities. Visa.

HASTINGS HI-FI, 33-35 Western Road, St. Leonards, E. Sussex TN37 6DJ. (0424) 442975. Linn, Musical Fidelity, Quad, Nakamichi, Arcam, Celestion, NAD, Denon, Yamaha, Tannoy. 2 listening rooms. Home trial. Free installation. Service dept. All credit cards welcome. Instant credit up to £1,000, written details on request. 9-6pm Mon-Sat.

JEFFRIES HI-FI, 69 London Rd, Brighton, East Sussex (0273) 609 431. 2 dem rooms, closed Mon, late night Wed. Parking, bus route. Credit facilities. **BADA**

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

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

SUSSEX (WEST)

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

BOWERS AND WILKINS Ltd, 1 Becket Buildings, Littlehampton Rd, Worthing. (0903) 64141. B&W, Nakamichi, Castle, Denon, Dual, JVC, Mordaunt-Short, Philips, Quad, Sony, Technics. 3 dem rooms. Mon-Sat 9-5.30, Weds 9-1. Home trial facilities, free installation, credit to £1,000. Access, Visa. Service dept.

CHICHESTER HI-FI, 7 St Pancras, Chichester, W. Sussex PO19 1SJ. Tel: (0243) 776402. Linn, Naim, Rega, Creek, Nakamichi, A&R, Denon, Roksan etc. Tues-Sat, 10-1, 2-5.15 (closed Mon) **BADA**

TYNE & WEAR

BILL HUTCHINSON LTD., 87A Clayton Street, Newcastle-Upon-Tyne. Tel: 091 230 3600. A.R., Aiwa, Denon, Dual, JVC, Mission, Mordaunt-Short, Omar, Technics, Yamaha, etc. Demonstration facilities, free installation, service department. Instant credit, Access, Visa. Mon-Sat 10-6.

RED RADIO SHOP AND HI-FI CENTRE, 11 Olive St, (Off Park Lane) Sunderland. (091 567) 2087. Castle, Denon, Bose, JVC, Kenwood, Mordaunt-Short, Michell, Teac, Tannoy, Shure. Dem room, large with comparator facility. Free install. Service dept. Interest free credit and no deposit interest free credit. 9am-5.30pm daily.

WARWICKSHIRE

AUTHENTIC AUDIO, 25 Henley Street, Stratford-upon-Avon, Warwickshire CV37 6QW. (0789) 414533. Linn, Quad, M.F., Denon, NAD, etc. Dem room. Home trials. Part-ex. Service dept. Mon-Sat 9.30-5.30.

WORCESTERSHIRE

WEST MIDLANDS AUDIO, 158 Ombersley Road, Worcester, WR3 7HA. (0905) 58046. Linn, Naim, Rega, Absolute Sounds, Meridian, Mission, Arcam, Ion Systems, Roksan. 3 dem. rms. for budget. High end & Audio Visual. Appt. nec. Home trials, Free Install. Service Dept. Access, Visa, Amex, Diners, Lombard/Hitachi. Mon-Fri 9.30-8.30 by appt. Sat 9-5.30.

YORKSHIRE (NORTH)

ELITE HI-FI, 178 Kings Road, Harrogate HG1 5JG (0423) 521 831. Voyd, Valdi, Avalon, Systemdek, Helius, Audionote, Goldring, Audio Innovations, Sugden, Marantz. Mon-Sat 9-5.30. Free installation. Service dept.

SCARBOROUGH HI-FI CENTRE, 53 Dean Road, Scarborough YO12 7SN. (0723) 374547. Cambridge Audio, Rotel, QED, Denon, Nad (incl. Monitor series), Thorens, Onkyo, Tannoy, Marantz, Ruark. Dem Room. Appts preferred. Home trial facilities. Mail order and part exchange. Visa, Access, Diners, Hi-Fi Markets Chargecard facilities. Open 10-6 Mon-Sat.

SOUND ORGANISATION YORK, 16 Gillygate, York YO3 7EQ. Tel: (0904) 627108. Linn, Naim, Rega, Roksan, Sony, Arcam, Mission, Denon, Ion, Rotel. 2 single speaker dem rooms. Appts. preferred. Home trial. Free installation. Service dept. Access, Visa. Instant free credit available. 10am-6pm Tues-Sat. Sony dealer. Award nominated 86, 87, 88. **BADA**

YORKSHIRE (WEST)

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

ERRICKS, Hi-Fi Experience, Fotosonic House, Rawson Square, Bradford (0274) 309266. Dem facilities. Sales/service agents for A&R, Linn, Quad, Exposure, Nakamichi, Mission etc. **BADA**

HUDDERSFIELD HI-FI CENTRE, 4 Cross Church St, Huddersfield. (0484) 544668. B&W, Kenwood, Denon, Dual, Arcam, Musical Fidelity, Quad, NVA, Audio Lab, Philips, Mission, etc. Dem facilities - appointment reqd. Mon-Sat 9-5.30, Thurs 9-8. Closed Wed. Free installation, credit facilities. Access, Visa.

IMAGE HI-FI Ltd, 8-10 St Annes Rd, Headingley, Leeds. (0532) 789374. AR, Audio Lab, Denon, Linn, Marantz, Meridian, Mission, Monitor Audio, NAD, Quad. **BADA**
SELECTIVE AUDIO, The Forge Cottage, 19 Crossgate, Otley. (0943) 467689. Exclusively handles Alphason, Roksan, NVA, ProAc, TDL, JDI, in the area and other minimalist British designer products for the discerning listener. Dem facility. Member of the Cognoscenti. Mon-Sat 10-6.

NORTHERN IRELAND

LYRIC HI-FI, 163 Stranmills Road, Belfast. (0232) 381 296. Linn, Naim, Rega, Arcam, Denon, Rotel, Musical Fidelity, Revox, Mission etc. Mon-Sat 10-6, Late night Thurs. **BADA**

EIRE

CEOL PRODUCTS, 185 Lower Rathmines Road, Dublin 6. Tel: 0001 975984 961358. Alphason, Audio Innovation, Exposure, Linn, Marantz, Monitor Audio, Mordaunt Short, Musical Fidelity, Rega, Roksan. Single Speaker listening rooms. Free installation. All major cards. Mon-Sat 9.30-6.00.

CLONEY AUDIO, 55 Main St, Blackrock, Dublin. 0001 889449/888477. Arcam, Acoustic Energy, Apogee, Linn, Naim, Creek, Rega, Rogers, Sony, Nakamichi. 2 single speaker dem rooms. Home trial. Free installation. Service dept. All major credit cards. Interest free credit. Tues-Sat 10-6, Thurs and Fri till 9pm.

SCOTLAND

EAST KILBRIDE

DAVID STEVEN HI-FI, 1-3 Main Street, East Kilbride, Strathclyde. (03552) 44145. Denon, Infinity, KEF, Marantz, Mission, Quad, Technics, Sony, Yamaha. Dem. room. Home trial facilities. Installation facilities available. Service dept. Access, Visa. Licenced credit broker. 9.30-5.30 Mon-Sat, 5.30-9.30 Mon-Fri by appointment.

EDINBURGH

BILL HUTCHINSON Ltd, 43 Clarke St, Edinburgh. (031) 667 2877. AR, Aiwa, Denon, Dual, JVC, Mission, Mordaunt-Short, Omar, Technics, Yamaha. Dem facilities. Mon-Sat 10-6. Free installation. Instant credit. Credit cards: Access, Visa. Service dept.

GLASGOW

BILL HUTCHINSON Ltd, 43 Hope Street, Glasgow. (041) 248 2857. A.R., Aiwa, Denon, Dual, JVC, Mission, Mordaunt-Short, Omar, Technics, Yamaha etc. Dem facilities. Mon-Sat 10-6. Free installation, instant credit. Access, Visa. Service dept.

STEREO STEREO, 278 St. Vincent St, Glasgow G2 5RL. (041) 248 4079. Linn, Naim, Rega, Arcam, Creek, Epos, Exposure, Revox, PT, etc. Mon-Sat 10-6. Interest free credit.

GRAMPIAN

HOLBURN HI-FI Ltd, 441 Holburn St, Aberdeen (0224) 585713. Linn, Rega, Quad, Audiolab, Mission, Cyrus, Rotel, QED, NAD, Krell, Nakamichi, Denon, Sony, KEF, Wharfedale, Monitor Audio, Kenwood, etc. 9.30-5.30 Mon-Sat. **BADA**

TAYSIDE

W.M. COUPAR, 33 Reform Street, Dundee, Tayside. (0382) 29588. Bang & Olufsen, Nada, Technics, Denon, Kenwood, Dual, Nakamichi, B&W, Acoustic Research, JBL. No appointment necessary, free installation, service department. All demonstration systems wired through a demonstration comparator. Licensed credit broker, Access, Visa. Monday-Saturday 9.00 am-5.30.

WALES

GLAMORGAN

AUDIO EXCELLENCE, 134 Crwys Road, Cardiff. (0222) 228565. Audio Research, Dual, Krell, Linn, Magneplanar, Naim, NAD, Yamaha, etc. Closed Mon. **BADA**
AUDIO EXCELLENCE, 9 High St, Swansea. (0792) 474608. Audio Research, Dual, Krell, Linn, Magneplanar, Naim, NAD, Yamaha, etc. Closed Mon. **BADA**

NORTH WALES

ACTON GATE AUDIO, 4 Ruabon Road, Wrexham, Clwyd (0978) 364500. Arcam, Cambridge, Celestion, NAD, Quad, Radford, Rotel. Semilink, Tannoy, Yamaha etc. Dem room, appts. nec. Free install. Service Dept. Access, Visa, Amex. 9-5.30 Mon-Sat. Closed Weds.
ELECTRO TRADER, 19 Colwyn Crescent, Rhos On Sea, Colwyn Bay, Clwyd. (0492) 48932. Ariston, Arcam, B&W, Heco, Infinity, Onkyo, Rotel, Tannoy, TDL, Yamaha etc. Dem room. Appts preferred. Home trial. Free installation. Access, Visa, American Express, Diners. 9.30-1.00, 2.00-5.30 Mon-Sat.



**BRITISH
"COTTAGE INDUSTRY"
HI-FI AT ITS BEST**

The Rothwell Electronics valve pre-amp is a high end pre-amp of modular design, offering the music lover renewed enjoyment of his/her music collection.

The first link in the chain is the moving coil step-up transformer. This is a high quality unit significantly better than miniature "in-line" transformers or the moving coil stage of most integrated amps.

Then comes the phono-stage. This is a valve amp with its own (separately boxed) power supply. The image depth and focus provided by this unit makes listening to vinyl much more of a real experience, and the separation between instruments makes the music much more understandable.

And finally, the selector/attenuator is a passive pre-amp of elegant simplicity. Just select from any of the seven inputs, set the volume, and enjoy the music.

However, unlike many passive pre-amps, this is not just a "pot in a box". Instead of using a humble potentiometer as a volume control, a high quality stepped attenuator has been used. The result is superb inter-channel balance and unsurpassed control over the volume, especially at low listening levels.

The moving coil step-up transformer (£98.00), the valve phono stage (£320.00), and the passive pre-amp (£145.00) are all available separately (and all have their uses as separate items), or can be purchased together to form a complete and versatile pre-amp.

The price may be ridiculously low for hi-fi of this quality, but you'll obviously want to know more than I can tell you in this ad before investing in any or all of the modules. So if you are considering an upgrade to your system, give me a call or write to me at this address and I will send you free further details. Then you can audition the pre-amp where it really matters - at home in your own system.

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KJ SALE

KJ's Autumn Clearance Sale offers hundreds of Ex-Dem and Second-Hand items.

STARTS SATURDAY

22nd SEPTEMBER

10 a.m.

HALF PRICE BARGAINS

The following items will be reduced to half the original NEW price if they are still unsold at the advertised start of the Sale. **FIRST COME FIRST SERVED.**

Make and Description	New Price	Sale Price
AUDION INTRO PRE-AMP (Line/CD/PH)	XD £ 995	£ 497
AUDION REFERENCE PRE-AMP	XD £1295	£ 647
CELESTION SL 12Si Speakers	XD £ 579	£ 289
DENON DCD 1700 CD Player	XD £ 650	£ 325
DENON DCD 3300 CD Player	XD £1200	£ 599
DNM 2A TWIN PRE-AMP	SH £ 850	£ 399
GALE GS 240 Speakers	XD £ 150	£ 75
GOLDMUND STUDIO 4 Turntable less Arm	XD £2990	£1495
HELIUS CYALENE Tonearm	XD £ 945	£ 472
LINN LVX Tonearm	XD £ 115	£ 57
LINX STRATOS Pre/Power Amplifier	XD £ 999	£ 450
MONITOR AUDIO R 452MD Speakers	XD £ 399	£ 199
SD ACOUSTICS SD2 SPEAKERS	XD £ 599	£ 299
TOWNSHEND GLASTONBURY 2 Speakers	SH £895	£ 947

We must emphasise that the above prices will not be available until 10.00 a.m. on Saturday 22nd September. The above items are covered by a one year guarantee.

A selection from the many other bargains available.

AMPLIFIERS	NEW PRICE	CLEAR PRICE	TUNABLES/TONEARMS	NEW PRICE	CLEAR PRICE
ACOUSTIC REE A 05 INT AMP	XD 200	149	ALPHASON HR 100S ARM	XD 420	299
ACOUSTIC REE A 07 INT AMP	XD 300	229	ALPHASON HR 100MCD ARM (vch)	XD 480	339
AUDION INTRO PRE-AMP	XD 995	497	LINN BASK PLUS ARM only	XD 129	89
RESEARCH REFERENCE PRE-AMP	XD 1295	647	MANTICORE MANIRA (Electronic)	XD 425	299
AUDIO D125 POWER AMP	XD 4650	3650	MANTICORE MANIRA less ARM	XD 345	250
AUDIO SP 11 MK2 PRE-AMP	XD 5250	2995	PINK TRIANGLE PT 100 less ARM	XD 689	580
BEARD P 35 MK2 POW/AMP	XD 895	699	REVOLVER REVOLVER + ARM/CART	XD 225	169
CAMBRIDGE P 25 INT AMP	XD 170	139	REVOLVER REVOLVER + SUPER ARM	XD 325	199
CAMBRIDGE P 50 INT AMP	XD 220	169	REVOLV B 291	XD 1130	795
CAMBRIDGE P 70 INT AMP	XD 280	179	VOYD VALDI less ARM	NEW 680	599
CAMBRIDGE C 70 PRE-AMP	XD 220	169	VOYD VALDI less ARM	XD 680	540
CAMBRIDGE A 70 POWER AMP	XD 220	169	VOYD VOYD less ARM	XD 1099	799
CAMBRIDGE C 100 PRE-AMP	XD 300	239	COMPACT DISC PLAYERS		
CAMBRIDGE A 100 POWER AMP	XD 300	239	ACOUSTIC REE CD 05	XD 300	229
CAMBRIDGE C 75 PRE-AMP	XD 280	179	ARCAM BLACK BOX D/A CONVERTER	XD 250	199
CAMBRIDGE C50 A50 PRE/POWER	XD 400	299	ARCAM DELTA 70 INCL R/CON L	XD 540	369
COUNTERPOINT SA 12 POW/AMP	XD 1250	995	CAMBRIDGE CD2	SH 650	399
COUNTERPOINT SA 20 POW/AMP	SH 2350	1590	DELTEC PDM 1 D to A CONVERTER	XD 500	450
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MUSICAL FIDELITY MA 100 POW/AMP	XD 1499	1199	ENERGY AE 2	XD 897	699
MUSICAL FIDELITY PIP PRE-AMP	XD 2670	2170	ACOUSTIC		
PE AUDIO PS 4 & PREAMP	XD 998	799	B & W		
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			MERIDIAN M 20 with stands	XD 1399	1199
			MERIDIAN D 600 DIGITAL ACTIVE	XD 2750	1995
			MONITOR AUDIO		
			AUDIO R 652MD	XD 369	999
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			MUSICAL FIDELITY MC 5	XD 790	599
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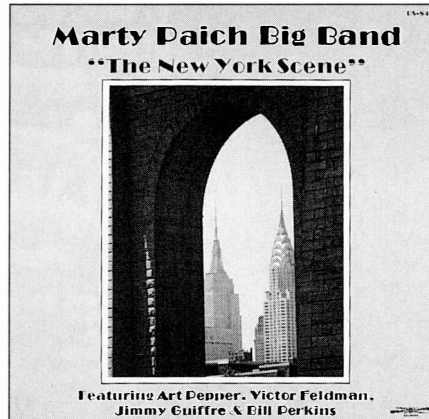
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Audiophile Recordings

Our mail-order service allows Hi-Fi Choice readers to buy some of the world's best audiophile records and CDs.



As top-quality 'audiophile' recordings seem to be becoming more and more difficult to find in High Street record shops, *Hi-Fi Choice* is making a determined effort to source some of the best recordings from around the world and make them available to readers by mail order.

You might stumble across one or two of these records in some specialist record shops, but for the most part these records and/or CDs are not readily available in the UK. You certainly won't find them in your local record store! We have already added many exciting discs from specialist American record labels such as Reference, Wilson and Sheffield - and we expect our catalogue of LPs and CDs to expand considerably during the next few months.

RADKA TONEFF: Fairytales

Ref LP1 £12.95

Ref CD1 £14.95

The well known audiophile (digital) recording of female voice and piano. Worth the asking price alone for the opening song, *The Moon's A Harsh Mistress*. Odin CD03/LP03

ARNE DOMNERUS' KVARTETT: Blatoner fra Froldehaugen

Ref LP34 £12.95

Ref CD34 £14.95

A selection of Grieg 'miniatures', imaginatively arranged for a jazz quartet. Superbly vivid sound. For-X, FXLP65/FXCD65.

NEW!

KETIL BJØRNSTAD: The Shadow

Ref LP35 £12.95

Ref CD35 £14.95

Recorded in Oslo and released earlier this year, *The Shadow* features the delightful voice of Randi Stene in a collection of compositions inspired by the Poems of John Donne. Bjørnstad is one of Norway's finest session players. For-X, FXLP93/FXCD93.

NEW!

SMITH/RICCI: Paganiniana

Ref LP10 £14.95

Ref CD10 £17.95

Breathtaking purist analogue audiophile recording of classical works performed on piano and violin. On the

American Water Lily Acoustics label, recorded by Kavi Alexander and sponsored by Conrad-Johnson. An essential addition to any audiophile's collection. Water Lily CJCD/CJLP

TOTTI BERGH: I Hear A Rhapsody

Ref LP4 £12.95

Ref CD4 £14.95

On the Gemini label, saxophonist Totti Bergh plays a selection of jazz standards. *Jazz Journal* magazine described this as "A delightful 'wee small hours' album". Gemini GMCD48/GMLP48

MARTY PAICH BIG BAND: The New York Scene

Ref LP13 £12.95

Featuring Art Pepper, Victor Feldman, Jimmy Guiffre and Bill Perkins, this soundful set includes extended modern stylings of some classic Broadway musical tunes by the likes of Cole Porter and Rodgers & Hammerstein. Discovery DS-844

MARTY PAICH: What's New

Ref LP14 £12.95

Another superb recording of big band 'swing' jazz, this time featuring mostly Marty Paich original compositions. It doesn't seem possible that this was recorded in 1957. Like *The New York Scene* LP, which dates from 1959, the

sound is quite breathtaking: vibrant, dynamic, and with a superbly natural soundstage. They knew what they were doing in those days. Discovery DS-857

OPUS 3 TEST RECORD 1: Depth Of Image

Ref LP11 £12.95

Ref CD11 £14.95

Produced with the idea of analysing hi-fi systems and their ability to reproduce depth of image. This is Opus 3's best selling recording, containing examples of the work of many of its recording artists. Opus CD7900/LP7900

OPUS 3 TEST RECORD 3: Dynamics

Ref LP12 £12.95

Ref CD12 £14.95

Another compilation on the Swedish Opus 3 label, with musical extracts carefully chosen to illustrate what is meant by musical dynamics and comprehensive liner notes to show you what you should be listening for. How good is your hi-fi system? Opus 3 CD8300/LP8300

GREX VOCALIS: Renaissance For Kor

Ref LP15 £12.95

Ref CD15 £14.95

A capella performances of Renaissance and medieval songs, beautifully

recorded in natural acoustic environments for the Norwegian For-X label.

CD: For-X FXCD39

LP: For-X FXLP39

YTRE SULOENS JASS-ENSEMBLE / BARBARA ANN SHORTS: A Stone For Bessie Smith

Ref LP16 £12.95

Ref CD16 £14.95

Blues and gospel singer Barbara Ann Shorts, backed by a small jazz ensemble with musical roots in the New Orleans tradition, plays tribute to the great US blues singer Bessie Smith who died in 1937. This collection of songs includes a fascinating re-working of Sting's *Moon Over Bourbon Street*. For-X FXCD69/FXLP69

ROAR ENGELBERG / STEIN-ERIK OLSEN: Mosaic

Ref LP17 £12.95

Ref CD17 £14.95

Scandinavia's only professional pan flautist, Roar Engelberg, plays a collection of arrangements with Stein-Erik Olsen (classical guitar) — pieces by Ravel, Bach, Faure, Desportes and more. Superb dynamics! For-X FXCD81/FXLP81

JIM BROCK: Tropic Affair

Ref CD18 £15.99

Ref LP18 £15.99

Vibrant contemporary jazz, recorded live to two-track by Reference Recordings' Prof. Johnson. Remarkable clarity and a tremendous 3-D soundstage. RR31



WILLIAM WALTON: Facade Suite

Ref CD19 £15.99

Ref LP19 £15.99

One of the Reference label's earlier analogue recordings (these days the company concerns itself with improving digital techniques), featuring the superb playing of Chicago Pro Musica. "A true state-of-the-art recording", said *The Absolute Sound* magazine. RR16

STRAVINSKY: L' Histoire du soldat Suite

Ref CD20 £15.99

Ref LP20 £15.99

Chicago Pro Musica again. The US underground magazine *The Absolute Sound* reckoned this to be one of the best (analogue) recordings ever made! RR17

VIVALDI / BACH: Sinfonia in C; Trio Sonata in C, etc

Ref CD21 £15.99

Ref LP21 £15.99

An exemplary digital recording of the Helicon Ensemble playing Baroque music from Vivaldi and Bach. The CD contains an extra track, Bach's *Prelude in C*. RR23

COPLAND: Appalachian Spring Suite

Ref CD22 £15.99

Ref LP22 £15.99

The *Appalachian Spring Suite* in its original version for thirteen instruments, recorded with a Nakamichi DMP-100 digital encoder. Plus the Pacific Symphony Orchestra in a world premiere recording of *Eight Poems of Emily Dickinson*. The CD contains an extra (analogue) recording of *An Outdoor Overture* (8m 50s). RR22

NATIONAL SYMPHONIC WINDS:

Winds of War and Peace

Ref CD23 £15.99

Ref LP23 £15.99

Conductor Lowell Graham leads performances of John Williams' *Liberty Fanfare*, Samuel Barber's *Commando March* and many more. A pure analogue audiophile recording from 1988 using John Curl's Ultramaster recorder. W8823, WCD8823

JAMES B. WELCH: Concert

Ref LP24 £15.99

JAMES B. WELCH: Recital

Ref LP25 £15.99

Two of the Wilson Audiophile label's famous recordings of classical organ works. On a big system these discs are truly breathtaking — watch out for your woofers!

Ref CD24/5 £15.99

Tremendous value: both *Concert* and *Recital* on one compact disc!

W177, W278, WCD177/278

The Choir of Grace Cathedral, San Francisco

Ref CD26 £15.99

Ref LP26 £15.99

W805, WCD794/805.

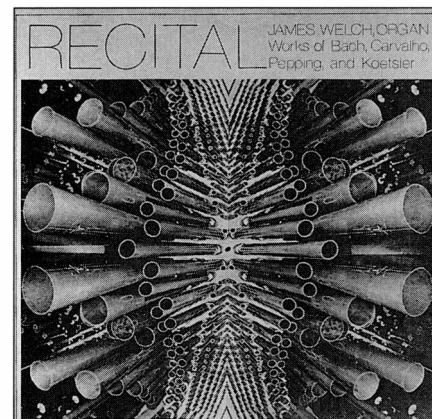
Another breathtaking example of Wilson Audiophile's pure analogue recordings, used as reference discs by hi-fi gurus around the world. The discs are hard to find in the UK.

THELMA HOUSTON & PRESSURE COOKER: I've Got the Music In Me

Ref LP27 £15.99

Ref CD27 £15.99

One of Sheffield Labs' most famous recordings. The original direct-cut has been out of print for many years and is now highly collectable — but the recording sessions were of course taped, and this issue will still blow



your socks off! Sheffield ST200, CD2. Listed below are further highly collectable Sheffield Labs discs which are astonishing in their sense of realism and truly awesome dynamics:

CLAIR MARLO: Let It Go

Ref LP36 £15.99

Ref CD36 £15.99

TLP29, CD29

NEW!

TOWER OF POWER: Tower Of Power Direct

Ref LP37 £15.99

Ref CD37 £15.99

LAB17, CD17

NEW!

JIM KELTNER & RON TUTT: The Sheffield Lab Drum Record

* The CD also includes The Sheffield Track Record

Ref LP30 £15.99

Ref CD32 £15.99

LAB14, CD14/20

The Sheffield Lab Track Record

* The CD also includes 'The Sheffield Lab Drum Record'

Ref LP31 £15.99

Ref CD32 £15.99

LAB20, CD14/20.

JAMES NEWTON HOWARD: James Newton Howard and Friends

Ref LP33 £15.99

Ref CD33 £15.99

LAB23, CD23.

SPECIAL OFFER

Order any 3 LPs or 3 CDs and receive a FREE copy of *First Sampling* (RRS1CD), Reference Recordings' compilation CD featuring a variety of classical tracks from its catalogue.

TO ORDER YOUR LPs AND CDs

(tick selections)

All prices include VAT and postage and packing

Radka Toneff: *Fairytales*

- Ref LP1 (£12.95)
- Ref CD1 (£14.95)

Totti Bergh: *I Hear A Rhapsody*

- Ref LP4 (£12.95)
- Ref CD4 (£14.95)

Smith/Ricci: *Paganiniana*

- Ref LP10 (£14.95)
- Ref CD10 (£17.95)

Opus Test Record 1: *Depth Of Image*

- Ref LP11 (£12.95)
- Ref CD11 (£14.95)

Opus Test Record 3: *Dynamics*

- Ref LP12 (£12.95)
- Ref CD12 (£14.95)

Marty Paich Big Band: *The New York Scene*

- Ref LP13 (£12.95)

Marty Paich Big Band: *What's New*

- Ref LP14 (£12.95)

Grex Vocalis: *Renaissance For Kor*

- Ref LP15 (£12.95)
- Ref CD15 (£14.95)

Ytre Suloens Jass-Ensemble / Barbara Ann

Shorts: *A Stone For Bessie Smith*

- Ref LP16 (£12.95)
- Ref CD16 (£14.95)

Roar Engelberg/Stein-Erik Olsen: *Mosaic*

- Ref LP17 (£12.95)
- Ref CD17 (£14.95)

Jim Brock: *Tropic Affair*

- Ref CD18 (£15.99)
- Ref LP18 (£15.99)

William Walton: *Facade Suite*

- Ref CD19 (£15.99)
- Ref LP19 (£15.99)

Stravinsky: *L' Histoire du soldat Suite*

- Ref CD20 (£15.99)
- Ref LP20 (£15.99)

Vivaldi, Bach: *The Helicon Ensemble*

- Ref CD21 (£15.99)
- Ref LP21 (£15.99)

Copland: *Appalachian Spring Suite*

- Ref CD22 (£15.99)
- Ref LP22 (£15.99)

National Symphonic Winds: *Winds of War and Peace*

- Ref CD23 (£15.99)
- Ref LP23 (£15.99)

James B Welch: *Concert*

- Ref LP24 (£15.99)

James B Welch: *Recital*

- Ref LP25 (£15.99)
- Recital and Concert* (on one CD)
- Ref CD24/5 (£15.99)

The Choir of Grace Cathedral San Francisco: *Music for Easter, Ascension and Pentecost*

- Ref CD26 (£15.99)
- Ref LP26 (£15.99)

Thelma Houston and Pressure Cooker:

I've Got The Music In Me

- Ref LP27 (£15.99)
- Ref CD27 (£15.99)

Jim Keltner and Ron Tutt: *The Sheffield Lab Drum Record*

- Ref LP30 (£15.99)

The Sheffield Lab Track Record

- Ref LP31 (£15.99)

Jim Keltner and Ron Tutt: *The Sheffield Lab Drum / The Sheffield Lab Track Record Record*

- Ref CD32 (£15.99)

James Newton Howard & Friends

- Ref LP33 (£15.99)
- Ref CD33 (£15.99)

Arne Domnerus' Kvartett: *Blatoner fra Frolidhaugen*

- Ref LP34 (£12.95)
- Ref CD34 (£14.95)

Ketil Bjørnstad: *The Shadow*

- Ref LP35 (£12.95)
- Ref CD35 (£14.95)

Clair Marlo: *Let It Go*

- Ref LP36 (£15.99)
- Ref CD36 (£15.99)

Tower Of Power: *Tower Of Power Direct*

- Ref LP37 (£15.99)
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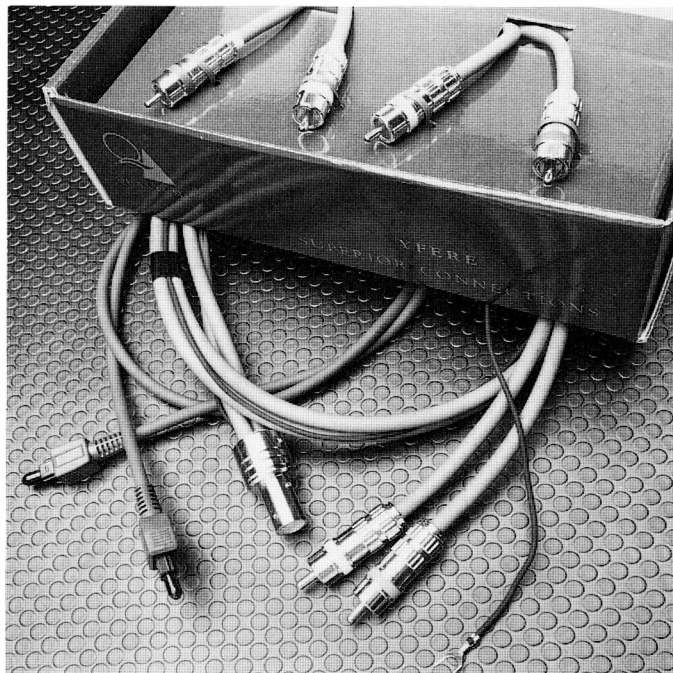
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Available to UK readers only

Quantum Cables Offer

Improve the sound quality of your hi-fi system with these top quality LC-OFC interconnects, PC-OCC speaker cables and save pounds.



YFERE and YBLENT cables and plugs are the latest accessories to be distributed here by Quantum Audio of Scotland. These high quality cables all use linear crystal oxygen free copper wires (LC-OFC) and beautifully crafted solid copper phono plugs which are gold plated. There are two basic configurations: Twin and Quad. The Twin leads employ two LC-OFC conductors of 22 strands, whereas the Quad leads use four conductors of 20 strands.

The *Superior* range of cables really are a gorgeous addition to your hi-fi system. However, for those of you who are on a tighter budget there is also the YFERE *Super* range which uses the Twin wiring configuration but the leads are terminated with less elaborate plugs.

For digital aficionados there is also a high quality fibre optic cable (yes, cables really do make a difference even in the digital domain). And the analogueophiles looking to get the best from their record collection might care to upgrade their arm cable with the *Superior* tonearm cable which uses YFERE's Quad wiring.

Also new to this country are *Furukawa* loudspeaker cables. All are two-core cables (twisted in the FS2T20 and '35 versions, flat in the FS2T09) using PC-OCC wire with a high density polyethylene dielectric and flexible PVC jacket.

Thanks to an exclusive deal with Quantum Audio *Choice* is able to offer its readers these cables at discount prices. With the *Furukawa* speaker cables, you can have your leads terminated with 4mm banana plugs or spade connectors free of charge!

Simply fill in the form opposite and leave the rest to us.

All our prices are inclusive of postage, packing and VAT. Please allow 28 days for delivery.

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<input type="checkbox"/> 004-006 LC-OFC Twin 2m pair	£73.00	£69.95

SUPERIOR

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<input type="checkbox"/> 004-010 LC-OFC Phono Quad .5m pair	£75.00	£71.95
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<input type="checkbox"/> 004-012 LC-OFC Phono Quad 1.5m pair	£95.00	£91.95
<input type="checkbox"/> 004-013 LC-OFC Phono Quad 2m pair	£105.00	£99.95
<input type="checkbox"/> 004-020 LC-OFC Phono Twin .5m pair	£65.00	£61.95
<input type="checkbox"/> 004-021 LC-OFC Phono Twin 1m pair	£70.00	£66.95
<input type="checkbox"/> 004-022 LC-OFC Phono Twin 1.5m pair	£75.00	£71.95
<input type="checkbox"/> 004-023 LC-OFC Phono Twin 2m pair	£80.00	£76.95
<input type="checkbox"/> 004-040 Fibre Optic 1m pair	£150.00	£139.95

FURUKAWA SPEAKER CABLES

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<input type="checkbox"/> 3 metre pair		£72.00
<input type="checkbox"/> 5 metre pair		£120.00
FS2T35 (3.5mm², 7 x 20 strand)		
<input type="checkbox"/> 2 metre pair		£100.00
<input type="checkbox"/> 3 metre pair		£150.00
<input type="checkbox"/> 5 metre pair		£250.00

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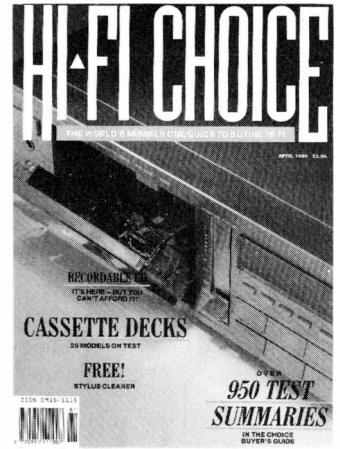
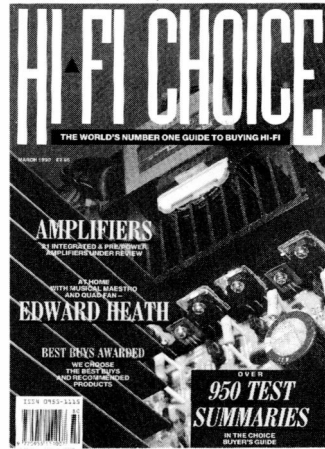
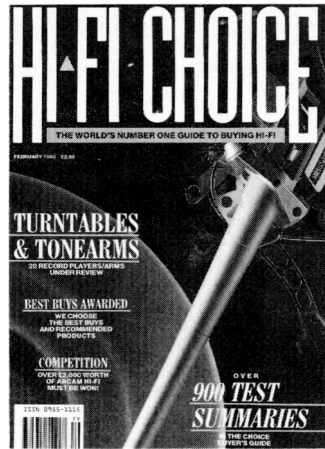
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THE DIRECTORY

The *Hi-Fi Choice Directory* was conceived as a reference guide to all the audio products reviewed by *Choice* that are currently available. The products are split into suitable categories, each with its own introduction containing information about the product type and its applications. They are particularly relevant to the uninitiated first time buyer and help sort out the order of priorities when buying a piece of equipment.

Each product along with its retail price is placed in its respective category in alphabetical order. For instance the Acoustic Research *EB101* is presently at the beginning of the Turntables and Tonearms section; however, the Ariston *Superior* heads the Motor Units section as it is sold and was reviewed as a separate component – requiring a separate arm. Where there are several products with the same name but different model numbers these are in price ascending order.

Then come the ratings for the standard achieved in laboratory and listening tests, with the exception of certain product groups where lab tests

were not carried out. One important point to remember is that they cannot be used to compare products from different categories – ie a cassette deck rated 'excellent' in sound quality will not usually offer the same standard of fidelity as a similarly rated turntable or CD player (unless you can get hold of first generation copies of the master tape!).

The Comments column contains a potted summary based on the original review, emphasising the salient points of a product's character and sonic performance. The space available doesn't allow for great detail but in the 20 or so words we have attempted to put across the essence of the review, in some cases using quotes from the review itself. Obviously, important information on compatibility or auxiliary equipment used in the test cannot be included, and it is best to refer to the original review for this, of which more later.

The next column(s) varies from category to category but is usually either features or specifications, the former being facilities available on a cassette deck or amplifier or the type of drive

system on a turntable.

Specifications vary with product type but usually relate to suitability or capability, for instance arm matching figures are given with the cartridges which tie in with the mass figures for the tonearms themselves, making it easier to avoid compliance/ mass mismatches.

Perhaps the most influential letters in the Directory are those found in the Value column, the *Rs* and *BBs* denoting the Recommended and Best Buy ratings that are appended to products we consider meritorious. The Best Buy tag means that a product not only offers good sound quality but is reasonably priced as well. With source components a price limit of approximately £300 is usually used as a guide. Recommended means that either the performance of a product is particularly good irrespective of price or, alternatively that a good value standard is achieved but overall attainment falls short of Best Buy classification. An ideal situation would be to choose suitably priced Best Buy or Recommended products from relevant categories and create a Best Buy system, but, due to

the variety in tonal balance that exists in much audio equipment (especially the electromechanical elements – ie cartridge and speaker) system building is not quite that simple. These ratings make a useful guideline for shortlisting components, but only experiencing the actual combination will tell you whether it works for you.

The final column contains a reference to the issue of *Hi-Fi Choice* which featured the complete review. If you wish to get a better idea of a product by reading the complete review it is possible to order a copy (if still in print) through our back issues department. Every *Choice* issue contains a Back Issues page for this purpose.

The Directory is constantly updated with the latest reviews and price changes as well as having discontinued products removed. If a listed product is updated to a 'mark two' form and the alterations are purely cosmetic or not too extensive we sometimes leave the product in with its current model number and an asterisk to denote that it has changed since our original review was published.

SYSTEM BUILDING

Pre-packaged one-make systems have been commercially very successful, with advantages like cosmetic consistency, competitive pricing, and (assumed) technical compatibility. However, despite the mass market clout of the consumer electronics giants, the hi-fi tradition of specialised separate components seems as strong as ever, and certainly represents the route taken by those who place sound quality first.

Yet those who choose the separates route still have lingering doubts – usually completely unjustified – over the compatibility of components from different manufacturers. Gross incompatibilities are very rare nowadays, only likely to rear their heads amongst the most exotic components. Here the delicate art of 'supercompatibility' really takes over the major role and might be regarded as the key to 'real' hi-fi.

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

There will always be controversy over the relative qualities of LP, CD and cassette. LP is still the choice for ultimate sound quality – particularly for those prepared to spend a substantial sum on a good quality turntable system.

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

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

CD is the latest challenger to these two established media, using a digital instead of analogue storage format. The sound quality remains controversial, hailed as near perfect by its fans but derided by vinyl freaks, so it is probably fairest to say that CD is fine for most listeners, but may not suit everyone; certainly the lack of background noise, defects and deterioration over time are major strengths.

While there will always be arguments about the different music storage and transmission formats available to the hi-fi listener, there is also controversy over the relative importance of the different components which make up the system chain – by which is meant the source, the amplification, and the loudspeakers (and for the pedantic the room itself, though there's often little that can be done here).

For many years the 'weakest link' theory proposed that the loudspeakers needed the most attention, that amplifiers merely had to have sufficient power, and that turntables were pretty well perfect. However, this perspective has become steadily discredited by an alternative 'theory of precedence', which stresses that no subsequent component can make up for the inadequacies of its

predecessors – all it can do is supply its own additional degradations. In such a context it is not uncommon to find more than half the system budget allocated to the record player, with scrimping and saving made on amplifiers and loudspeakers.

Choosing the components of a system is only part of the task of getting the system as a whole working as well as possible. Good turntables and loudspeakers both benefit to a surprising degree from proper support – from stands that enable them to give their best performance, whether floor-standing or wall mounted.

Siting of components within a room can play a significant role, as can the room itself. Some people may prefer an acoustically more 'live' room than others, but most will agree that the larger it is the better, because this tends to provide smoother and better extended bass reproduction. All rooms create reflections and standing waves, and the effects of these are more severe if all opposing walls are parallel, similar distances apart, and with hard reflective surfaces.

Provided that the loudspeakers can be placed fairly symmetrically, slight asymmetry elsewhere in the room is usually helpful.

The loudspeakers are most critical of placement, because it is their job to create the stereo image, and it will be impossible to do this if the sound from each is not roughly similar at the listening position. Each loudspeaker should operate in a similar immediate acoustic environment, unencumbered by other furnishings and structure, and a similar distance from listener, nearby walls, and

corners. Some loudspeakers are designed to operate close to a rear wall, others a metre or so out into the room, but all loudspeakers benefit from being closely mechanically coupled via proper stands to the floor.

Mixing and matching the components of a record player to get optimum results can be something of a black art, over and beyond the fairly simple business of choosing a cartridge of roughly the right compliance to suit the arm effective mass. Certainly the combining of turntables and tonearms is not a simple matter, and this is where a good specialist dealer will come into his own, both in terms of recommending good combinations from the models he holds in stock, and then in correctly carrying out the sometimes tricky set up procedures which are often required to get the best results.

The key to getting the best results from a separates system lies in finding an experienced and skilled dealer in the first place, one who takes the trouble to find out what you really want and then demonstrate some likely alternatives.

The Directory has been compiled so that it can be used by *Choice* readers as a buying guide. A guide in the sense that you should use the information in it to make a shortlist of equipment suited to your needs and budget, and then audition it at a dealers before taking the plunge. Because tastes inevitably differ it would be unwise to buy purely on the basis of our recommendation and dealers are the most experienced people around when it comes to making systems work as a whole.

THE DIRECTORY

TURNTABLES & TONEARMS

The schizophrenic split between consumer electronics and 'real hi-fi' is most obvious amongst turntables. The former are supplied simply as a means of playing vinyl in a system context. Cheaply manufactured in the Far East, these are complete players with a variety of automatic facilities, sometimes tied into system remote control. But engineering compromises severely limit sound quality, cartridge choice may be P-mount restricted, and such machines are rarely stocked by specialist hi-fi dealers these days.

Specialist turntables offer big sound quality

improvements, but lack so-called convenience features (that practised users often find irksome). Such turntables at the cheaper end of the market (sub-£350) tend to be supplied with matching tonearm, and often include a 'starter' cartridge. Still better quality is found at higher prices amongst the separate motor units and tonearms. Careful partnering and set-up is essential for these individual components, but 'naturally sympathetic' combinations do exist, and the good dealer can help.

Listed separately as integrated players and as turntable motor units and tonearms, our **sound**

quality rating is based on results achieved using a high quality system – but in point of fact the turntable is usually the limiting factor soundwise in any system. **Lab performance** summarises the speed stability, vibration generation and environmental isolation of turntables, along with the friction, alignment and adjustment of tonearms. The tonearm's physical characteristics also define a range of mechanically compatible cartridges (see cartridge listings).

INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research EB101 £230	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Alphason Solo/Xenon MCS £420/£300	Average+ Good	The deck is warm and euphonious with high levels of clarity. Wow artefacts occasionally just audible.	3 point suspended motor unit, optional quartz PSU/speed change 13g		67
Alphason Sonata/HR-100S MCS/atlas £720/£480/£340	Very Good Very Good	Good sound in all areas – bass, clarity and neutrality all in the top class and bettered by very few decks. Atlas PSU expensive but worthwhile	Belt drive, suspended, optional PSU, 13g	R	79
Ariston Q-Deck £165	Good Average+	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid	BB*	67
Ariston Icon £215	Good Good	A thoughtful and efficient design that offers good sound, excellent value and semi-automatic operation too! Good vibration isolation eases siting	Belt drive, suspended, semi-automatic, 10g	BB	79
Ariston Forte £350	Average– Average	Heavy on engineering, short of soul? The Forte almost makes it, losing out only because of some residual pitch variations and a lack of bass power. The arm is modestly good	Manual 2-speed belt drive player and detachable arm, 10g		67
Dual CS430 £100	Average Average–	Ragged, sometimes unpleasant cartridge mixes with a modest pleasing player in a very sharply priced package.	Belt drive, with cartridge, auto return, 5g	R	67
Dual CS505-3 £160	Very Good Good	Continuous steady improvements have kept this model at the forefront of the budget market. Practicality is excellent and the deck has excellent timing bass/mid and stereo imaging	Semi-auto belt drive, 8g	BB	67
Dual CS5000 £230	Average Average+	The rare 78 facility may give grandma's collection a new lease of life but the player did not merit recommendation on price vs sound	Electronic, belt drive, subchassis, 10g		48
Goldmund ST4 £4,589	Very Good Excellent	The Studio turntable takes on a cheaper tonearm than the T3F, yet provides a similar reference standard objective and subjective performance at £2,000 less, in a neatly integrated though bulky package.	Solid subchassis, direct drive, parallel arm, detachable headshell	R	60
Heybrook TT2 turntable & arm £424/£269	Average Good+	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, belt drive, 14g	R	67
JVC AL-FQ555 £170	Below Average Poor	Clear midband sound but woolly bass and crude treble. Ease of use however ranks highly, and there's little to go out of adjustment	Auto, direct drive, 5.5g		67
Kenwood DP-990 £400	Average Average	Smart, slick and massive player suitable for low compliance cartridges only. A good but not inspired performer.	Semi-auto 2 speed direct drive, 16g		67
Kuzma Stabi/Stogi £699/£399	Average+ Stabi: Good; Stogi: Excellent	Stabi is powerful, spacious but not sufficiently subtle. Stogi is an excellent all rounder with even spread of abilities.	Manual, belt drive, subchassis. 12.5g	Stogi: R	60
Linn Axis/Akito £399	Good– Average+	A neat, attractive and well-made package which delivers a rather harsh sound with a 'one-note' effect in the bass, but it's well suited to mid market systems	Belt drive, semi-suspended, electronic PSU, 10g		79
Linn Sondesk/Ittok/Troika* £549/£483/£669	Excellent Very Good	Superb sound – the best LP12 combination yet. The Troika gives the system real solidity and strength, stretching the deck and arm qualities to the full. Arm has since been upgraded	Manual subchassis player, belt drive, 14g	R	60
Manticore Mantra/Musician £340/£170	Good+ Good+	Well engineered deck with satisfying sound. The arm is particularly fine and very good value	Belt drive, suspended, 15g	R	79
NAD 5120 £90	Average Average	A number of running improvements have given this player a range and tautness denied its lazier sounding antecedents.	Semi-auto belt drive, detachable arm/tube/weight, 9g	BB	67

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THE DIRECTORY

INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
Omega Point Silver/Black £895/£295	Good Good+	An avowedly stripped down turntable that lacks even an on/off switch, the Omega Point Silver offers fine midrange clarity and good stereo, but some HF compression and a lack of 'wellie'	Manual, solid, belt drive, unipivot, 11g		55
Opus 3 Continuo/Decca London International (Revised)* £599/£99	Poor Good	Heavyweight motor unit with many fine properties, but which needs further development. The idiosyncratic arm is a suitable (though not ideal) platform for the Decca cartridge. For all its faults though, the whole transcends the sum of the parts	Belt-drive manual, damped unipivot arm, 12g		67
Rega Planar 2 £155	Average+ Good	A remarkable product at the price, surprisingly articulate and confident	Manual, 11.5g	BB	48
Rega Planar 3 £207	Good Good	A long time leader in its price category, the '3 (with its excellent RB300 arm) sounded nicely 'musical' in a balanced and coherent manner	Manual, 11.5g	BB	48
Revolver Rebel £169	Average— Average—	Fat, assured and forward presentation, but ragged and subjective speed stability problems. With a little further development, it will be a winner	Manual, 2-speed belt drive inc cartridge, 13g		67
Revox B291* £892	Average— Average—	Sound quality ranks as below average. Subjective bandwidth is narrow and the music lacks grace and energy. Ease of use however is unrivalled	Automatic, remote controllable, direct drive parallel arm, prefitted cartridge		55
Roksan Xerxes/Artemiz/Shiraz £695, £595, £655	n/a Very Good	Imaginatively designed, sophisticated front-end system, a little drier than some perhaps, with superior stereo, resolution and presence	2-speed manual, MC cartridge, 9g	R	72
Rotel RP-855 £189	Good Good	Great sound for the money – detailed and clear with good bass and no irritating nasties	Belt drive, solid, speed adjust, 9g	BB	79
Systemdek IIX £248	Good Average+	Poised, clean sounding deck, forward and explicit in character. A good value deck under £250, and a relatively cheap and satisfactory suspended model	2 speed belt drive manual turntable and arm, 11g	R	67
Technics SLBD-22 £90	Average— Average—	Not bad for the price and a great improvement on the L20, it performs reasonably when not stretched	Semi automatic, solid plinth, electronic, 6g P-mount	R	48
Technics SL-DD33 £110	Average Average	As with the 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 you dig facilities	Electronic, solid plinth, 5g, P-mount		48
Technics SL-QD33 £140	Average Average	The quartz speed controlled version of the DD is short on sound quality but not features. But it did have fair focus and some depth	Automatic, Quartz, direct drive, solid plinth, 7.5g, P-mount	R	48
Thorens TD 280 Mk II £180	Good— Good—	Legendary Thorens build quality on the cheap – slightly unsubtle sound but eminently liveable-with and very good value	Belt drive, solid, electronic PSU, 12g	BB	79
Thorens TD 166 Mk V £200	Good Good	Classic suspended-subchassis deck with clear, stable sound of no particular character. Unlikely to make enemies	Belt drive, suspended, 12g	BB	79
Thorens TD 316 Mk II £220	Good Good—	Very solid deck with neat split-chassis construction. Sound is a bit insecure in the bass, but it could suit classical music lovers well	Belt drive, suspended, electronic PSU, 12g	R	79
Thorens TD320 Mk II £350	Good Good	Good, consistent sounding deck with much improved (but not ideal) arm. A little expensive for performance offered	Semi-auto two speed belt drive, 14g		67
Townshend Rock Reference/Excalibur £1,800/£650	Excellent Excellent	Overall, the closest reproduction to master tape we've yet heard, with stunning real bass and excellent neutrality. Front-end damping trough improves LF detail significantly	Belt drive, suspended, electronic PSU, front-end damping, 12g	R	79
Well Tempered WTAT £1690	Average Very Good	Intriguing and challenging design. Musically it is not ideal, but it has a limpid quality and a lack of artificiality that sets standards as well as turning the ear, though it's not completely uncoloured. A charmer yet mainstream enough in its virtues to be viable	Manual 2-speed, damped, suspended arm, 7.5g	R	67
Zarathustra S4/Pluto 5A Prestige/PSU £1500/£2500/£500	n/a Excellent	The very well made and finished heavy platter S4 with the superb Pluto arm make a devastating combination ranking up there with the very best	Subchassis, manual, available without PSU	R	72

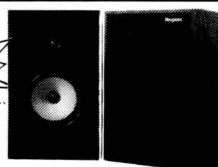
MOTOR UNITS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ariston Superior £598	Good+ Good	Good but slightly damped sound quality, with powerful and stable bass. The pro quo is a certain lack of pace, energy and resolution	Belt drive, subchassis, electronic		55
CEC ST930 £599	Good Good++	A rarity – a serious hi-fi product that loses nothing to budget rivals in finish or convenience. Good clean sound, very stable and assured	Belt drive, external PSU, 78 speed inc.	R	79
CS Audio Resan kit for Rega £80	Good— Good	After-market kit to convert Rega 2 or 3 to semi-suspended subchassis style. Looks good and sounds tidier than original. Feedback is much reduced	Conversion kit, all work reversible	R	79
Michell Syncro £265	Good Good	A particularly happy blend of qualities endows the Syncro with a blend of subtlety and force – the mailed fist in the velvet glove. Easy on the ear in the best sense.	Manual, belt drive, suspended motor unit	R	67
Michell Gyrodec £595	Good Good	Sweet and natural sounding player, well exploited by the Rega RB300 arm. Aesthetics, and the acres of acrylic, are unique	Manual, belt drive, suspended motor unit		55
NVA Senior £450	Good— Average	Very high sensitivity to low-frequency vibration, especially on NVA stand, gives strange subjective bass response and confused sound. Looks are unusual but pleasing	Belt drive, electronic PSU, two-part plinth		79
Oracle Alexandria Mk III £995 – £1095	Very Good Very Good	One of the most beautifully presented players made, and fully supported by superb separation, dynamics and a euphonious style of delivery.	Manual 2-speed belt drive	R	67
Origin Live Oasis B £199	Average Average+	Aesthetics are not its strong point, but its lively and articulate – if idiosyncratic – sound will please some tastes. Highly resonant construction is very sensitive to feedback	Belt drive, 33 $\frac{1}{3}$ rpm only, solid plinth/subchassis		79
Origin Live Oasis A £495	Good— Average	Rather coarse sound with lack of detail resolution – but lively presentation may appeal. Appearance is industrial	Belt drive, external mains filter, 33 $\frac{1}{3}$ rpm only, suspended subchassis		79
Oxford Acoustics Crystal Reference £2395	Very Good Excellent	This big, open and powerful sounding turntable works beautifully with Airtangent arm to give superb 3-D imagery	Manual, belt drive, subchassis, stand	R*	60
Pink Triangle Little Pink Thing £345	Good+ Very Good	Leads the field for clarity and neutrality at this price or a good bit more. It also looks very smart! Excellent value. Arm cut-out suits Rega or Linn style	Belt drive, semi-suspended, electronic PSU	R	79
Pink Triangle PT TOO £650	Very Good Excellent	Uniquely clear sound, uncoloured, free from ringing and with good bass. Very close to master tape, given a good arm and cartridge	Belt drive, external PSU, suspended subchassis	R	79
Revolver £150	Average Average	Nicely balanced, but unimpressive timing and lightweight bass made this deck rather average for the price. Manufacturer has since made several changes, but not re-submitted for review	Manual, belt drive, solid plinth		48
Roksan Xerxes £695	Excellent Very Good	This unique design cuts a swathe through the conventions of turntable design, providing superb resolution and stereo. Power supply has since been upgraded – see issue 78 for our latest report	Manual, belt drive, solid/decoupled	R	67
Systemdek IIXE £248	Good Very Good	Fine, honestly specified and well built player which easily betters its closest stablemate, the IIX. Frankly, at the price it's a sonic bargain	Manual 2-speed, external PSU	R	67

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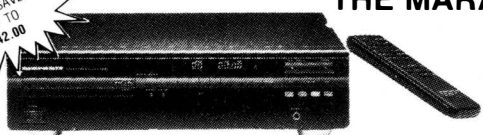
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DENON DCD 920 C/D PLAYER.....	(319)	£235	(SBL SPKRS INC PASSIVE CROSSOVER)		
DENON DCD 190 C/D PLAYER.....	(299)	£169	NAIM 32.5 PRE (BOXED/MINT).....	(494)	£295
DENON DCD 1420 C/D PLAYER.....	(399)	£295	NAIM HI-CAP (For 32.5/MINT).....	(425)	£269
LINN LK 1 PRE-AMP.....	(545)	£399	QUAD 44 PRE-AMP	(459)	£359
LINN LK 2 POWER AMP.....	(695)	£485	QUAD 34 PRE-AMP	(299)	£229
(LK 2 Upgraded to LK280 Spec)			QUAD 306 POWER AMP	(265)	£205
LINN KABER SPRS (WAL).....	(989)	£695	QUAD C/D PLAYER	(449)	£359
LINN SARA 9 (BI-WIRED BLK).....	(759)	£575	ROTEL RC 850 PRE-AMP	(139)	£99
(Mint S/H inc SARA STANDS)			ROTEL RB 850 POWER AMP	(160)	£119
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THE DIRECTORY

MOTOR UNITS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Systemdek IV £495	Good Very Good	The level of wow is a theoretical concern at least, but elsewhere this player shines, combining euphony, information and imaging in a polished, untemperamental package	Two-speed manual belt drive	R	67
VPI HW-19 £1,317	Very Good Very Good	Built to accommodate parallel tracking arms, this large but elegant deck produced clean, smooth sound when fitted with an SME arm. Good bass	Belt drive, suspended subchassis	R	79
Voyd Valdi £680	Good— Good+	Slight 'one-note bass' effect and lack of pitch stability compromise the performance of this well-made deck	Belt drive, suspended subchassis, electronic PSU		79
Voyd "The Voyd Plus" £2,777	n/a Excellent	Based on the standard 3-motor Voyd but with upgrade options (better bearing, platter, etc) which take it half way to a Voyd Reference, so we've dubbed it The Voyd Plus. Superb build and finish; colourful, dramatic performance. A thoroughbred	Belt drive, 3 motors, subchassis, outboard PSU	R	72

TONEARMS

NAME PRICE	LAB SOUND	COMMENTS	ARM EFF. MAS	VALUE	BACK ISSUE FULL REVIEW
Airtangent 1B £1990	n/a Excellent	A complex but superbly built arm for high quality systems, giving excellent stereo and resolution	7.5g (vertical)	R	This
Alphason Opal £130	Good Average	This is a straightforward adequate sounding low cost arm, priced just above where it rightly belongs	10g		55
Alphason Delta £190	Good Average+	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason Xenon £240	Good Good+	A trimmed down HR100S, the Xenon has inferior bearings and a simpler finish, but sounds crisp and coherent. Fits any Linn cutout	12.75g	R	55
Alphason HR100S £420	Good++ Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	48/Coll
Ariston Enigma £99	Average Average+	Good but not the best in its class: mid-band sounds a little uneven; treble a trifle "brash"	11.5g		48
Audio Technica AT1130 £186	Good Good	Well suited to most cartridges including high compliance ones, the AT is smooth and tonally neutral, if slightly lacking in 'balls'	8.5g	R	67
Decca London International £49	Average+ Average+	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48Summary
Eminent Technology £1000	Good+ Good++	One of the best sounding tonearms around, the linear tracking Eminent delivers impressive stereo imagery, focus and transparent sound	9g (vertical)	R	48/Coll
Goldmund T3F arm £4400	Excellent Excellent	This complex parallel tracker created an "ear-opening" experience when tested with a (since updated) Goldmund Studio turntable	16.5g	R	Coll 2
Helius Orion 2 £490	Very Good Very Good	Excellent engineering with rigid bearings, free from slack. It remains expensive but the level of performance deserves Recommendation	12g	R	48
Kuzma Stogi Reference £699	Very Good Very Good	A large, solid and well-made arm that holds the cartridge firmly, giving exceptionally clear sound with just a hint of brightness	12g	R	79
Linn Ekos £895	Very Good Very Good	Superb, state of the art design which builds significantly on Ittok's strengths	9g	R	67
Mission Mechanic £900	Good Good+	Nearly right, but inconsistency with level and vague imagery spoil what is otherwise a firm, powerful advocate for black vinyl	11g		55
Moth Arm £78	Good Good+	The ultimate budget arm? Refined, detailed, sweet and natural – performance improves in line with the rest of the system	12g	BB	60
Rega RB300 £115	Good++ Good++	Despite its modest price this sets exceptional performance standards and could be used on a number of high-quality turntables	10-11g	BB	60
Roksan Artemiz £595	Average Good	Interesting design which works a treat on the Xerxes deck. Fits Rega cut-out. See issue 72 for up to date assessment	8g		67
SME 3009 Series IIIS £182	Good Average+	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009 Series III £253	Good Average+	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009R £335	Average+ Average+	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME 309 £495	Very Good Very Good	Beautifully made, finished and presented, this arm is fully and easily adjustable and a highly neutral performer	10g	R	79
SME Series IV £810	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	60
SME Series V £1247	Excellent Very Good	Excellent in terms of design engineering and sound quality, this arm arguably sets a new reference standard regardless of price	10.5g	R	60

* rating refers to original tested model

CARTRIDGES

Very much the 'slave' of turntable and tonearm and to some extent undermined by the supply of free 'starter' cartridges on many turntable systems, the cartridge is still worth taking seriously. The quality of both the stylus itself and the cartridge's tracking performance are important in preserving that most important part of the hi-fi system – the record collection – and the cartridge also plays a significant role in determining the overall balance of a system

Cartridges fall into two groups: high output models, capable of working directly into any amplifier, and more expensive low output models. Stereotypically, low output cartridges use the moving coil principle of operation, have better mechanical integrity and tighter tolerances, and give better performance but at much higher cost. Most under-£150 amplifiers and many valve designs need either an extra head amp or transformer to cope with the low output. **Cartridge/amplifier**

interfacing can be very subtle, but even basic high output moving magnet designs benefit in overall balance from optimised amplifier capacitance loading. Still more important, the mechanical cartridge characteristic of cantilever compliance ('springiness') needs to be considered in the light of the effective mass of the tonearm which will be used (see Turntable & Tonearm entries).

NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/type	VALUE	BACK ISSUE FULL REVIEW
Arcam C77 £22	Average+ Average+	A sensible moving magnet package with good bounce at a competitive price	6-16g Normal, MM	BB	48
Arcam C77Mg £30	Average— Average	Punchy sound quality with plenty of extra energy to liven things up. The solid body seems well worth the extra £10	4-8g Normal, MM	BB	67

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NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/type	VALUE	BACK ISSUE FULL REVIEW
Arcom E77Mg £50	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laid back sound, with good 'scale'	3-8g Normal, MM	R	48
Arcom P77Mg £60	Average + Average +	Cautiously recommended, the P77Mg was preferred to its cheaper partner by virtue of a better tip. Channel balance could have been better	4-9g Normal, MM	R	48
Arcom PMX10 £100	Good + Good + +	Not the very clearest in complex high-frequency sounds, but lively and exciting, good transients.	5-11g Low, MC	R	85
Audionote I02VDH £895	Good Very Good	One of the best, giving 'an extraordinarily relaxing midrange clarity', needs a transformer	8-18g Very low, MC	R	43
Audioquest MC5 £220	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal, MC		54
Audioquest AQ 404i-L £400	Good + + Good +	Slight harshness detracted from the performance of this otherwise clear-sounding and detailed cartridge	8-16g Low, MC		84
Audio Technica AT95E £18	Average - Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal, MM	BB	48
Audio Technica AT-420E OCC £31.50	Average Average	Better suited to pop recordings this MM bears some of the sonic hallmarks of the Linn K5	7-14g (damp) Normal, MM	R	67
Audio Technica AT-430E OCC £44.50	Average + Average	A rising high frequency response yields something of a treble sting, not a good all-rounder	3-7g Normal, MM		67
Audio Technica AT-F3/OCC LE £74	Average + Good	Though the 'limited edition' badge is a trifle tongue-in-cheek the 'F3 still offers excellent value	8-15g Low, MC	BB	67
Audio Technica AT-F5/OCC LE £106	Average Good +	This latest sample demonstrated some technical weaknesses but its spacious, fluid sound quality still represents a benchmark at this price	4-10g Low, MC	BB	67
Audio Technica ATOC7 £265	Good + Good +	The OC9 is better if you can afford the extra. But OC7 is at least a taste of the high-end at a sensible price	6-13g Low, MC	R	54
Audio Technica ATOC9 £400	Average + Very Good	Tonal colours are reproduced faithfully and it rarely puts a foot wrong. Slightly less transparent than more costly MCs but it has got real welly. Good value (really!)	6-14g Low, MC	R	60
Audio Technica ART1 £800	Good + Very Good	This is a delicate and very fluid-sounding MC that tracks well, offers very low distortion and exceptionally good stereo separation	9-18g Low, MC	R	72
Cello Chorale £750	Average + Good	Now available through a new distributor at a saving of some £300, the Chorale is still blessed with a delicate but highly detailed treble. Arm matching is a problem	3-9g Low, MC		72
Denon DL110 £69	Good Good	Firmly recommended as a fine all-rounder, this high-output moving coil model is likely to perform well in nearly all circumstances	6-16g Normal, MC	BB	48
Denon DL160 £89	Average + Good	Although listeners just preferred the 110 its brother here proved a twin in lab tests and is still "thoroughly competent"	6-16g Normal, MC		43
Denon DL103 £99	Average Good	This classic spherical stylus model gives a lively sound with powerful bass, and is popular in broadcast studios	6-16g Low, MC	R	48
Dynavector DV-50X £99	Good Average	A high-output MC model with impressive lab performance, but whose tip and sound quality both disappointed	6-14g Normal, MC		48
Dynavector DV10X IV £125	Average Average +	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g Normal, MC	R	48
Dynavector DV23RS £230	Average + Good	Sound quality was described as "shut-in", lacking energy and sparkle but with some "edginess" in high frequencies	10-22g Low, MC		28
Dynavector XX-1 £680	Good + + Good +	Good, but not immensely competitive at the price, and not helped by comparison with the low output version	7-15g Normal, MC		84
Dynavector XX-1L £680	Good + + Very Good	Very clear, very detailed, no troubles with tracking; response lift around 20kHz seems to do no harm	7-13g Low, MC	R	84
Empire 800 Mk II £33	Good Average	This very high output MM appears to be based on the classic Ortofon VMS series. A trifle uninspiring overall	7-17g Normal, MM		67
Empire MC-5M £110	Average + Good	A very low compliance renders this MC best suited to heavy tonearms while its sweet, non-aggressive sound quality earns it a recommendation	13-20g Low, MC	R	67
Empire Benz Micro MC-2 £600	Average Good +	Similar to both the Empire MC1000 and vDH MC2 in design, the Benz offers a warmer and very transparent account of the music. Its tracking prowess is slightly limited	5-12g Low, MC	R	72
Glanz MFG 110EX £25	Average Average	A little bright but giving detailed bass and clear treble this was competitive at the price	6-16g Normal, MM	R	Systems
Glanz MFG310-LX £50	Good + Good + +	Detail and treble outstanding for sub-£100 cartridge. Slight coloration may be due to body resonance.	6-10g Normal, MF	BB	85
Glanz MFG610-LX £90	Good + Good +	Similar to cheaper '310 but slightly clearer transients and bass. Benefits from lowish impedance loading.	3-10g Normal, MF	R	85
Glanz GMC-10EH £50	Good Good	The rising HF trend of this high o/p MC may cause problems in certain systems but with a favourable wind its seductive qualities will win out	8-14g Normal, MC	R	67
Glanz GMC-10LX £80	Average + Average +	Bearing some of the hallmarks of the '10EH, the '10LX is still less competitive in the sonic stakes	7-15g Low, MC		67
Glanz GMC20E £129	Average Average	You could try haggling but we thought the makers of this number were demanding too much lucre for their product	3-6g Low, MC		48
Goldmund Clearaudio £1500	Average + Very Good	Something of a mixed bag overall, its sonic character bears a strong resemblance to the Pradikat though it shares some of the hallmarks of the more expensive Accurate	5-12g Low, MC		60
Goldring 1012 £40	Good + Good	Slightly harsh sound but plenty of life and quite good detail. Some very high frequency coloration apparent.	6-12g Normal, MM	R	85
Goldring 1022 £60	Good + Good	As with 1012, a touch harsh; detail and transient purity improved, though, and it goes well with electric guitar!	5-11g Normal, MM	R	85
Goldring Elan £16	Average + Average	A lightweight and frisky-sounding MM that appears to be based upon the same body as the Nagaoka mm4	7-15g Normal, MM	R	67
Goldring Epic II £26	Average Average +	An excellent budget choice though the limitations of the stylus are rather obvious at higher frequencies	5-12g Normal, MM	R	67
Goldring Eroica £100	Good Good -	More confused and coloured than its low-output sibling - high output less of an issue in these days of cheap MC-compatible amplifiers	8-15g Normal, MC		84
Goldring Eroica LX £115	Good + Good	Not the most subtle cartridge in the world; can sound edgy at times, but lively and informative	8-14g Low, MC	R	84
Goldring Excel £500	Average + Good	Goldring's most expensive cartridge to date errs on the warm and heavy side of neutral. Strong bass lines are its forte though its ability to resolve subtle treble details is weaker	6-13g Low, MC		72
Grado ZTE + 1 £26.50	Average - Average	Bass and treble are a trifle coloured but the midband proved highly enjoyable. Ideal for budget systems	6-13g (damping) Normal, MM	R*	54

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NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/type	VALUE	BACK ISSUE FULL REVIEW
Grado ZF3E+ £47.50	Average— Average	Downtilting balance disguises the brightness of this cartridge; bit of a mixed bag at this price	9-20g (damping) Normal, MM	*	54
Kiseki Blue Goldspot £450	Good+ + Good+	Good bass and imaging, but hints of spit and coloration let the side down slightly	8-15g Low, MC		84
Kiseki Purpleheart Sapphire £799	Good+ Good+	Rare, beautiful to look at and sweet to listen to, our review of this high-flyer conjured up images of Japanese art	5-14g Low, MC		Collection
Kiseki Blackheart £1795	Good Good	This cartridge demonstrated refined poise and a delicate but at once potent security, however, the price did seem a little on the high side compared to other Kisekis	6-16g Low, MC		60
Kiseki Lapis Lazuli £4000	Good Very Good	Combining very sensible design concepts at a silly price, the Lapis Lazuli is best thought of as combining the detail of the MC3000 and the fluidity of the Clearaudios	4-12g Low, MC		60
Koetsu Black S £612	Average Good+	The S is an OEM design built to Koetsu's blueprint. It features a sturdier fixing plate and offers a brighter, faster and more tactile sound than the earlier K	8-15g Low, MC	R	72
Linn K5 £32.50	Average Average+	Not as crisply focused as the costlier Linn magnetics, the K5 offers a smoother presentation	7-16g Normal, MM	R	67
Linn K9 £81	Average Good	Linn threw this model into the leading pack by beefing up the Basik's bodywork, adding a super stylus, and keeping the price fair	6-15g Normal, MM	BB	48/Coll
Linn Asaka £299	Good+ Good+	Disciples of Linn who are trying to realise their true "Karma" may find that saving money is not a short cut to heaven	9-18g Low, MC	R	48/Coll
Linn Karma £465	Very Good Very Good	A specialist which is strongly recommended for Linn-based systems; results may be less predictable in more general application	9-18g Low, MC	R	48/Coll
Linn Troika £669	N/a Very Good	Ex-Karma users have been seen with glazed expressions indicating smug self-indulgence the morning after fitting a Troika	8-18g Low, MC		Coll
London Maroon £149	Average Average+	Now manufactured under the London brandname this Decca cartridge is as iconoclastic as ever	9-20g (damp) Normal, MM		67
London Super Gold £300	Poor Average—	Immediate and (in the midrange at least) detailed, but very coloured, very nonlinear and questionable effect on records. Devotees swear by it	9-15g, damp Normal, fixed stylus MM		84
Milltek Aurora £249	Good+ Good+	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal, MC	R	48/Coll
Milltek Olympia £349	Average+ Good+	Warm and detailed sound – packs the punch of the best MCs with high output as a bonus	12-20g (damping) Normal, MC	R	54
Nagaoka MM4 £9	Average— Average—	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal, MM	R	54
Nagaoka MP10 £18	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal, MM	R	48
Nagaoka MP11 Boron £40	Average Average+	Responding well overall in PM's equipment and listening room, this model was mildly criticised for low level and dynamic limitations	5-13g Normal, MM	BB	48
Nagaoka MP11 Gold £47	Average— Average+	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal, MM	R	48
Nagaoka Stilton TS10 £50	Good— Good	Stilton-designed solid body (with three-point mounting) certainly gives remarkably resonance-free sound, but tip and generator are less good – a little rough at times	5-10g Normal, MM	R	85
Nagaoka Stilton TS11 £70	Good— Good	Differs from TS10 in having Vital stylus with better tracing but still some high frequency harshness.	5-10g Normal, MM		85
Ortofon OM5E £15	Average— Average—	The OM10 is a hi-fi cartridge – the OM5E is not	5-16g Normal, MM		43
Ortofon OM10 £20	Average Average	One of the leading "cheapies", this gives a fine level of sound quality for the price, with good matching compatibility	5-15g Normal, MM	BB	48
Ortofon OM20 £45	Average Average+	This turned out to be the listening panel's favourite among Ortofon's moving magnet models	5-16g Normal, MM	R	48
Ortofon 510 £30	Good Good+	For the price, a good blend of virtues – weight, clarity and neutrality	3-11g Normal, MM	BB	85
Ortofon 520 £50	Average Average+	Very sensitive to load capacitance this new Ortofon maintains the company tradition for a lively, effervescent SQ	7-16g Normal, MM	R	67
Ortofon 530 £80	Good+ Good+	Very clean and assured sound; transients not quite perfectly pure but plenty of detail.	4-11g Normal, MM	R	85
Ortofon X1 £50	Average Average	The cheaper X1 scored higher marks with our listening panel than the X3, but both were a disappointment	6-15g Normal, MC		48
Ortofon MC10 Super £70	Average Good	"What a delightfully sweet-sounding cartridge this is..." we said	5-15g Low, MC	BB	48
Ortofon X3 £70	Average Average	A lack of bass power, definition and a "zitty" top end makes this competent but uninvolving	5-15g Normal, MC		48
Ortofon OM40 £90	Average Average+	Highly competent engineering, secure tracking and decent sound quality are major strengths. But it's a little cold, a little polite	3-8g Normal, MM		48
Ortofon 540 £100	Average— Average	Graced with an advanced FGI stylus our sample possessed too high a compliance for broad arm matching. It could also sound a little unforgiving	3-8g Normal, MM		67
Ortofon MC20 Super £200	Average+ Good+	An "inviting" sound quality: polite rather than exciting it approaches much more expensive models, but does not better them	6-15g Low, MC	R	48/Coll
Ortofon MC30 Super £270	Very Good Good+	Beautifully engineered and well-balanced, it was slightly criticised as bland, though some may appreciate the lack of rough edges	5-14g Low, MC		Coll
Ortofon Quasar £300	Good+ + Very Good	Many of the qualities of the MC3000, although a touch bright. Good detail and delicacy	8-15g Low, MC	R	84
Ortofon MC3000 MkII £850	Very Good Excellent	Low levels of body resonance are a real ear-opener. Nothing to criticise elsewhere: one of the very best	9-16g Low, MC	R	84
RATA RP20 £22	Average— Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g Normal, MM	R	48
RATA RP40 £44	Average Average+	The '40 did a good job of sorting out the layers and complexity of the mix, with good focus, excellent stereo spread and fine scale	6-15g Normal, MM	R	48
RATA RP70 £77*	Average Average+	Clearer and sweeter than the '40 this also seemed heavier and less lively. For £99 you can have a van den Hul stylus	6-14g Normal, MM		43
RATA RP70vdH £99	Average+ Good	Able to retrieve bags of musical detail (thanks to the vdH stylus), RATA's top cartridge ranks as one of the most articulate MM's available	11-18g Normal, MM	R	67

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NAME PRICE	LAB SOUND	COMMENTS	ARM OUTPUT/type	VALUE	BACK ISSUE FULL REVIEW
Rega Bias £34	Average Average +	Difficult to mount in some arms due to its shallow build, the bias offers a gentile, refined SQ that certainly makes it worthy of audition	4-10g Normal, MM		67
Rega Elys £74	Good Good	Clearly superior to the Bias, despite their common heritage, the Elys is both more detailed, accurate and musically convincing	8-15g Normal, MM	R	67
Revolver £20	Average + Average	This modified AT-95E enjoys a very lively mid and treble even if the bass is somewhat 'slower' in protection. A firm budget buy	8-16g Normal, MM	BB	67
Shure M92E £17	Average - Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal, MM		43
Shure M99E £29	Average - Average -	Sister to the 92E this is a solid but not particularly exciting cartridge	5-10g Normal, MM		38 (Summary)
Shure ME75ED £26.50	Average Average -	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal, MM		38
Shure M104E £36	Average - Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal, MM		38
Shure ME97HE £49	Average Average +	It won't turn a sow's ear of a turntable into a silk purse, but will at least keep going and produce an acceptable result	8-20g Normal, MM	R	48
Shure M105E £49	Average Average -	A slightly 'spitty' sound lacking deep bass and dynamic contrast, but can be used in virtually every system where it will perform "unobtrusively"	5-12g Normal, MM		38 (Summary)
Shure M110HE £60	Average Average	Sound quality was thought eminently presentable, but not exciting; smooth clear high frequencies, but a loss of bass definition	5-10g Normal, MM		38 (Summary)
Shure M111HE £72	Average Average	Early reviews of this cartridge complained principally of the price - which has since come down	5-10g Normal, MM		38 (Summary)
Shure ML120HE £95	Average + Average +	Quite decent sound quality and a generally fine balanced performance	6-18g Normal, MM		48
Shure ML140HE £120	Average + Good	Qualitatively the treble of this well-balanced moving magnet model was a match for many moving coil cartridges	6-16g Normal, MM		43
Shure V15 VMR £215	Good Average +	Initial listening gave promising results, but extended familiarity gave the feeling of a lack of energy and a "shut-in" sound	5-12g Normal, MM		38
Shure VST V £158	Good + + Very Good	Quite exceptional assurance with difficult material; very stable and clear sound. One of the best. Dynamic Stabilizer actually works!	4-11g Normal, MM	R	85
Shure Ultra 500 £499	Good Good	There was no doubting the accomplishments of what could well be the finest moving magnet cartridge around	6-14g Normal, MM		48
Stilton/AT-F3 £110	Good + Good +	At a premium of some £40 this modified AT-F3 offers a startlingly refined performance and is strongly recommended	8-18g Low, MC	R	67
van den Hul MC10 £499	Good Good +	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass. Gosh!	5-10g Low, MC	R	60
van den Hul MC One £699	Good Very Good	This extended all the positive qualities of the '10 but added greater authority and scale - worth it for the extra money	6-12g Low, MC	R	60
van den Hul MC1 Super £800	Good + + Very Good	Slight softening effect on transients was the only real flaw, but it didn't quite seem to have that special touch one expects for the money	8-15g Low, MC		84
van den Hul MC Two £899	Good Very Good	Connected directly to any standard MM input the vdH MC Two rewards with a highly detailed yet fluid and musically convincing portrayal	6-13g Normal, MC	R	72

* rating refers to original tested model

AMPLIFIERS

The amplifier sits at the heart of the system, processing the outputs from all the various music sources as necessary and then driving the loudspeakers. These two (quite separate) functions are integrated into a single box at the low-to-middle price points; separated pre- and power amplifiers become increasingly common as one moves upmarket. At the upper end of the specialist market, valve amplifiers provide a popular alternative to the transistor types amongst enthusiasts.

There is a substantial difference between specialist (sound quality oriented) amplifiers and the consumer electronics style models. The former

are bleakly simple, avoiding all unnecessary features to provide the most direct signal path in the interests of best sound quality. The latter range from models with just basic tone controls and tape recorder switching, to those with elaborate facilities such as graphic equalisers, remote control (including volume), surround sound options etc. etc.

Lab measurement provides some useful data, particularly in regard to an amplifier's ability to drive a wide range of different types of loudspeakers, but this is only obliquely related to sound quality. We also include our measured power output (RMS, 8ohm load, 1 channel driven) - but

again, paradoxically, this doesn't necessarily correspond to the loudness capability of the amplifier, which has as much to do with the elegance of the overload characteristics within a given system (valve amplifiers invariably sound more powerful than their rating would suggest). The listing of features provides some indication to the complexity of an amplifier: many users prefer to retain the option of tone controls to 'shape' the overall sound according to taste; many others have found living without tone controls surprisingly easy, with additional benefits in terms of transparency.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research A03 £160	Average + Average	New slimmed down version of the A04 with less power and facilities but also a slightly 'fuzzy' sound	38W, MM disc, CD direct and 3 aux inputs		74
Acoustic Research A07 £299	Very Good Average +	Relatively smooth but ineffectual sound quality that lacks some weight and impetus at very low frequencies	75W, 4 line, 2AV and MM/mc inputs		68
Aiwa XA-005 £130	Good + Average -	A technically competent amp with big, friendly but not overly engrossing sound quality	61W, MM 5 line inputs, source-direct		80
Akai AM-52 £230	Average + Average -	Basically equipped, this amplifier offers a comfortable but hardly over-detailed sound	95W, MM/mc disc, 5 line inputs, loudness		74
Akai AM-65B £299	Good Average	On-board 18-Bit DAC's actually give better sound than standard CD inputs! Punchy via MM disc	101W, MM, 6 line, digital inputs		80
Akai AM-93 £550	Average Average -	Unfortunately Akai's on-board D/a converters were less successful than its conventional analogue CD input.	112W, coax and optical dig inputs, MM/mc		68
Amadeus Silver £270	Average - Good	Limited headroom via disc but still offers a sweet, lush sound. Limited current delivery	37W, MM/mc, 3 line inputs	R	80
Amadeus Gold £360	Average - Good	There is some indication of instability but otherwise sounds very rich, warm and musical. High-ish IMD.	56W, MM/mc plug-in cards, 3 line inputs	R	74
Aragon 4004 £1795	Good Good	Despite its imposing bulk the Aragon is something of a softy at heart. It can deliver oodles of power but its musical presentation is more laid-back	231W power amp		72

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NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Arcam Alpha II £180	Good Good+	Very confident, convincingly musical and punchy sound that sets the standard for other budget amps	41W, 4 line and MM inputs	BB	68
Arcam Delta 60 £280	Good Good+	Very refined and highly detailed sound via MM and CD without any of the hardness noted via the MC stage	59W, 4 line, MM/mc inputs, no tone controls	R	68
Arcam Delta 90.2 £400	Average+ Average+	Dark but slightly dead or conservative sounding version of the original Delta 90. Improved disc stage	73W, MM/mc, 4 line inputs, tone bypass, bi-wire	R	74
Ariston Amp £219	Average Average+	Slightly veiled and thin sound but proved suitably attractive in the listening tests	32W, full logic control, MM and 4 line inputs	R	68
Audio Innovations Series 200 £429	Poor Good++	Like most 'Innovations valve power amps, compatibility with other brands is unpredictable. Hardly a powerhouse, but nicely 'open', transparent and dynamic sound in small(ish) systems	12W	R	77
Audio Innovations Series 300 £479	Poor Good++	Something of an anomaly the 300 is an integrated valve amp that looks awful in the lab but sounds remarkable in a system	10W, MM, 6 inputs	BB	63
Audio Innovations Series 400 £625	Poor Good++	Superior styling and better build quality than the Series 300 make for a very attractive integrated valve amp. Capable of fine results in the right system, but can sound too 'thin' and lacking in welly	12W, MM and 4 line inputs	R	77
Audio Innovations Series 1000/2nd Audio Amplifier £1379/2579	Poor Excellent	This valve combination offered awesome dynamic range with superb transparency and power to match. Compatibility with other brands is unpredictable	15W, MM, 6 inputs, monoblocks	R	63
Audiolab 8000C £325	Excellent Good	A well established preamp with a highly controlled sound, though it could do with more life and depth	MM/mc, 5 inputs, hdph, tone controls	R	62
Audiolab 8000A £350	Very Good Good+	Exceptionally detailed, tactile and transparent via CD but slightly more clouded via disc. A stalwart design	72W, MM/mc, 4 line and full record out selection	R	74
Audiolab 8000P £495	Excellent Good+	A dynamic powerhouse, load tolerant and sonically reliable	100W	R	62
Audion CD-1 £399	Average+ Good++	Nicely presented valve (line-only) preamplifier with fine bandwidth and enjoyable, musical sound. Great - if you can justify the cost. Well worth hearing	5 line inputs		77
Aura VA-40 £189	Average Average+	Based on ITL's earlier M80, this amp sounded slightly withdrawn or 'dead' if inoffensive	55W, MM 4 line inputs, MOSFET output		80
Bead Audio CA35/P35mkII £695/£895	Fair+ Very Good	Good build quality and a very smart finish combine with a characteristic valve sound to make a first class amplifier capable of giving hours of musical enjoyment	35W, MM/mc, 4 inputs	R	63
Bead 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
Bead M70 £1995 pair	Good Good+	A substantial British monoblok power amplifier, but not a great deal more impressive than the P35 at half the price	70W	*	50
Bryston 0.5B/2B £695/£695	Very Good Good	Very rugged Canadian pre/power combo that sounds cool confident and punchy. Headamp available to suit MC cartridges	65W, MM and 4 line sources, overload LEDs on power amp	R	74
Bryston 12B/4B £1295/£1395	Good+ Good	Bryston's massive 4B power amp stood out as the backbone of this combo, the preamp sounding a trifle unbalanced between MM and MC inputs	272W, bridgeable to 800W. 6 line, 2 disc inputs, subsonic filter		68
Cambridge P50 £200	Good Average+	A pleasant enough sound with full bass yet with a slightly mechanical quality that reduced its sense of 'naturalness'	56W, 4 line inputs + MM/MC + tone		85
Cello Audio Suite £1200	Excellent V Good/Excellent	Cello's preamp represents a whole new ball game in flexibility and sound quality (or war of attrition on your wallet)	Optional inputs MC etc	R	50
Chord SPM-900 £1725	Average+ Good+	Technically very interesting, this mini-powerhouse uses a switched-mode supply to deliver a crisp and refined sound	236W with protection into lower loads	R	85
Concordant Excelsior £856	Good++ Excellent	Cottage industry styling might not inspire confidence, but sonically this preamp is tremendously vivid and detailed. Real high-end performance. We loved it!	MM plus 3 line inputs. External power supply	R	77
Conrad Johnson PV10 £1,395	Excellent Excellent	Pricy, yes, but a fabulous preamplifier which confirms C-J's high reputation in the States. Beautiful imaging, superb detail, plenty of gain on the phono stage - classy build quality too.	MM plus 4 line inputs	R	78
Conrad Johnson MV50 £1995	Good+ Good+	Coupled with the PV5, this CJ power amp performed well on audition	50W		Collection
Conrad Johnson Motif MC-8 £1995	Very Good Very Good	A cheaper alternative to the '7, this preamp is an undoubted success in maintaining the Motif sound but does not compare on sound quality	MM/mc	R	50
Conrad-Johnson Premier Seven £8995	n/a Excellent	Price has increased since we tested it - but at this price who cares? The 'Seven is designed without compromise, and it's clearly one of the finest (valve) preamplifiers money can buy. Absolutely gorgeous!	MM, 4 line inputs, sep, Rec Out, versatile cartridge matching	R	72
Creek CAS 4040 S2 £179	Good Good	More neutral than its predecessor tonally, substantial improvements in transparency were also noted, while the lively punchy, character is retained	30W, MM, 4 inputs, tone controls	BB	62
Creek CAS 4140S2 £219	Average Good	Disc headroom still poor but the open and detailed, if slightly bright, sound wins through	40W, MM/mc, 3 line inputs, mono and mute	R	80
Creek CAS-5050 £399	Average Good	Strong RF IMD compromises the sound of the CD input which contrasts with the delightful performance via MM/mc	72W, MM/mc, aux CD and video + pre/power mode	R	74
Croft Super Micro A £549	Average+ Very Good	The looks are somewhat improved, while this 'hot rod' version with tuned components performed very well indeed. There is still no gain on the line inputs	4 inputs, MM, straight line	R	57
Croft Series IV(S) £850	Good Good	The original IV is still available now supplemented by the higher price and power (S), both are fine performers	40(60)W channel	R	57
Croft Series IVSA £1000	Good Very Good	Featuring tuned components chosen for their sound quality, the 'A' variant is an impressive example of Croft's technique in valve design	60W special supply regulation	R	57
Cyclone Catalyst £1995	Good+ Very Good	Exceptionally load tolerant and very refined in delivery. Extra options available in future	74W, external MM or MC stages, 3 line inputs	R	80
Deltec DSP-50S DPA-50S Pre/Power £725/£925	Excellent Very Good+	Remarkable pre/power combo based around the highly linear DH-0A32 hybrid op-amp. Unmatched detail resolution, control and transparency	63W, external feedback wiring, 3 line, MM/mc no tone controls	R	68
Deltec DPA 100S £2200	Very Good Very Good	A top-quality transistor power amp, sounding fast, articulate and well controlled, though maybe a touch clinical for some tastes	80W	R	50
Denon PMA-250II £140	Good Good+	Spacious yet tactile and gutsy sound via all inputs. Worthwhile upgrade over original PMA-250	53W, MM 3 line inputs, source-direct	R	80
Denon DAP-2500 PDA-4400A Pre/Power £549/£599 pr.	Very Good Good	Denon's fully-fledged preamp also incorporates D/a converters that did not improve the sound of our £299 CD player. The power amps are brilliant!	172W, monoblocks Opt/Coax dig + 2 tape, 4 line and MM/mc inputs		68
Denon PDA-6600 £1,000/pair	Excellent Very Good	Delivers abundant high quality sound, solid engineering expertise and content clearly compensating for any compromising of purist audiophile principles	250W monoblok, remote power	R	60
DNM 3A From £1000	Good+ Very Good	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art preamp	5 inputs MM/mc twin vol controls	R*	44

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AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
E.A.R. 802/509mkII £1098/£1868	Average Very Good	Extremely well made and combining the sonic strengths of both transistors and valves this EAR combo warrants attention	100W, MM, 6 inputs, monoblocks	R	63
E.A.R. 549 £3,628/pair	Very Good Very Good	A valve monoblok that measures like a solid state amp is itself an achievement, but exceptional power delivery and bass 'slam' is not fully matched by delicacy and transparency elsewhere	200W monoblok, bias setting		60
Exposure VII/VIII £430/£470	Very Good Good	Supplied as a combination without the separate preamp power supply, this pre power combination performed satisfactorily especially on the moving coil input	50W, MM/mc, 3 inputs, straight line		62
Exposure VI/VII*/VIII Pre/Power £320/£500	Good Very Good	An established company like Exposure could do more to improve the 'look' of these amps which, nevertheless, sounded confident, dry and musical. Dual version no longer available	63W, Super mod. 4 line and 2 disc inputs with full rec-out switching	R*	68
Exposure XI/XII/VIII Super £1600	Good Very Good	New preamp and improved power amp led to a smooth and refined sound, MM/mc less transparent than CD	61W, MM/mc, 5 line inputs	R	80
Grant G60AMS £948 pr.	Good Very Good	This neat and compact 60W valve monoblok gave good sound on the 8ohm tap, better still on 4ohms. The midrange was particularly natural	60W monoblocks 8ohms	R	57
Hafler DH120 kit form £295	n/a Fair	We didn't build one: see below	60W		44
Hafler XL-600 £1,145	Very Good Very Good	Sounds remarkably open, transparent and inherently 'musical' XL-600 is tremendously powerful and very compatible	426W in stereo mode, 1.5kW in bridge	R	74
Hafler DH120 assembled £360	Very Good Fair	Sound quality results were decent enough, but this power amp won't set the world on fire at this price	60W		44
Harman Kardon HK6100 £159	Good Good	Re-packaged version of the popular PM635. Still offers very up-beat and exciting sound	47W, MM, 5 line inputs, tone controls	R	80
Harman Kardon HK6800 £600	Good+ Good	Smoother and more evenly paced than previous H/K superamps, this model sounded both confident and nimble. A fine result	115W, 4 line + 2 tape i/p's + MM/MC	R	85
Harman Kardon Citation 25/22 £649/£899	Good Average+	Not as outrageous as previous Citation amplifiers but neither as punchy nor exciting in the sonic stakes. A good all-rounder but lacks sparkle	138W, MM/mc full range of input and record out		74
Heybrook C3/P3 £400/£500	Average+ Average—	There's a chance our power amp was a dud for the combo sounded very disappointing on the whole — glassy and uncouth	138W with plenty of current. Passive line inputs		85
Jadis JP30/JA30 £4,145/£4,200	Fair Excellent	Two-box preamp plus monoblok power amps, classic valve design gives stereotype valve sound. Beautiful build, nostalgic styling and delightful sounding midrange transcend limitations at frequency extremes, in lab, and re cartridge matching	30W 2-box pre-, monoblok power, MM-only, 4 line inputs	R*	60
Jeff Rowland Coherence One/Model 7 £3950/£9900	Very Good Very Good	The technical design of these amps is very elaborate but ensures they achieve an extraordinarily transparent and potent sound. However, the CD i/p is clearly superior to the disc inputs	448W monoblok MM/mc with variable loading options. Balanced topology	R	72
Kelvin Labs Absolute Zero/M30 £395 + £295/£595pr.	Good+ Average+	Latest versions of the M30 offers a true 30W Class A and a slightly muddled but very comfortable sound. MC preamp is a very linear design	33W monoblok MC only + 4 line inputs. Separate L/r balance	R	74
Kelvin Digital Integrated £550	Good+ Very Good	Not so Class A as before but now fitted with a PDM DAC which offers a smooth, detailed and naturally 'musical' sound	34W, digital, line and MM i/p's only	R	85
Kelvin Integrated £395	Good+ Very Good	A true 20W Class A amp with lush, detailed and very musical sound to match. Watch out for re-style	18W, MM/mc, 4 line inputs	R	80
Kenwood KA-5500 £130	Very Good Fair	Having dropped its moving coil input, this latest version has British style dynamics and rhythm but is not first grade yet	35W, MM, 4 inputs, hdph, tone controls	R	62
Kenwood KA-4010 £170	Good Average+	A flexible design at moderate cost. Smooth and cultured sound if slightly lean in balance	81W, MM/mc, 4 line inputs, source-direct	R	80
Kenwood KA-5010 £210	Good Good	Offers a slightly bass-light but very smooth, fresh and alive sound. Well built and sensibly equipped	101W, MM/mc, cd 3 tape, tuner, aux + direct	R	74
Kenwood KA-7010 £300	Average+ Average+	More powerful version of the 5010 but less successful in the listening tests. RF IMD is the likely cause.	123W, as above plus —20dB mute facility		74
Klyne SK5a £2590	Very Good Very Good	Beautifully made and presented this American thoroughbred has a good lab performance, but although versatile, is rather expensive for the quality of sound offered	Balanced output, versatile cartridge loading		72
Lectron JH50 £2,300	Average Very Good	Sexily presented valve power amplifier from France. Lovely valve sound too, with delicate and airy top end. Not especially powerful and rather expensive — but very desirable!	50W		78
Linn LK1/LK280 Pre/Power £545/£695	Good Good—	A very modern, logic-controlled amp with distinctive and inoffensive sound quality. Its restrained sound could do with extra insight and zip.	84W, compact amp CMOS sw. for 2 tape, 2 line and MM/mc. xlr sockets.		68
Linn Nebula £500	Average+ Average+	Ambitious both in style and design this amp was less impressive in the sonic arena — positive but two-dimensional	88W, logic-controlled i/p switching		85
Magnum MP150/MF150 £320/£320	Average+ Good	This is no technical masterpiece but the strain-free, fluid sound augers well for CD-based systems. Excellent value	89W, 3 line + MM/MC i/p's. No tone cont.	R	85
Marantz PM-50 £230	Good+ Average+	One of Marantz's new breed, the PM-50 has a big and beefy sound yet one that lacks refinement	92W, MM/mc, 4 line inputs, source-direct		80
Marantz PM-75 £500	Good Average	More successful than most amps with on-board DACs but still not as balanced as other Marantz products	136W, opt/coax dig inputs, 6 line + MM/mc		68
Marantz PM80 £400	Very Good Good+	Technically robust with an equally beefy and tactile sound. Great sense of power and control but spatially a little flat	133W, 3 tape, 4 line + MM/MC, Class A option	R	85
Marantz PM94 £1,200	Very Good Good	At 23kg the PM94 is no lightweight in either physical or sonic respects. A very powerful and comprehensively equipped amplifier	140W MM/mc tone controls (switchable)		60
Marantz PM-95 £1,800	Very Good Average+	Beautifully constructed, this amp was less convincing via its digital i/p than via line. Class A option best suited to sensitive speakers. Costly	151W with 30W available in Class A. Opt + coax inputs		74
Meridian 201/205 £599/£425 each	Very Good Good+	A fine preamp with additional luxury option of full system remote, plus competent and attractive monoblok power amplifiers with generally good performance	100W MM/mc 6 line inputs remote capable straight line	R/—	62
Mission Cyrus One II £200	Very Good Very Good	Crisp, meaty and exquisitely detailed, this latest Cyrus amp had us enthralled via CD. MM/MC enjoyed a lesser clarity	34W, 4 line + MM/MC i/p's with dual-conc vol.	R	85
Mission Cyrus PSX £230	Very Good Very Good	The PSX does make the Cyrus Two sound better; and also improves the PCM II CD player giving more wallop and clarity	Auxiliary power supply	R*	62
Mission Cyrus Two £330	Very Good Very Good	Also a top performer in its group with fine moving coil and compact disc sound. Since our review Mission has omitted the headphone socket on the Cyrus Two	50W, MM/mc, 5 inputs, straight line	R*	62

THE WORLD'S NO 1
GUIDE TO BUYING HI-FI

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NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Musical Fidelity B1 £200	Average+ Good+	The subject of much controversy, this 50W wonder offers a very deep, solid and powerful sound	50W, MM/mc, 5 line inputs, tape monitor	R	80
Musical Fidelity A1 £269	Average+ Average+	Just scraping a recommendation, this current AI sounded lush but sleepy — lacking the bite and sparkle of old	26W with 9W of Class A. 4 line + MM/MC inputs	R	85
Musical Fidelity B200* £349	Very Good Good+	Running cooler than other MFs, the B200 delivered fine musical and dynamic sounds with plenty of power	80W MM/mc 4 line inputs straight line	BB	62
Musical Fidelity A100 £459	Good+ Very Good	This is another one recommended for fine sound with which you could keep your Chinese carry-outs warm	50W MM/mc 5 inputs straight line	R	62
Musical Fidelity MA-50 £875 pair	Good Excellent	An audiophile bargain. One of the best sounding power amplifiers made	50W, monoblok	R	62
Musical Fidelity P270 £1,399	Very Good Very Good	If the hot-box aspect is not a deterrent, this is something of a bargain. A big amplifier scale of sound which is just a little rough-edged	135W	R*	50
Musical Fidelity MVX/A370 £2399/£2399	n/a Excellent	In its latest guise, the A370 confirms its status alongside the MVX as amongst the best indigenous components for both sound and presentation	MVX – mm/mc/4 line/phase invert. A370 – 150W	R*	72
NAD 3020i £140	Very Good Good+	The most balanced and communicative of NAD's 3020 series. Great at revealing subtle musical clues without aggression	31W with tone controls, 3 line + MM inputs	R	85
NAD 3225PE £160	Average+ Average+	Light and detailed if not as rich or weighty sounding as others. MM input sounds warmer than CD	42W + 70W dyn. headroom; soft-clipping, MM only	R	68
Naim NAIT 2 £339	Average+ Fair	Well built with good load tolerance the NAIT delivered a fully competitive sound in spite of its modest measured power output. Recent modifications as yet unchecked	15W pc MM 3 inputs	R*	50
Naim Separates £560-c£8,000	Very Good Good	A consistent and coherent series of 'building blocks' for conventional passive or active operation. Sound quality ignores conventional audiophile standards of presentation, but achieves fine musical communication	40-70W, MM/mc etc	R*	60
Nikko Beta 400/Alpha 800 £225/£800	Very Good Good	Big, bold and gutsy these are indestructible amps with a sound quality to satisfy all but the most demanding users	358W(!) with every feature necessary	R	85
NVA P70MC/a60 £830	Fair Average+	NVA's speaker cables are a must, the amp offering well-integrated but not particularly crisp sound	68W, MC, 3 passive line inputs		80
Oakley S £499	Good Very Good	Much improved version of the original Image preamp from Yugoslavia. This one won't disgrace itself even in top-notch systems. Image Six model (£150 more) is really fabulous	MM plus 3 line inputs	R	78
Onkyo A-8000 £140	Good+ Good+	A rare combination of style, features and very acceptable sound quality. Free of compression and 'grain' — undemanding	64W, 5 line + MM disc i/p's + full tone cont.	R	85
Orell SA-040 £359	Good Good+	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/mc, 4 line inputs, straight line	R	56
Orell SA-040SE £400	Average Average+	Very natural, relaxing if not overly exciting via CD, the sound closed-in to become 'pinched' or fettered via disc	64W, 5 line + MM/MC i/p's. Tweaky compts.		71
Philips FA-880 £200	Good Average	A new and cheaper design from Philips that sounds best via MM disc. Can appear soft and unbalanced via CD	108W, MM/mc source-direct tone		74
Philips FA960 MkII £300	Good+ Average	The MkII '960 still failed to grasp our listeners' attention but it remains a competent amp nonetheless	122W, 6 line & 2 disc inputs + tone controls		68
Philips DFA-888 £300	Good Average	As above but including a modified disc input and onboard DAC. Sounds tight but also slightly thin	107W, as above + opt and coax digital inputs		74
Pink Triangle PIP £2670	Excellent Excellent	This state-of-the-art preamp is one of the few truly high end products to come out of this country this year. It will most certainly worry the competition	MM/mc, 4 inputs, battery supply	R	62
Proton 520 £115	Average Average	Very well equipped budget amp with a slightly flat and undynamic sound — acceptable at the price though	31W, MM/mc with variable MC gain, 4 line inputs	R	74
Proton AP-1000/AA-1150 £250/£395	Good+ Average+	Bags of headroom available from this pre/power combo, but can seem bloated or unrefined via MM	67W, MM/mc, adjustable MC gain, 5 line inputs		80
QED A240 CD II £199	Good+ Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	62
QED A240 SA II £259	Good+ + Good+	Redesigned 240SA represents a significant allround improvement over its predecessor, and provides a good moving-coil disc input in a competitive price	45W MM/mc 5 line inputs straight line	BB	62
QED A270 £299	Good— Good+	Building on the strengths of the '240, the '270 sounds weighty, fast and dynamic. A bit 'lumpy' via MC	51W, 5 line and 2 disc inputs, pre-out	R	68
QED C300/P300 £300/£300	Good Good	A cost-effective combo, limited in its resolution but no less beguiling as a result. Disc stage is sweeter but samey	58W, 2 tape, 3 line, MM/MC + mono/biamp opt.	R	85
Quad 34 £299	Very Good Fair	This well-built durable preamp has useful filtering and above average tone controls but was found lacking in sound quality (viz: detail/dynamics)	4 inputs MM/mc tone controls		44
Quad 405 £389	Very Good Fair	Not an impressive power amp but easy on the ear if not pushed and very reliable	100W		44
Ray Lumley Model 75 £1,995 pr	Average Good+	Monstrous valve monobloks which represent good value. What they lack in musical subtlety they make up for in sheer muscle. And these are Lumley's small monobloks!	75W monoblok		78
Revox B150 £1,047	Very Good Average+	Beautifully constructed but hampered by Revox's convoluted logic control. Open and smooth sound. Still costly.	117W, CMOS sw. for 3 line, 2 tape and MM		68
Revox B250 £1,467	Very Good Good	With much improved sound over its predecessors plus amazing remote control facilities, this could form the heart of a round-the-dream-house system	150W MM/mc system/house remote tone controls		56
Rose RV-23 £395	Good Very Good	Beautifully built classy British 'hybrid' preamplifier. You can spend more to get a more transparent sound — but it's hard to criticise the Rose given the competitive price	MM plus 3 line inputs	R	77
Rotel RA810A £120	Very Good Fair	As a cut price RA820AII this is a very successful little amp that loses little in sound quality to its predecessor. Excellent value	20W, MM, 5 inputs, hdph, tone controls	BB	62
Rotel RA-820AX £150	Very Good Very Good	The spacious, detailed and very musical performance of this budget amp is almost too good!	47W, MM, 4 line inputs	BB	80
Rotel RA-840BX4 £190	Good+ Good+	Very authoritative but creamy-smooth and delightfully musical. Spatially convincing too, yet not as open as RA-820AX	39W, 4 line + MM/MC, dual-conc. volume. No tone	R	85
Rotel RA870BX £330	Very Good Good+	A powerful blockbuster with solid and well focused sound, good versatility and fine load tolerance	85W MM/mc 7 line inputs tone controls	R	56
Rotel RB/RC850 £160/£140	Good+ + Good+	Quality separate pre and power amplifiers at near budget integrated amplifier prices. A notable achievement	60W MM/mc 4 line inputs tone controls	BB	62
Rotel RC-870BX/RB-870BX Pre/Power £219/£230	Excellent Good+	Reduced price makes the 870 combo better value but, despite mods to the preamp, it is the power amp that must take the lion's share of credit	128W or 208W in bridged mode. CD direct, 4 line, 2 tape and MM/mc	R	68

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NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
SAE P102/A202 £499/£599	Average+ Average+	Microprocessor-controlled pre and power amp that sounds much better at low rather than high volume levels. Pro-oriented aesthetics	151W, MM/mc + CD tuner and 2 tape tone memory, spk switching		74
Sansui AU-X911 DG £480	Very Good Good+	At its best when used with the on-board MASH/PWM DAC where it sounds technically neutral but still emotionally charged	112W, 4 dig, 3 line and MM/MC i/p's Rec-out	R	85
Sony TA-F410R £170	Average+ Average+	Over-zealous protection circuitry limits continuous power but sound is still agreeably focused despite being tonally lean	84W, 2 tape, 3 line + MM i/p's. Tone + Rec-out		85
Sony TA-F630ESD £350	Good Average	Based on the '530 but equipped with PDM D/a convertor. Amp is competent but DAC sounds truly magnificent!	130W, as above + opt. and coax digital inputs	R	74
Sony TA-F730ES £450	Very Good Good	A very stable and coherent amp but one that lacks a crucial sense of involvement	133W, MM/mc, 3 tape, 2 line, full rec-out		80
Sumo Athena/Polaris £695/£695	Very Good Very Good	Very good value US pre/power combo with transparent, detailed and gutsy sound via all inputs	128W, MM/mc, 2 tape and 3 line inputs	R	80
Teac A-X400 £115	Average Average	Sibilance and a lack of crisp vitality hamper the performance of this amp, as does the stringent protection circuitry	59W, 4 line + MM + tone + mic i/p level control		85
Technics SU810 £130	Average+ Average	Our sample started off sounding fast, taut and well-integrated yet eventually failed on the MM disc input	66W, 2 tape + 3 line + MM. Tone + loudness cntrl		85
Technics SU-V660 £250	Good Fair	Chunky build but integrated output stage infers a weak, insubstantial and rather monophonic sound	107W, MM/mc, cd aux, tape + tuner + power amp-direct		74
Technics SE-M100 £550	Very Good Good+	An unusual disc-less poweramp with volume control. Standard line input sounds very open and clean. Digital input is harsher and less convincing	123W, coax and opt digital inputs, var and direct CD no MM or MC disc	R	74
Yamaha AX-330e £130	Average+ Average+	An improvement on earlier efforts but still a little bland or lack-lustre. Very compatible though	48W, MM, 3 line inputs, source-direct option		80
YBA Model 3 pre/power £995/£995	Good Good	Suited to highish sens. loudspeakers this duo produced see-through, ethereal stereo images that were more convincing towards the centre of the soundstage than at the edges	56W stereo amp MM only with 3 line i/p's. Separate L/r volume controls		72
YBA 2 pre & pwr £1395/£1695	Good+ + V Good/Excellent	Superbly finished French audiophile separates, with very good space and transparency, slightly softened bass. Needs extra transformer (£300) for MC cartridges	70W MM (MC extra) straight line	R	56
YBA 1 preamp £2895	Very Good Excellent	A front line French audiophile product. Great stereo and a fine Krell style finish	MM/mc, 3 inputs, straight line	R	62
YBA 1 power amp £2995	Good Excellent	This equally well finished power amp offers front rank stereo staging and transparency, and is capable of driving the most difficult loads	85W	R	62

* rating refers to original, tested model

LOUDSPEAKERS

Last item in the hi-fi chain, to some extent the loudspeaker is merely the slave of what has gone before, capable only of reproducing a signal as good as it is fed. Nevertheless the distortions (colorations and stereo effects) introduced by loudspeakers (and rooms) tend to be more immediately obvious than those anywhere else in the chain, so careful choosing according to taste is very important.

The average loudspeaker consists of a smallish enclosure, much of which may have begun life as

part of a tree, plus a couple of drive units hidden behind a removable grille. Inside the box lurks a simple electrical circuit known as a crossover, which divides the incoming (full range) signal into the right bits for the drivers to handle. Variations on the above formula are specifically identified in the entries. The designer's primary task is to balance the sensitivity of the loudspeaker (how loud it goes for a given electrical input) against the bass extension (how low does it go) for the given box size. After that such subtleties as coloration and

dispersion come into the equation

Careful placement of the loudspeakers within the room is as important as the initial choice of model. For good stereo they need to be more or less the same distance from nearby walls, and preferably on similar rigid stands. The listener should be about the same distance from and listening angle to each loudspeaker. The ideal placement depends on the way a particular model has been balanced (not to mention a number of other factors), and our recommendation is given in the entries.

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Acoustic Energy AE1 £696	Good Very Good	To the author's knowledge, the most awesomely dynamic and articulate miniature ever made	29.5 x 18 x 25cm semi-open space	88dB/w 60Hz	R	59
Acoustic Energy AE2 £1138	Good Very Good	Dynamic, solid and lively, a great allrounder if a bit small considering the price. AE proves that metal cone/dome drivers really work.	39 x 23.5 x 29.5cm heavy stands in free space	88.5dB/w 45Hz	R	66
Acoustic Energy AE3 £1650	Very Good Very Good	Solid, authoritative and impressively accurate – if a shade ponderous and slow – AE's latest 'big one' is a much better bet than the earlier '4, combining traditional monitoring virtues with the latest metal diaphragm technology.	63 x 26.5 x 37cm low stands in free space	85dB/w 23Hz (in room)	R	86
Acoustic Energy AE4 £1800 (stands £552)	Good Good	Magnificent but also seriously flawed, the AE4 possesses tremendous dynamic realism but a very mid-dominant balance. Large rooms and wallets only need apply.	54 x 32.5 x 44cm own stands in free space	90dB/w 40Hz		71
Acoustic Research Red Box £100	Average Average	Lively and balanced if a bit crude and uneven, this under-£100 econobox succeeds partly because of its simplicity, and works well with some rear wall assistance.	32 x 19.5 x 17cm close to rear wall	87dB/w 85Hz	R	74
Acoustic Research AR112 £125	Average Average—	Nicely presented and engineered, but sounds a bit small and boxy without true coherence.	36 x 19 x 18.5cm stands near rear wall	87dB/w 75Hz		66
Acoustic Research AR122 £150	Average Average	Despite a promising enough list of ingredients, the 122 failed to excite real enthusiasm amongst the listening panel	38.5 x 19 x 22cm stands near rear wall	87dB/w 68Hz		68
Acoustic Research AR132 £200	Average+ Average—	Good presentation and detail engineering was not sufficient to counter bass heavy balance problems on auditioning	44.5 x 23 x 25.5cm stands 1ft from rear wall	87dB/w 50Hz		66
Alexander SE5 £199	Average Average	Particularly well suited to surround sound A/v applications, the SE5 can give any miniature a run for its money on bass performance, hardness and coloration mar good detail and clarity, and price is a little high	40.5 x 12 x 15cm ALS stands near wall	82dB/w 50Hz (in room)		78
Alexander SE11 £299 (stands £69)	Good Good	Clearly better than its cheaper stablemates, the metal jacket delivers a different – and in some respects superior – sound than the wood-based competition	52 x 14 x 17.5cm stands close to wall	86dB/w 25Hz (in room)	R	82
Allison AL105 £150	Average Average—	Pretty enough in appearance, sonically the AL105 doesn't really make the grade at the £150 asking price	37 x 24 x 21cm high stands against wall	87dB/w 45Hz (in room)		78
Allison C06 £290	Average Good—	An unusual cube-shaped model designed for wall mounting gives exceptional bass extension from a small box, though it's also a bit heavy, coloured and slow	28.5 x 28.5 x 28.5cm stands against rear wall	88dB/w 45Hz	R	71
Alphason Amphion £680	Good Good	This fine-sounding, nicely finished compact wall-mount is just a little too expensive for formal Recommendation, but is a good performer for all that	44 x 23 x 27.5cm high stands against wall	88dB/w 47Hz (in room)		78
Alphason Orpheus £1000	Good Good+	Large hi-tech two-way features unusual, sweet-sounding isodynamic tweeter; well engineered and balanced if a shade odd in appearance	65.5 x 28 x 34cm stands near rear wall	87dB/w 43Hz	R	71
Apogee Caliper Signature £3350	Good+ Very Good	Pretty but power hungry full range panels have remarkable transparency and delicacy, though loudness and bass 'grunt' both a bit lacking; need very costly amplification	122 x 59-70 x 6.5-28cm floor, free space	81dB/w 30Hz (in room)	R	81

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Arcam Three + * £150	Average + Average —	Arcam's baby speaker did not delight our listeners, but it might do better in less expensive systems	34 x 18 x 23cm close to wall at head height	88.5dB/w 95Hz		53
Arcam Alpha £199	Good Good	It has its own colorations to be sure, but delivers a fine room balance with unusually good dynamics, timing and 'life', and is fine material value for money as well	46 x 26.5 x 26cm stands close to wall	89dB/w 30Hz (in room)	BB	82
Arcam Two + * £280	Good Average	Most things to most men this compact is unlikely to disappoint with its lively "ballsy" character though lacking weight... a bit	38 x 23 x 28cm near wall shelf or 40cm stands	88dB/w 55Hz		59
Arcam One + £380	Good Average	Provides a solid, weighty and rich sound, but is a little raw in the treble and indefinite in the midband	22.3 x 28.1 x 37.8cm open space, on stands	88.5dB/w 60Hz		59
Ariston Image £180	Average — Average —	Despite a sweet treble character, the Image fails to impress with a 'lumpy' over-rich balance that has room integration problems	42 x 22 x 27.5cm stands in free space	89dB/w 28Hz (in room)		82
Ariston Q £395	Average + Average	The prettily shaped Q delivers a good impression of scale from a small box, but the rather laid back, ponderous and over-rich overall sound engendered little enthusiasm amongst the listening panel	35 x 16.5-25 x 20-27cm high stands in free space	85dB/w 30Hz (in room)		86
ATC SCM20 £1320	Very Good Good +	Massively built to no-compromise Pro monitoring standards, the SCM20 is invariably informative but the rather forward presentation is a mite uncomfortable too. Needs a big amplifier and sadly lacks a bi-amp option	44 x 24 x 31cm stands close to rear wall	82dB/w 28Hz (in room)		86
Audio Electronics TC10 II £599	Good — Good +	Oddball appearance is rescued by a respectable technical performance, interesting and impressive engineering and fine sound quality at a realistic price	70 x 33.5 x 33.5cm low stands in free space	87.5dB/w 40Hz	R	68
Audioplan Kontrapunkt £799	Good Good +	Cute little German miniature sounds as sweet as it looks, dressed expensively in real wood with matching stands. Not for bass or loudness freaks.	31 x 24 x 13cm matching stands in free space	83dB/w 48Hz (in room)	R	86
B&W Vision DS1 £99	Average Average —	Although significantly hampered by upper bass cabinet coloration, the DS1 cleverly combines high sensitivity with a rich and generous soundstage	36 x 21 x 19cm stands quite close to wall	91dB/w 40Hz (in room)	R	82
B&W Vision DS2 £150	Average Average —	Although the box is generous for the price, the DS2 is a rather uneven performer, both on measurement and listening. Careful stand selection and placement is needed to control the enthusiastic mid bass.	50 x 24 x 25cm stands in free space	89dB/w 43Hz (in room)		86
B&W DM550 £149	Good + Average —	Beautifully presented, well engineered near-miniature with precise sound but a distinct lack of 'wellig'. Ideal for considerate flat dwellers	35 x 20.5 x 22.5cm stands in free space	86dB/w 70Hz		71
B&W DM560 £200	Average + Average —	Fine cosmetic presentation and good engineering for the price; overload protection may be handy but listening panel was underwhelmed	49 x 23.5 x 30cm stands in free space	88dB/w 55Hz		66
B&W CM1 £345	Good Average	Cleverly thought out luxury design package is also fundamentally well engineered, if a shade pricey on 'sound for pound' basis	24.5 x 16 x 22cm close to rear wall	84dB/w 90Hz		74
B&W Matrix 801 £2500	Good + Good +	Lacks the transparency of the best panels, and the drama of the best dynamics, but is something of an acoustic tour de force, with low coloration and fine stereo imaging	77/99 x 56 x 43cm floor or stands, free space	86dB/w below 20Hz (in room)	R	81
Bose Interaudio 3000XL £150	Average Average —	Lots of perceived value and well enough balanced, but low cost cabinet and driver engineering results in a crude and unsubtle sound	46.5 x 29 x 23cm stands in free space	89dB/w 45Hz		71
Bose 305 £350	Average Good —	A bit of an oddball, fine dynamic liveliness and a good room match more than make up for the strange stereo imaging and treble	28 x 45 x 23cm high stands near wall	88dB/w 40Hz (in room)	R	78
Bose 901 MK6 £1600	Good Average	Still controversial after all these years, the pre-equalised multi-driver 901 is cleverly engineered to deliver exceptional loudness with a modest amplifier, but mid bass tends to dominate the sound and transparency is notably lacking.	33 x 54 x 32cm rigid stands in free space	(92dB/w midband) 28Hz (in room)		86
Boston A120 £349	Average + Good —	Ugly but cleverly engineered, the 120 combines a tiny main driver with much larger ABR to give a generous, bighearted and lively sound despite little genuine bass extension and a few rough edges.	62.5 x 31.5 x 25cm stands in free space	89dB/w 48Hz (in room)	R	86
Boston A4011 £120	Average Average —	Competent performance for size and price but below average relative to the UK competition	34 x 21 x 20cm on stands near wall	88.5dB/w 63Hz		41
Boston Acoustics T830 £399	Good Good	A lot of speaker for the money, the T830 is a smooth and accomplished performer with a big and easy – or alternatively a lazy and laid back – sound	82.5 x 25.5 x 24cm floor, away from walls	91dB/w 28Hz (in room)	R	82
Castle Clyde £159	Average + Average	A tidy little performer packing punch, but beginning to show its age in the light of new competition	37 x 21.5 x 22cm open space on stands	89.5dB/w 64Hz	R	46
Castle Warwick £179	Good Average —	Excellent presentation and fine engineering with overload protection, but a sonic disappointment in bass and dynamic qualities	46.5 x 25 x 23cm stands 1ft from rear wall	88dB/w 50Hz		66
Castle Durham £209	Average + Average	Listening results were encouraging, well engineered and finished, but lean on treble and a bit weak on bass; still recommended	41 x 21.5 x 25cm near rear wall	89dB/w 67Hz	R	46
Castle Pembroke £229	Good Average +	Comfortably recommended, a sweet smooth sound with good overall balance of engineering-based performance	55 x 37.5 x 30.5cm open space on stands	88dB/w 46Hz	R	31
Celef Cirrus £180	Average Good	It's nice to see Celef back in the UK, with this decent sounding small reflex box that seems unusually tolerant of siting	39 x 20.5 x 23cm stands in free space	84dB/w 60Hz	R	66
Celef CF2 Nimbus £230	Good — Good —	Nicely balanced overall but a little uneven with it, this lively and dynamic large bookshelf model came close to Recommendation	46 x 25.2 x 24cm stands in free space	88dB/w 55Hz		71
Celestion 3 £109	Average + Average	This attractive little wall-mount gives good balance and stereo imagery, with a character which leans more towards inoffensiveness than excitement	31 x 18.5 x 21cm high stands against wall	86dB/w 55Hz (in room)	R	78
Celestion DL6 Series Two £159	Good Average	Good tonal colouring and plenty of bass for the enclosure size; the metal dome tweeter is excellent, but bass and mid lack clarity and 'bite'	45.4 x 24.5 x 26.2cm near wall, on stands	87dB/w 65Hz		59
Celestion OL8 Series Two £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open, stands	87.5dB/w 60Hz	R	59
Celestion SL12Si £579	Average Average	Careful setting up does reveal elements of fine sound quality, but this 'grown up' SL6 variation has a lumpy response alongside its improved power handling	53 x 20 x 27cm matching stands clear of walls	85dB/w 50Hz		66
Celestion SL600Si £799	Good + Good	This Aerolam high tech miniature has certain remarkable qualities that some will find irresistible, but needs careful system and room matching.	27 x 20 x 23cm matching stands in free space	82dB/w 52Hz		68
Celestion SL700 £1349 inc stands	Good Good	Very sophisticated, mostly smooth and accurate transducer, with fast but not very deep bass and a rather bright treble	37.5 x 20 x 23.5cm free air on tall stands	83dB/w 45Hz		60
Celestion 6000 £1470	Very Good Very Good	A genuine fullrange audiophile quality speaker system – with Star Wars styling to suit a high tech environment	Complex, on floor in free space	82.5dB/w	R	60
Cyrus 781 £250	Average + Good	Properly run in, the pretty little 781 delivers a fast, dynamic and informative sound which more than justifies its price. Take care to adjust placement to suit room and system.	43 x 22.5 x 28cm matching stands 1ft from wall	88dB/w 28Hz (in room)	R	86
Doxa 5 – 2 £900	Average Good	The high sensitivity and seductive midband makes an obvious partner for valve amplifiers, though obtaining a good room match may prove a little tricky	98 x 21 x 28cm floor well away from walls	91dB/w 30Hz (in room)	R	82
Quntech PCL500 Marquis £3998	n/a Very Good	Better value for money than the Crown Prince – and arguably more dynamic, with real bass 'slam' – but a little less refined in the higher registers	147.5 x 27 x 40 free standing away from walls	92dB/w 48Hz	R	65

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Qunttech PCL1000 Crown Prince £6120	n/a Very Good +	Immensely 'listenable', refined sounding speaker capable of creating lifesize musical images. Not overly transparent to source, but very civilised nonetheless	180 x 30.5 x 43.5 free standing away from walls	90dB/w 42Hz	R	72
Goodmans Maxim Two £90	Average + Average	More wham-bam-thankyou-mam sound that imitates much bigger speakers when you let these babies yell. (A well-controlled yell)	26 x 17 x 19cm near wall on shelf or stand	86dB/w 85Hz	BB	59
Goodmans B-Max/Maxim Two £90 + £90	Poor Average—	Stick with the Maxims on their own until you can afford some real grown up loudspeakers	60 x 21 x 26 + see above, suck and see	89dB/w 55Hz (in room)		78
Goodmans M100 £79	Average + Average—	Effectively a Maxim on the cheap, the M100 measures more smoothly but sounds somehow less involving than its more famous stablemate.	20 x 17 x 26cm close to rear wall	85dB/w 50Hz (in room)	R	86
Goodmans M300 £99	Average Average—	Conveying much of the charm and life which has made the Maxim 2 so popular, the M300 is sensitive, but also significantly hampered by upper bass cabinet coloration	38.5 x 21.5 x 17cm stands close to rear wall	89dB/w 50Hz (in room)	R	82
Harbeth LS3/5A £343	Good Average	Still a classic miniature, though not to every taste, and none the better for the recent update under our listening conditions. Limited dynamic range	30.5 x 19 x 16cm stands in free space	81dB/w 60Hz		66
Harbeth HL Compact From £539	Very Good Average	The clean and neutral sound lacks resolution and gives rather 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
Heco Interior 90S £159	Good Average—	Neatly finished and engineered miniature, but the disappointingly 'lifeless' sound left the listening panel decidedly unimpressed	27 x 18 x 16cm on high stands	87.5dB/w 90Hz		74
Heco Interior 120 £169	Good Average	Drab appearance belies a lively enough character, though the balance is altogether a bit bright for UK tastes	32 x 23 x 23cm high stands against wall	88dB/w 50Hz (in room)		78
Heco Interior 430s £429	Good Good—	This tall floorstanding enclosure delivers an impressively even sound balance with good bass extension, if not the lively dynamics to satisfy enthusiasts	85 x 24 x 27.5cm free space	88dB/w 43Hz	R	71
Heco Superior 740 £599	Good Good—	A similar sonic package to the cheaper Interior 530, these Superior clothes are very pretty indeed, though spikes are still awaited	84.5 x 22 x 25cm on floor in free space	88dB/w 30Hz (in room)		78
Heco Superior 940 £1000	Good Good	This large and beautifully finished floorstander has an impressively smooth and attractively transparent midband. Bass is well extended but follows rather than drives the music along.	110 x 26 x 31.5cm free space	88dB/w 20Hz		86
Heybrook Point 5 £139	Average Average	"Uncouth yet still satisfying", the Point 5 gives good dynamics and bass for a compact wall-mount, but is burdened by a somewhat unhappy treble	37.5 x 23 x 24cm high stands against wall	85dB/w 32Hz (in room)		78
Heybrook Point 7 £185	Average Average	Physically an attractive package, but not entirely convincing in lab or listening panel test: interesting for all that	40.5 x 23 x 23cm stands against rear wall	85dB/w 60Hz		68
Heybrook HB1 £199	Good Average +	No longer an over-bright character, a strikingly clear sound and fine transient performance now merits recommendation	47 x 29 x 23cm on stands near wall	88dB/w 61Hz	R	46
Heybrook HB100 £255	Average + Good	Well matched for wall siting, the HB100 is a lively and informative performer in the tradition of the popular HB1	47 x 26 x 28cm stands near rear wall	86dB/w 50Hz	BB	66
Heybrook HB150 £319	Average Good	Convincingly communicative but a bit colored and congested, this lively compact wall-mount is nicely finished but a little costly for the content	40.5 x 23 x 22cm stands close to rear wall	89dB/w 42Hz (in room)		82
Heybrook HB200 £399	Average Average	This luxury successor to the HB2 is lively and informative, but sounded insufficiently balanced to convince our listening panel	46 x 23 x 26cm stands against rear wall	87dB/w 55Hz		66
Infinity RS2001 £180	Average Average +	A little coloured and unruly in the treble, the 2001 nevertheless retains the lively dynamic bounce of its predecessor: pity the price has gone up	36.5 x 22.5 x 20cm lightweight stands	87dB/w 50Hz (in room)	R	78
Infinity Kappa 6 £795	Good Good	Interestingly styled US loudspeaker has unusual high tech drivers and good neutrality, but the sound seriously lacks excitement	63 x 38 x 24cm stands, free space	85dB/w 35Hz		66
Infinity Kappa 8 £1850	n/a Good + +	Very nicely made and unobtrusive but large four-way speakers which have a tendency to sound bass heavy unless used with solid core cables	118 x 51.5 x 17.5cm floor standing, open space	89dB/w 33Hz		72
Infinity Modulus £695	Good Average +	Luxury high-tech miniature is carefully conceived and beautifully executed. Undeniably attractive in the midrange and treble, the Modulus failed to handle the bass end of the spectrum as successfully.	30 x 18 x 26cm high stands 1ft from wall	84dB/w 45Hz (in room)		86
Jamo Concert 2 £230	Good Average—	A thoroughly respectable 'bookshelf' performer that needs free space siting but includes attractive cabinetwork and a neat grille	41 x 24 x 25cm stands in free space	85dB/w 48Hz		66
JBL TLX12 £149	Good— Average	This smart near-miniature has a 'boppy', lively bottom end, but beware of the fizz in its top	37 x 23 x 23cm stands 0.5m from rear wall	87dB/w 55Hz	R	71
JBL LX33 £259	Average + Good	A bit of a cheat, but a lot of speaker for the money, which manages a better room balance than many 'large bookshelf' rivals, and delivers a fine acoustic performance	80 x 25 x 21cm floor, 1ft from wall	89dB/w 48Hz	R	82
JBL LX44 £340	Good— Average	This generously built model offers good power handling, bass extension and dynamic range, but suffers from the 'three-way syndrome', with middle muddle	58.5 x 30 x 29cm stands in free space	89dB/w 40Hz		71
JBL XPL 90 £699	Good Average +	Though undoubtedly pretty and very expensively engineered, this elaborate near-miniature didn't really convince our listeners that it could deliver a sound quality to match its elevated price.	39.5 x 24 x 24cm stands in free space	85dB/w 45Hz (in room)		86
JPW Minim £79	Average + Average—	Very civilised but dynamically limited, the Minim is well suited to the smaller room and where limited loudness is acceptable	27.5 x 18 x 19.5cm stands against wall	85dB/w 28Hz (in room)	R	82
JPW Sonata £99	Good Average +	Well balanced and integrated, this near-miniature offers fine sound if limited bass and dynamic range, plus real tree wood at a nearly silly price	32 x 23 x 20cm stands near rear wall	86dB/w 55Hz	BB	71
JPW P1 £139	Good Average +	Honest and basically articulate if not very sophisticated, resolution is good but it can sound a little wearing in bright systems or with rough sounding material	44 x 25.9 x 26.1cm free space on stands	89dB/w 60Hz	R	59
JPW AP2 £165	Good Good	Few grounds for criticism but purchasers should check out the treble qualities to avoid hammering the ear anvils	46 x 26 x 25cm 40cm from wall on 45cm stands	89dB/w 65Hz	R	53
JPW AP3 £219	Good Average +	Pretty good stereo and well balanced overall it had its own character which is well suited to vinyl replay	52 x 25 x 29.5cm near wall on stands	90dB/w 57Hz	R	46
JRT AD1 £500 (stands £100)	Average + Good +	A most auspicious Choice debut for relative newcomers JRT. A fair share of cosmetic deficiencies do little to spoil the impressive coherence and timing that makes this beautifully finished and generously proportioned model so enjoyable.	59.5 x 28 x 36cm own stands close to rear wall	86dB/w 28Hz (in room)	R	86
KEF C15 £99	Good Average	One of the tiniest around delivers a surprisingly 'big' and well balanced sound, with excellent stereo from free space siting	26.5 x 18 x 14cm stands in free space	85dB/w 60Hz	R	71
KEF C25 £139	Average + Average—	Very safe and competent, but rather short on inspiration, the '25 lacks the brio and flair of its smaller C15 brother	34 x 20.5 x 17cm high stands near wall	87dB/w 60Hz (in room)		78
KEF C45 £199	Good Average—	Conventional and competitively priced, C45 delivers an impressively consistent and competent sound. As one listener commented: "Offensively inoffensive . . . whether it be love or loathing, give me some emotion"	47.5 x 28 x 24cm uncritical	87dB/w 30Hz (in room)		86
KEF C55 £219	Good Average +	Similar to but less good value than C75, the '55 provides Uni-Q stereo stability but not real wood veneer or good low frequency room match	48 x 24.5 x 25cm stands, free space	91dB/w 30Hz (in room)		82

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KEF C75 £349	Good Good	Compact floorstanding model's Uni-Q driver provides fine crossover integration, giving stable stereo and fine dynamic range within a slightly 'rich' balance	72 x 24.5 x 25.5cm floor in free space	90dB/w 45Hz	R	71
KEF R102 £365	Very Good Very Good	High class near-miniature with expressive, articulate midband and clean, accurate bass and top. The sound quality of the Kube circuitry, however, is suspect	33 x 20.7 x 26.3cm near wall or open on stands	89.5dB/w 60Hz	R	59
KEF C95 £599	Good Good	Rich and lazy, but nonetheless very endearing in a cosy sort of a way, the '95 is a lot of speaker for the money, and delivers a big sound with grace and subtlety	88.5 x 24.5 x 31cm floor in free space	90dB/w 28Hz (in room)	R	78
KEF 103/3 £680 inc. stand	Good+ Good	Technically impressive, excellent bass/power handling for size, but not for the audiophile system. Better among cheaper components, and good in a large room	56 x 27 x 30cm supplied stands free space	90-95dB/w 35Hz		53
KEF 104/2 (inc KUBE equaliser) £895 (£994)	Very Good Good++	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound levels	90 x 28 x 41.5cm floor standing in free space	92dB/w 50Hz	R	60
KEF 107 £2025	Very Good Good+	A welcome sense of ease and lack of strain at most normal levels. Minor criticisms included a dulling in the extreme treble. Excellent bass extension	116.5 x 33 x 45cm on floor in free space	87.5dB/w 20Hz	R	60
Linn Helix £279	Average+ Good	Attractive presentation is coupled with an attractively lively sound which is more neutral if less committed than earlier Linn loudspeakers	51 x 25.5 x 28cm stands 1ft from rear wall	88dB/w 53Hz	R	66
Linn Kan 2 £339	Average+ Average+	A niche product for those prepared to tolerate its strong character for the sake of its fine bass performance and near invisibility	30.5 x 18.5 x 16.5cm Kan stands against wall	82dB/w 35Hz (in room)		78
Linn Nexus £379	Good Average	Good features include a solid, meaty bass plus good imagery and tonal balance. The catch is that Nexus lacks resolution and timing	49 x 23.5 x 30.4cm near rear wall supplied stands	89dB/w 60Hz		59
Linn Kaber £989	Average Good+	Discreet wall-mount package trades sensitivity for fine bass extension and midbass performance; can be a little relentless but has prodigious dynamic capabilities	93 x 19 x 28cm floor against rear wall	86dB/w 28Hz (in room)	R	82
Magneplanar SMGa £675	Average- Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB/w 56Hz		46
Magneplanar MG1.4 £1190	Good+ Good+	Replaces the stalwart MG1c with a revised panel layout. Offers a very crisp and articulate sound, particularly revealing of upper mid vocal details	155 x 8 x 57cm open space	88dB 40Hz	R	72
Magneplanar MG2.5R £1998	Good Good	Offers the low coloration and profound musical insight of better electrostatic loudspeakers but without loss of low frequency extension	183 x 56 x 4.5cm Open space	83-85dB/w 35Hz	R	60
Magneplanar MG11a £2700	Good Very Good	Another excellent true-audiophile loudspeaker this American panel speaker helps to convey much of the original character of the music	180 x 62 x 38cm well clear of walls	84-86dB/w 35Hz	R	46
Marantz LD20 DMS £170	Average Average	Recommended more for CD users than vinyl keepers, soundly engineered and built but should be heard before bought	36 x 23 x 24cm free space on 45cm stands	86.5dB/w 55Hz		53
Marantz LD50DMS £200	Very Good Good-	Well behaved larger two-way has fine balance, stereo and integration with good bass extension, albeit with mild 'boxy', 'chesty' and 'fizzy' effects	42.5 x 27 x 28cm stands in free space	87dB/w 50Hz	R	71
Martin Logan CLS II £3998	n/a Very Good	Much improved high resolution design, fussy about system set-up and demanding of ancillaries and software alike. It rewards the efforts though	60 x 28 x 7.5cm open space	86dB/w 45Hz	R	72
MB Quart 220 £270	Average- Average	The elaborate and pretty enclosure in a wide range of finishes works better than the drivers and crossover, which impose a lumpy balance	30 x 22.5 x 21cm stands in free space	87.5dB/w 80Hz		74
MB Quart 280 £340	Average- Average	Despite redoubtable build quality and good dynamics, the 280 has a rather 'obvious' mid bass and a balance that adds rather too much of its own character	44 x 27 x 29cm uncritical	88dB/w 40Hz (in room)		78
MB Quart 390 £469	Below Average Poor	An aggressive, messy sounding design whose uncouthness undermines the positive level of detail	52 x 31 x 30.5cm open space, on stands	89.5dB/w 60Hz		59
Meridian M30 £775	Average+ Average	Priced but easy on the ears and worth considering especially where space is at a premium	38.5 x 18 x 32cm free space on stands	Active 40Hz		46
Mission 761 £130	Average Good	One helluva speaker for the price, if a shade small and short of subtlety and refinement - should prove a worthy successor to the 70 and 700	38 x 21 x 21cm stands near rear wall	87dB/w 60Hz	BB	66
Mission 762 £200	Average Average-	Mission's 'bookshelf middleweight' offers high sensitivity and loudness capability, but at the expense of a somewhat untidy and rather 'heavy' sound	50 x 25 x 27cm stand, experiment advised	91dB/w 55Hz		66
Mission Cyrus 781 £250	Average+ Good	Properly run in, the pretty little 781 delivers a fast, dynamic and informative sound which more than justifies its price	43 x 22.5 x 28cm own stands 1ft from wall	88dB/w 30Hz (in room)	R	86
Mission 763 £300	Average+ Average+	A very artful combination of generous volume and good bass extension at a modest price. Works well in the listening room despite a few rough edges	77 x 25 x 32cm near rear wall	86dB 40Hz	BB	68
Mission Cyrus 782 £350 (stands £80)	Good- Good-	Lively, articulate and beautifully finished, this compact wall-mount model with twin main drivers has good integration but a rather rich, 'Loudness' balance	50 x 25 x 32.5cm Cyrus stands near wall	90dB/w 50Hz		71
Mission 764 £450	Good Good-	Large floorstander has fine bass extension but limited dynamic range, and sounds 'lazier' than Best Buy 763	86 x 25 x 32cm 0.5+m from rear wall	86dB/w 43Hz		71
Mission 767 from £2500	Very Good Very Good	Magnificent and massive part-active monoliths have fine acoustic subtlety and impressive loudness capability, ultimately limited by partnering (Cyrus) electronics	138 x 29 x 43cm floor, flexible	91dB/w below 20Hz (in room)	R	81
Monitor Audio Monitor 7 £150	Average- Average	This lively and punchy near-miniature looks pretty enough and is good value but is let down by an unruly and indifferently integrated tweeter	34 x 16.5 x 17cm stands 1ft from wall	84dB/w 70Hz		74
Monitor Audio Monitor 9 £190	Good Average	Despite a much better treble balance than the 7, the Monitor 9 is less engaging and lively at low frequencies than its smaller sibling	37 x 20 x 21cm high stands near wall	84dB/w 40Hz (in room)		78
Monitor Audio R300/MD £250	Average Average-	An attractive 'large bookshelf' model that's handicapped by poor crossover and integration between paper cone bass and metal dome tweeter	47.5 x 25 x 30.5cm stands in free space	88dB/w 50Hz		71
Monitor Audio R352/MD £299	Average+ Good	A good value large box that sounds more engaging than subtle, providing a good compromise between bandwidth and sensitivity	64 x 25 x 32cm stands in free space	89dB/w 45Hz	R	66
Monitor Audio MA700/Gold £349	Good Average+	Lacks bass authority and timing, but could suit the smaller room, at the end of a CD-based system used primarily for classical music at modest levels	35 x 21.5 x 25cm stands, free space	87dB/w 48Hz (in room)		82
Monitor Audio R852/Gold MD £449	Good Good	Luxury build and 'high tech' tweeter or not, this compact model offers good refinement and detail on an open soundstage	45 x 25 x 26cm stands in free space	86dB/w 50Hz	R	66
Monitor Audio 1200 Gold MD £799	Average Average+	This 'smooth and civilised' slimline floorstanding loudspeaker is well built and nicely presented. But it is also expensive	94 x 20 x 26cm in free space	85dB/w 48Hz		68
Monitor Audio MA1800/Gold £1299	Good Average+	Attractive and beautifully finished, even when ballasted with lead shot the 1800 inclines towards upper bass richness and lacks genuine extension	106 x 22 x 32cm floor, free space	88dB/w 30Hz (in room)		81
Mordaunt-Short 3.10 £100	Average Average+	Probably the liveliest and most communicative miniature around, this beautifully presented design is probably better suited to budget 'real hi-fi' than the blandness of the mid system	28.5 x 17.5 x 20cm high stands near wall	84dB/w 50Hz (in room)	BB	78
Mordaunt-Short MS 3.20 £130	Average Average+	All the charm of its BB-rated £99 baby 3.10 brother, plus a smidgeon more bass for those in a suggestible frame of mind	35.5 x 18 x 20cm open stands against wall	85dB/w 50Hz (in room)	R	82

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Mordaunt-Short 3.30 £180	Average Average +	A little too mid-forward for neutrality or formal recommendation, this attractive, good-sized model nevertheless has more than enough appealing qualities to merit serious consideration	46 x 23.5 x 27cm high stands 1-2ft from wall	87dB/w 38Hz (in room)		78
Mordaunt-Short MS3.40 £230	Average + Average	It looks pretty and sounds civilised, but the 3.40 failed to ignite any degree of enthusiasm amongst our listeners. Low frequency stand and room matching is a bit tricky.	57 x 23.5 x 27.5cm stands in free space	87dB/w 30Hz (in room)		86
Mordaunt-Short 442 £1150	Good + Good + +	A resounding success with the listening panels. Make sure your room can accommodate the bass	95 x 26 x 38cm floor standing in free space	87.5dB/w 40Hz	R*	60
Musical Fidelity Reference 2 £199	Good - Good -	This compact wall-mount design with advanced drivers has good dynamics, balance and stereo, plus flashy styling and some midband 'boxy' coloration	38 x 25 x 20cm stands near rear wall	88dB/w 50Hz		71
Musical Fidelity MC-2 £299	Very Good Good + +	This exceptionally clean and clear design offers real subtlety and finesse. Bass quality is light but exceptionally clear; the treble is smooth if slightly shallow	48.5 x 25.5 x 16.5cm open space and stands	87.5dB/w 65Hz	BB*	66
Musical Fidelity MC-4 £499	Very Good + Good + +	Achieving a very high standard, the MC-4 sounds detailed and coherent like the MC-2, but with more bass depth and solidity, and large image scale	56.5 x 26.9 x 29cm open space on stands	87.5dB/w 60Hz	R*	59
NAD 8225 £150	Good Average +	Notwithstanding lacklustre styling and an unprepossessing appearance, this NAD miniature has a smooth and even midband plus an appealing overall jauntiness. The whole turns out to be worth more than the sum of its parts	34 x 20 x 18cm stands close to wall	87dB/w 45Hz (in room)	R	86
NVA Cube 2 £380	Average Good	A rude but exciting miniature, with unusually accomplished bass capabilities for its size	28.5 x 27 x 28.5cm NVA stands against wall	85dB/w 48Hz (in room)	R	82
NVA Cube 1 £600 (stands £200)	Good - Good +	Attractive, cube-shaped semi-omni is very sturdily built, and gives an idiosyncratic but unusually open, spacious and informative sound	33 x 32 x 32cm own stands c0.5m from wall	85dB/w 52Hz	R	71
NVA Cubix £1,100	Average Good	Too idiosyncratic for formal recommendation, the Cubix possesses remarkable bass extension for its size, but is tricky to optimise and has some aggressive tendencies	60 x 32.5 x 32.5cm low stands against wall	88dB/w 20Hz (in room)		78
Opus 3 Credo £399	Average Average	Credo's odd-shaped silicate-based cabinet confers good box and bass performance, but the sound could be more neutral for the price	32 x 28 x 32cm stands in free space	88dB/w 65Hz		74
Opus 3 Capella £599	Good Good	The sound of this Scandinavian curiosity certainly benefits from the crushed marble enclosure, though presentation is strictly DIY	32 x 40.5 x 26(ave)cm amongst books in bookcase	86.5dB/w 45Hz		66
Pearl & Oakley Victoria 200 £1099	Average - Average -	Extraordinary - and to many very attractive - 'ginger jar' presentation in Staffordshire ceramics, but let down by need for further acoustic and mechanical development	93 x 33 x 33cm on floor in free space	87dB/w 30Hz (in room)		78
Philips FB815 £230	Average Average	An impressive - indeed imposing - physical package for the price, clever engineering gives a very competent if slightly hard and brittle sound quality that somehow lacks genuine authority.	63 x 27 x 27cm low stands in free space	85dB/w 30Hz		86
QLN Model One £700	Good Average	Similar to Signature at two thirds the price, Model One exaggerates the latter's rich and heavy midbass and lacks its velvet smoothness	35 x (16-25) x (21- 27)cm pillar stands, free space	85dB/w 28Hz (in room)		82
QLN Signature £1,100	Good Good	Beautiful but expensive luxury compact has a rather laid back and 'heavy' sound, but coloration is low and stereo imaging very good	37 x 18 x 36cm heavy stands in free space	83dB/w 30Hz (in room)		78
Quad ESL-63 £1690	Good + Good + +	With its unusual but subtle characteristics this classic electrostatic may not be punchy in the bass, but has strengths that some cannot live without	92 x 66 x 27cm open stand well clear of wall	84dB/w 34Hz	R	60
Richard Allan CD5 £184	Average - Average -	This neatly presented small reflex design can sound engagingly communicative, but is flawed sonically and technically and quite expensive too	38 x 19 x 23cm on rigid stands	88dB/w 80Hz		68
Rogers LS2a £180	Average Average	Provides very good engineering and stereo performance for the price, alongside some 'boxiness' and certain dynamic constraints	36 x 23 x 21cm low stands 1ft from wall	88dB/w 50Hz (in room)		82
Rogers LS4A £219	Good Good -	This artfully voiced and well balanced compact gives a fair flavour of the classical 'BBC sound' at a very reasonable price	43 x 25.5 x 24.5cm stands 1ft+ from wall	87dB/w 32Hz (in room)	R	78
Rogers LS6A £285	Good Good	Stereotypically a Rogers model with impressively even balance, prospective purchasers will have to weigh the fine midband naturalness against slightly lazy dynamics and timing	51 x 27.5 x 28cm stands in free space	86dB/w 25Hz (in room)	R	86
Rogers LS7t £399	Good + Good +	A fine combination of classic qualities at reasonable price produces the "R" tag, but try to get a pair home on approval to check for bass 'heaviness'	56 x 27 x 28cm free space on 40cm stands	88.5dB/w 48Hz	R	59
Rogers Studio 1a £579	Very Good Good -	The classic BBC monitor style sound sensitively updated - transparent and natural with fine stereo, but a touch 'heavy' in balance	63.5 x 30.5 x 30.5cm stands in free space	87dB/w 36Hz	R	66
Roksan Darius £1395 (+£345 integral stand)	Good Very Good	Now totally realigned, the current Darius provides an exceptionally impressive combination of transparency and delicacy with fine information retrieval and speed. The problem is affording the amplification to do it justice.	47 x 27 x 40cm own stands angled in space	82dB/w 20Hz (in room)	R	86
Rotel RL850 II £140	Average + Average +	Strongly recommended. Well-balanced, clear, with decent focus and fine stereo, but tendency to 'heaviness' needs decent stands and space	44 x 25 x 24cm free space on 40cm stands	86.5dB/w 50Hz	BB	59
Royd A7 Series 11 £115	Average + Average	Lively clear sound; good upper bass and dynamics, but treble "ramp" made vocals sound shut in. Try before you buy	31 x 20 x 17cm shelf or 50cm stands near wall	86dB/w 75Hz	R	53
Royd Eden £235	Average Average +	Delightful mid/treble speed and transparency but determinedly bass light, this oddball miniature threatens cult status but could use a sweeter tweeter	31 x 20.5 x 18.5cm stands close to rear wall	87dB/w 85Hz	R	66
Royd Apex £485	Average + Good	Not the smoothest sound around, it more than compensates with an impressively communicative and informative musical presentation	85.5 x 20 x 30cm on floor close to wall	87dB/w 33Hz (in room)	R	78
Ruark Swordsman £219	Good Average	Very attractively styled and finished, the Swordsman is a well built 'small bookshelf' model that delivered better test than listening results	38.5 x 20 x 27.5cm stands 0.5m from wall	84dB/w 50Hz		71
SO Acoustics OBS £695	Average Average	Recent changes have added some refinement to a seductive midrange, good timing and fine sensitivity, though bass extension is limited and coloration obvious	102 x 35 x 25cm floor, angled, away from walls	92dB/w 30Hz (in room)	R	82
SO Acoustics SD1 £1150	Average Very Good	A large scale, airy and unusually detailed system with excellent dynamics. Current model has more civilised top-end and warmer balance than original model	123.5 x 38.2 x 31.9cm free space	90dB/w 50Hz	R	60
SO Acoustics SD3 £500	Average Good	Neither cheap nor perfect, this near miniature (using OBS' mid driver down into the bass) sounds unusually lively and dynamic within inevitable physical constraints, and is ultimately both engaging and entertaining.	38 x 19 x 29cm stands 10cm from wall	83dB/w 30Hz (in room)	R	86
SO Acoustics Ribbon £2000	Average Good +	Entertaining but a little underdeveloped and rather amplifier sensitive, the Ribbon is a lively and loud hybrid marred by some colorations: some like it, others don't	152 x 30 x (15-30)cm floor, angled, away from walls	91dB/w 30Hz (in room)		81
Seventh Veil System IV £1290 (+£340 integral stand)	Average Good +	Lacks welly and loudness but delivers astonishing results with female vocals in particular. Antithesis of the 'good allrounder', this oddball design has considerable charm that the committed enthusiast might find irresistible.	72+44 x 21 x 29cm own stands close to wall	84dB/w 28Hz (in room)	R	86

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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Shan Shinna £280 (stands £75)	Average + Good—	Pretty little miniature in cast mineral/plastics has limited dynamic range and could sound smoother, but integration is good and box effects slight	31 x 16 x 17cm stands near rear wall	84dB/w 65Hz	R	71
Snell Type C £2350	n/a Very Good	Pricey, yes, but an extremely capable loudspeaker. Musical and transparent; excellent bass extension	112 x 38 x 33 free standing away from walls	90dB 35Hz	R	65
Sony APM-101ES £100	Good Average	Big hearted sound from small bookshelf successor to BB '10ES, sounds a little untidy at frequency extremes, so suits CD better than vinyl	39.5 x 22.5 x 23.5 stands in open space	86dB/w 52Hz	R	71
Sony APM-141ES £200	Average Average	A great deal of loudspeaker for the money, the rich-sounding '141 needs a big room and still shows significant 'loudness' (boom'n'tizz) tendencies	61.5 x 26 x 32cm large room, free space	88dB/w 30Hz (in room)	R	78
Sony APM-181ES £300	Very Good Average	Big and beefy but also somewhat fat and bass heavy, this well engineered three-way has notable strengths but lacks transparency and sounds better at lower levels	57.5 x 29 x 36cm stands in open space	87dB/w 40Hz		71
Sony APM 66ES £700	Average + Average +	Powerful heavyweight sound with a brilliant midband – clear articulate and transparent. But the bass is on the boomy side and the treble can sound grainy	66 x 38 x 36.5cm open space, low stands	89dB/w 60Hz		59
Sony 121ES £150	Average Average—	Good perceived high tech value, but the balance has an artificial 'loudness' character, too rich in the bass, making room matching difficult, and too strong in the treble as well.	43 x 25 x 28cm stands in free space	86dB/w 25Hz (in room)		86
Spendor SP2/2* £500	Very Good Good +	Conceding little to the SP1, this 30 litre model displayed good tonal balance with a highly articulate midrange, only slightly marred at frequency extremes	50 x 25 x 30cm free space, stands	87dB/w 45Hz	R*	59
Spendor SP1 £800	Very Good Good	A very subtle and musical performer that works particularly well with digital material. An exceptional allrounder	63.5 x 29.5 x 30.5cm stands in open space	87dB/w 41Hz	R	60
Spica TC50 £599	Good— Good	This triangular-profile 'grown up' miniature is a shade boxy and laid back but has good rhythmic and musical integrity	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
Spica TC50SE £799	Good— Good	A heavily UK-modified TC50, the SE sounds less boxy and more spacious, but lacks some of the urgency of the standard model	40.5 x 33 x 29cm stands in open space	88dB/w 55Hz		71
Spica Angelus £1295	Good Average	A little bass shy and soft in the bass and lower mid, the free standing Angelus is otherwise tidy, extremely lively and fluid, if uneven overall	116.8 x 53.3 x 26cm away from walls	86.5dB/w 50Hz		60
Studio Power DMS100 £249	Average + Average +	Close to a BB rating, and in many respects remarkable value for money. Delivers an impressively smooth and large sound, but sheer ugliness will limit its appeal	51 x 26 x 32cm open stands 1ft from wall	86dB/w 25Hz (in room)	R	82
Sugden CL £275	Average + Good—	A thoroughly impressive and likeable near-miniature, the CL is prettily and properly built, and needs a good driving amplifier	35.5 x 18 x 26.5cm high stands in free space	86dB/w 35Hz	R	78
Tannoy E11 £129	Average Average—	Fundamentally turgid and slow, thanks to leaden upper bass and 'shut in' treble, though stereo images are convincing, as are the reasonably uncoloured vocals	39 x 21 x 22cm stands, free space	87dB/w 45Hz (in room)		82
Tannoy M15 £170	Good Average +	Somehow lacking the magic of its predecessors, the M15 remains a fine value compact that needs careful set-up to give optimum results	50 x 25 x 21cm Blu-tack to stands 1-2ft from wall	88dB/w 40Hz (in room)	R	78
Tannoy DC1000 £200	Average Average—	The smaller of two DC models with dual concentric drivers, the '1000 is much less well balanced than the larger, floorstanding '2000	50 x 24 x 25cm	91dB/w 53Hz		71
Tannoy DC2000 £300	Good Good	Remarkably high sensitivity from unique dual concentric driver that has an involving but characteristic sound. Bass could be better	68.5 x 26 x 27cm floor in free space	93dB/w 55Hz	R	66
Tannoy DC3000 £600	Good Good	Giving new meaning to terms like dynamic range and headroom, the magnificent '3000 is a must for those who enjoy high-level monitoring. But spare a thought for the neighbours	94 x 26 x 31cm floor 1ft+ from wall	94dB/w 30Hz (in room)	R	78
Tannoy M20 £250	Good Good	Alongside fine build and presentation, the M20 provides an unusually clever combination of the 'traditional' virtues of transparency and low coloration with more trendy strengths of speed and pace	50 x 25 x 22cm stands in free space	87dB/w 25Hz (in room)	R	86
Tannoy Westminster £3600	n/a Good +	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few pockets and rooms	Huge, flat against rear wall, away from corners	96dB/w (manuf.)	R	Coil
TDL Studio 1 £549	Average + Good	Delivering genuinely extended bass from a compact floorstanding enclosure, the Studio is very detailed but a shade clinical and detached in presentation	76 x 23 x 33cm low stands in free space	84dB/w 25Hz (in room)	R	78
TDL Monitor £1799	Very Good Very Good	Fine solidity and good accuracy, with enough bass extension to satisfy even organ freaks. Needs a big room and can sound a bit lazy and a shade tinkly	118.5 x 30 x 47cm 0.5m from walls	88dB/w 28Hz	R	66
Technics SBC 250 £140	Average + Average—	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character	36.5 x 23.5 x 20.5cm free space, stands	86dB/w 60Hz		46
Technics SB-CS5 £70	Average Average	Clearly fine material value for money, the CS5 nevertheless betrays its mid system heritage, the quest for size for its own sake compromising the performance of both enclosure and main driver.	42.5 x 25 x 24cm stands in free space	86dB/w 48Hz (in room)	R	86
Technics SB-RX50 £500	Very Good Average +	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass	48 x 30 x 26cm free space on 40cm stands	86dB/w 40Hz	R	46
Toshiba SS33-M £100	Average Average	Providing a benchmark for budget loudspeakers, this Toshiba-inspired but UK designed and manufactured model is a lot of loudspeaker for the money, if a shade on the cheap	40 x 26 x 21.5cm stands in free space	85dB/w 55Hz	BB	68
Townshend Glastonbury IIS* £1700	n/a Very Good	What? No bass? Actually, like the KEF 107, Glastonbury II goes down so low you might not notice how good it is. A truly remarkable performer. Superb soundstaging	91.5 x 28 x 46 free standing in room corners	88dB 27Hz	R*	65
Vandersteen Model One £1000	Average + Average +	This compact American floorstander's elegant staggered baffle arrangement contributes to a refreshing freedom from boxiness, but the price is quite high in view of the additional mid forwardness and bass imprecision.	100 x 30.7 x 25.6cm floor clear of walls	87dB/w 23Hz (in room)		86
Videotone Minimax 2 £80	Poor Average—	Cheap in build and QC as well as price, but cheerful (if coarse) with it – if a little too cheerful after extended listening . . .	27.5 x 17 x 20cm near rear wall	84dB/w 90Hz	R	74
Visonik David 6001 £173	Average— Poor	Sharp styling a classy looking miniature makes, but the complex grillework worsens a sound which starts off with too much top and not enough bottom	20 x 12 x 13cm against rear wall	87dB/w 130Hz		74
Wharfedale Delta 30 £80	Good Average	Very clear and surprisingly neutral for the price, with good dynamics and stereo within limited volume ceiling	37.9 x 20 x 16.9cm near wall on high stands	88.5dB/w 80Hz	BB	59
Wharfedale Delta 50 £100	Average + Average—	"There's nothing obviously wrong, but it seems a bit mundane," is what we said when the Delta 50 was £129. But since then the price has dropped by 30 per cent, making it great value	48 x 27 x 19cm near wall on 40cm stands	88dB/w 55Hz		53
Wharfedale Diamond III £100	Below Average Average—	This latest version of the long running Diamond sports a better tweeter, but bass, though deep, is soft, and the midband is indistinct and uneven	24 x 18.5 x 20.5cm near wall, stands	86.5dB/w 75Hz		59
Wharfedale Super Diamond £140	Average Average—	Although there are improvements on the basic "legendary" model, listening panelists did not get airborne about this upgrade	24 x 19 x 19cm close to wall at head height	88dB/w 57Hz		53
Wharfedale 504/2 £150	Average Average	Not strictly accurate, this musically involving miniature sounds unusually coherent and well integrated, if a shade dull in balance	29 x 18.5 x 19cm stands against rear wall	84dB/w 60Hz	R	68

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MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FREQ	VALUE	BACK ISSUE FULL REVIEW
Wharfedale 505/2 £180	Average Good	This lively Wharfedale provides plenty of speaker with unusual refinement for the money, and should be fairly tolerant of room siting	44 x 25.5 x 24cm stands 1ft from wall	86dB/w 55Hz	BB	66
Wharfedale 507 £220	Average+ Average-	Generous in size but uningratiating sonically, the 507 doesn't seem to gel in the way the smaller 505.2 does, finding a good in-room balance difficult to achieve	49 x 25.5 x 29.5cm high stands 1ft+ from wall	86dB/w 35Hz (in room)		78
Wharfedale Coleridge £499	Average Good	Compact, beautifully finished and extravagantly engineered box sacrifices bass extension in the cause of high midband sensitivity; communicative, but can be a little unforgiving	48 x 26 x 26.5cm stands 1ft from wall	91dB/w 48Hz (in room)	R	82
Yamaha NS 1000M £900	Good Good+	Living up to its monitor label, and tonally well suited to digital material, the NS 1000M is superbly crafted and capable of high levels	67.5 x 37.5 x 32.5cm 30cm from wall, stands	90dB/w 40Hz	R	46

* rating refers to original, tested model.

CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal – at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes.)

There is no problem in connecting a cassette deck to any normal amplifier, but some care needs

to be taken in choosing the best tapes for a specific machine. (Trial and error is one effective technique, but many decks have manual bias adjustment and some match up to the tape automatically.) Lab performance and sound quality often go hand in hand, and are frequently somewhat dependent upon factory alignment. The mechanical integrity of the mechanism itself is another crucial factor, that is often reflected in the asking price

All modern hi-fi decks have Dolby B and the majority have Dolby C besides; the very worthwhile

HX Pro system is becoming steadily more widespread. Remote control remains rare, though sometimes it is available as a system option. Three-head recorders allow simultaneous checking of the recording being made. Auto-reverse is a useful convenience feature, but usually with some mechanical compromise, while double-mechanism 'dubbing' decks of dubious quality are fashionable at the bottom end of the market. The welter of different 'music search' systems available is some indication of their frequent ineffectiveness.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research RD-06 £280	Average Average+	Acceptable middle market player with very simple facilities and cramped control section, but unusually good looks	Dolby B/C/HX Pro, fine bias, counter memory, repeat		69
Aiwa AD-F270 £90	Average Average+	An excellent budget machine, adequately equipped and satisfactorily built. Sound quality is in severe danger of transcending the price category	Dolby B/C, fine bias adjust	BB	75
Aiwa AD-F370 £130	Average Average	Adequate but uninspiring recorder with detail shortcomings but good control layout and successful sounding with recorded musicassettes	Dolby B, C, HX Pro, bias adjust		63
Aiwa AD-R470 £150	Average Good	For once, an auto-reverse deck with the performance of a decent unidirectional one at a similar price. The Aiwa is modern in concept and execution, and has good, transparent electronics	Dolby B/C/HX Pro, auto reverse, cue & review, bias adjust	BB	69
Aiwa AD-WX777 £179	Very Good Very Good	Excellent, middle price dual deck with quick side change and a living, breathing sound – though prerecorded tapes sound bright	Twin auto-reverse, one records. Dolby B/C, fine bias	BB	75
Aiwa AD-F700 £199	Good Average-	Somewhat less than the sum of the (most fine) individual parts, this deck has an artificial quality which spoiled the efforts of a fine transport	Dolby B/C/HX Pro, fine bias, CD Direct input		75
Aiwa AD-F800 £249	Good Very Good	Close to first class performance – and superb value. The Aiwa is purposeful and finely engineered. It provides a near irresistible blend of good mechanics and electronics	3 head, dual capstan, Dolby B/C/HX Pro, tape calibration	BB	75
Aiwa AD-WX888 £249	Good Good	Inaccurate set-up spoils metal tape operation, but with other tapes the deck works well. This deck offers fine engineering, facilities and sound	Dual auto-reverse twin deck, Dolby B, C and HX Pro	R	75
Aiwa XK-007 Excelia £400	Good Good	Downmarket version of XK-009 with simplified bias/equalisation adjustment section and more forgiving but less informative sound. Still good, but less exciting than XK-009	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment		63
Aiwa AD-WX909 £400	Good Good	Convenience meets sound quality, and both win. An essentially clean, positive recorder which works alongside an auto-reverse player of lower standard – a sensible compromise	Dual deck, auto-reverse, track search, Dolby B/C/HX Pro, bias adjust, 3 Head	R	57
Aiwa XK-009 Excelia £550	Very Good Very Good	Excellent detail, stable articulate midband and slightly obvious treble. The most interesting Aiwa for yonks	Dolby B, C, dbx, HX Pro, 3 Head, tape alignment, CD direct	R	63
Akai GX-32 £170	Average Poor	Constrained and smeared sum this deck well. It has poor bass and treble definition alike, though it proved well aligned for prerecorded cassettes	Dolby B/C, variable bias, headphone out, track search		69
Akai GX-52 £250	Very Good Very Good	Well finished and a pleasure to use this well specified deck sounds clean and defined with all tape groups, with or without Dolby	Dolby B, C, HX Pro, track locate features	BB	57
Akai GX-65 £300	Average Average+	Fine un gimmicky middle ranking deck with simple, purposeful controls, works best with metal tapes. Performance standards fair to good	3-head, dual capstan, Dolby C/HX Pro		87
Akai GX-95 £400	Good Very Good	Well designed and finished cassette deck with features well judged to please the audiophile – especially switchable Dolby HX Pro and switchable panel display. The calibration system is simple and effective, and the deck sounds great	Dolby B/C/HX Pro, 3 head, manual tape set-up	R	69
Denon DRM-400 £140	Poor Poor	Messy, confused sound terminally lacking in detail and space under all conditions of use due to high mechanical flutter levels.	Dolby B/C, memory stop, track search		81
Denon DRM-500 £180	Good Very Good	Powerful, refined and detailed sound, and an excellent transport are keys to the success of this cleanly styled addition to the range – but why no timer standby?	Dolby B/C/HX Pro, variable bias	BB	75
Denon DRW-750 £250	Good Good	Polished and articulate, the only significant shortcoming is poor performance with prerecorded material	Dolby B/C/HX Pro, twin unidirectional, one records	R	69
Denon DRM-700 £250	Good Very Good	Sloppily executed (though attractive) user interface contrasts with a high standard of music making belying its modest price	3 head, Dolby B/C/HX Pro, record return	R	81
Denon DRM-800 £330	Good Very Good	There are some niggling faults and limitations (no timer standby is particularly annoying), but as a means of recording music it sets a very high standard	Dolby B/C/HX Pro, off tape monitoring, dual capstan	R	75
Dual 5850RC £269	Poor+ Average-	Average-to-middling deck which does most things well and skates over the more subtle things. Control system is uninspired but easy to master. Overpriced	Dolby C/HX Pro, bias adjust		87
Goodmans GSW-5200 £90	Poor Poor	Musically unimpressive but at least it's cheap!	Dolby B, twin, one records		69

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CASSETTE DECKS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Grundig Fine Arts CCT-903 n/a (system component)	Good Good—	[Competent part of complete Grundig system]. Solid and well engineered deck with small but significant problems preventing it scoring highly. Basic design generally – and transport specifically – are excellent	Dolby B/C, twin auto reverse, one records		69
Harman Kardon CD491 £695	Good Good+	Excellent audio engineering and tremendous flexibility make this an audiophile cassette deck 'par excellence'	Real-time counter, auto reverse, track search, Dolby B, C, HX Pro, bias adjust	R	52
Kenwood KX-440HX £130	Average+ Poor	Uneven, unstable sounding player with limited resolving power, but good control layout and finish	Dolby B, C, HX Pro, intro scan		63
Kenwood KX-3010 £170	Average+ Average	Minor ergonomic shortcomings notwithstanding, this is a workmanlike deck that only misses recommendation due to an azimuth problem leading to very dull sound with prerecorded tapes	Dolby B, C, HX Pro, auto bias		75
Kenwood KX-4520 £260	Good+ Very Good	Some high frequency Dolby misalignment and obscure minor functions aside, this is a vital and engaging performer	Dolby B/C/HX Pro, 3 heads, various search functions	R	81
Kenwood KX-5010 £270	Very Good Excellent	This important new middle price deck is a well thought through and thoroughly developed design which eschews gimmicks for the sake of musical excellence	Dolby B/C/HX Pro, auto tape calibration, track/intro search	BB	69
Kenwood KX-9010 £400	Very Good Average+	Clean, detailed but flat and overtly hi-fi-ish sound quality makes the 9010 a little less than the sum of its parts.	3-head, auto tape calibration, Dolby B/C/HX Pro, remote control		75
Marantz SD-40 £170	Average Average—	Transitory sounding electronics mar a basically good recording machine. Prerecorded material suffers from effects of Dolby pumping	Dolby B/C/HX Pro, bias adjust		81
Marantz SD-50 £220	Good Very Good	Fine, exacting all-rounder offering good stereo, precision and focus. Good with prerecorded tapes too.	Dolby B/C/HX Pro, track & intro search, variable bias etc	R	81
Marantz CP230 £300	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52
Marantz SD585 £300	Average Average—	Sound quality is a little sat upon, and control ergonomics are somewhat opaque, though the twin auto-reverse/recording capability makes this a powerful machine	Dolby B/C, twin auto-reverse & record, parallel recording etc		69
Marantz SD-60 £350	Good Very Good	A first rate, highly capable deck offering energetic yet refined sound largely due to good electronic design	3-head, Dolby B/C/HX Pro, variable bias & sensitivity	R	81
Marantz CP430 £399	Average Average	Uniquely flexible and compact package for outside work which at a pinch can double as a domestic cassette deck. dbx is useful for location work; results with Dolby B are acceptable	Portable 3 head, dbx, fine bias, ever-ready case and charger/adaptor	R	87
Memorex SCT-5 £150	Bad Poor	Poor example of a twin cassette deck where everything has been sacrificed on the altar of flexibility	1 rec/play, 1 play only transport, Dolby B/C		87
Memorex SCT-84 £200	Average+ Average+	The playback only transport is a little disappointing, but the record one is a quality item and the deck works well. Ergonomics are good, but styling and control feel are decidedly tacky.	Dolby B/C, fine bias, twin with auto-reverse record, unidirectional play	R	69
NAD 6300 £550	Very Good Very Good	Solid and homogeneous sound quality and very good replay compatibility thanks to 'play trim'. Distinctive, musical – and costly	Dolby B, C, HX Pro, 3 Head, bias adjust	R	63
Nakamichi CR-1E £345	Very Good Good	Modestly equipped by any standards, the CR-1E stands or falls by its build quality, which is high, and sound which is highly competent	Dolby B & C		57
Nakamichi CR-2E £395	Very Good Good+	Ordinary to look at, in some respects rather awkward to use (tape switching especially), the CR-2E sounds very slightly better than the CR-1E, and therefore ranks well. But it doesn't come cheap	Dolby B & C, bias adjust, remote control	R	57
Nakamichi RX-202E £545	Good Very Good+	Fine, clear and articulate sounding player. Excellent with prerecorded material, but idiosyncratic and sometimes obstructive control system	Auto reverse, Dolby B, C, 2 Head	R	63
Nakamichi RX-505E £895	Very Good+ Very Good+	First class recorder with near state of the art performance. Auto reverse tape system raises a few smiles, but provides auto-reverse without the usual compromises	Unidirectional auto-reverse, 3 heads, dual capstans	R	87
Nakamichi CR-3E £595	Very Good Very Good	The user interface is a little clumsy, though conceptually straightforward. Sound quality approaches the CR-4E, and is amongst the best at the price.	Dolby B & C, bias adjust, remote control	R	57
Nakamichi CR-4E £745	Very Good+ Very Good+	High class deck with a reasonably full range of features and superb sound at a slightly unlikely price	Dolby B & C, bias adjust, remote control, 3 Head	R	57
Nakamichi CR-5E £995	Excellent Excellent	A slightly simplified version of the all-conquering CR-7, the CR-5 has a very similar standard of audio performance – the best	Dolby B/C, fine bias, 3-head	R	69
Nakamichi CR-7E £1500	Excellent Excellent	Remarkably this deck is not only ergonomically but also sonically superior to the Dragon, particularly on record/replay	Real-time counter, track search, Dolby B & C, tape alignment adjust, bias adjust, remote control, 3 Head	R	60
Nakamichi Dragon £1750	Excellent Excellent	Previous to the birth of the CR-7E, this machine stood head and shoulders above the rest. It is still the ultimate for musicasset replay	Auto reverse, Dolby B & C, tape alignment adjust, bias adjust, remote		60
Onkyo TA-2120 £130	Average+ Good	Clear, vivid sound with good timing and resolution when using Type II tapes without Dolby. The controls are less inspiring – the meters in particular are plainly inadequate	Dolby B/C, auto tape sensing, block/side repeat	R	63
Onkyo TA-2200 £190	Poor Poor+	Mediocre, dynamically rather squashed sound quality, partly due to iffy transport. Messily equipped too	Dolby C/HX Pro, variable bias		87
Philips FC566 £179	Average+ Average+	Mostly well equipped, though some tape search facilities fail to exploit the auto-reverse capability. Sounds clean and stable – with prerecorded tapes too	Auto reverse, track search, Dolby B & C		57
Philips FC870 £250	Average Average	Disappointing at the price, this is a well equipped deck with off-tape monitoring, but a somewhat listless, smeared musical style	Dolby B/C/HX Pro, 3-heads, track/intro search etc		81
Philips FC567 £279	Average Poor	Well equipped but ergonomically substandard; sound quality is messy and lacking in clarity and dynamics	Dual deck, auto reverse, track search, Dolby B & C		57
Pioneer CT-337 £130	Average Average+	Simple but well made machine with a slightly soft but consistent standard of reproduction	Dolby C/HX Pro, CD synchro, mic inputs	R	87
Pioneer CT-447 £170	Good Good	An excellent and affordable package, decidedly OTT in the display area but capable of genuinely fine musical reproduction	Dolby C/HX Pro, auto tape alignment, track search	BB	87
Pioneer CT-656 £250	Good Good	Well conceived and executed low cost 3-head recorder. It benefits from and makes good use of metal tapes, but is never less than couch and stable sounding – even with ferric tapes	3 heads, off tape monitoring, fine bias, Dolby B/C/HX Pro	R	75
Pioneer CT-737 Mk II £350	Good Average+	Easy to use and sensibly equipped, the CT-737 is much improved, but sound quality is still a tad lacklustre	3-head, Dolby B/C/HX Pro, manual record bias/sensitivity		75
Pioneer CT-959 £450	Very Good Very Good	Near state of the art for £450. Engineering is of a high order which reflects in an open window sound quality, but playback response is very bright (being corrected by manufacturer)	3-head, var bias & eq, multi-mode meters, Dolby HX Pro	R	87
Pioneer CT-91a £500	Very Good+ Very Good+	Superb, near state of the art recorder with an excellent dual capstan transport and very capable electronics. At the price, this one is a mould breaker	3-head, tape calibration, Dolby B/C/HX Pro	R	75
Revox B215 £1,727	Very Good Very Good	Fine, consistent and solid sound quality, with excellent under the skin engineering and many useful features – but you're also paying for the same	Dolby C/HX Pro, 3 heads, dual capstans, auto tape align	R	87
Revox B215-S £1,826	Very Good Very Good+	This is a superbly engineered deck with a classically fine performance that almost transcends the stereotypes. Ergonomics are flawed but the user interface is both powerful and flexible	3-head, dual capstan, Dolby B/C/HX Pro, auto calibration	R	75
Rotel RD-845 £130	Below Average Good/Poor*	Extremely fine transport and clean sounding electronics for the price. Bass lacks weight, but deck works remarkably effectively with chrome tapes. *See text	Dolby B/C, manual tape selector	R	81

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CASSETTE DECKS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Rotel RD-855 £180	Average Good	The transport is OK and the various frequency responses are erratic, but good basic electronics help the Rotel deliver. Coherent, enjoyable and informative	Dolby C memory stop & repeat, track search	R	87
Rotel RD-865 £200	Good Very Good	Fine, architecturally solid sound quality in a package with a low gimmick count and strong audiophile appeal	Dolby B/C/HX Pro, fine bias	BB	75
SAE C102 £549	Average + Good	Looking most unlike a cassette deck designed in the States and proving competitive in its price group. Not sonically that outstanding, however	Real-time counter, track search, Dolby B & C		52
Sansui D-X301i £180	Average + Good	Lively, informative and well equipped basic deck, if rather obscure operationally	Dolby B/C/HX Pro, variable bias, track search	R	69
Sansui D-X501 £230	Poor Poor	Unhappy mixture of good looks, excellent ergonomics and mediocre, sometimes poor sound	Dolby B/c, random track search		81
Sansui D-X701 £340	Average Average	A little flat and smeared under some conditions, this design is at its best with metal and prerecorded tapes	Dolby B/C, 3-head, variable bias & output, track search		81
Sherwood DS-1135C £100	Average + Average	Excellent value. There is a low level constant background drone, and Dolby C recordings sound flat and coloured. Elsewhere sound quality exceeds expectations	Dolby B/C/HX Pro	R	87
Sherwood DS-7000R £230	Average - Poor	Rough and ready cassette deck in which sound engineering has been sacrificed on the altar of extra selling features, namely three heads for real time off-tape monitoring	3-head Dolby B/C/HX Pro		87
Sony TC-RX110B £90	Poor + Poor +	Woolly bass and scrappy treble combine to make a meal of many music types, despite accurate response shapes with most types of tape. Prerecorded material sounds dull	Dolby B/C		75
Sony TC-TX55 £150	Average Average +	The sound quality ranking is a good one for an auto reverse machine at this price level. Clean, sharp sound, only slightly let down in the deep bass.	Auto reverse, Dolby B, C & HX Pro	R	75
Sony TC-K520 £170	Average + Good	Fine, assured and detailed performer with a very well designed and straightforward user interface	Dolby C/HX Pro, variable bias, display on/off	BB	87
Sony (WMD6C) ProWalkman £249	Good + Very Good	"One of the finest sounding cassette decks on the market today. A mandatory Best Buy, which also fits in your pocket"	Dolby B, & C	BB	60
Sony TC-K850ES £400	Very Good Very Good +	Near state of the art recorder with excellent recording quality, and even better playback performance. Sounds — and looks — best with the display turned off	3-head, Dolby HX Pro, bias/level adjust, dual capstans	R	87
Sony TC-K730ES £500	Very Good Very Good +	First rate cassette deck that scarcely betrays it is a cassette deck on audition. Features and control wise, it feels a little dated	Dolby B, C, bias and equalisation adjust	R	81
Teac V-270C £89	Average - Average -	Not quite cheap enough to compete solely on price, the V-270C is a rather messy and unstable sounding deck	Dolby B & C, bias adjust		63
Teac V-480 £129	Average Average +	A rather utilitarian model, the V-480 just makes it on to our recommended list by virtue of a clean, open sound that to an extent transcends the measurements	Dolby B/C/HX Pro, fine bias	R	75
Teac V-470 £129	Average - Average	A low grade transport is allied to respectable electronics to give sound quality ranging between acceptable and good. Prerecorded tapes sound bright	Twin deck, one records, Dolby B/C, intro-search		75
Teac V-870 £349	Good + Good	Cut-down V-970X for the proletariat. Expensive and carefully engineered with mostly very good but slightly cold sound quality	Dolby B, C, HX Pro, 3 Head, manual tape calibration	R	63
Teac V-970X £449	Very Good Very Good	An excellent sounding deck with useful features (tape calibration etc) that fully justifies the price	Real-time counter, track search, Dolby B/C/dbx & Dolby HX Pro, bias adjust, remote control, 3 Head	R	57
Teac W-990RX £445	Good Good	A mess with dbx, but taut and articulate otherwise. The 990, though expensive, has a powerful range of features, making it one of the few really ambitious decks to successfully straddle both sets of requirements	Dolby B/C 9 dbx, dual auto-reverse/record, parallel & sequential recording, remote	R	69
Teac R-919X £489	Very Good Average	Superbly equipped, yet usable — and well built too. But sound quality is something of a disappointment at this price level, being appropriate for a model about half the price	3-head auto-reverse, tape calibration, Dolby B/C/HX Pro/dbx		75
Technics RS-B555 £160	Good + Good +	Very good value. Resolution, stability and quality of set-up are strong points, a slightly strained, synthetic quality is sometimes apparent	Dolby B/C/HX Pro, bias adjust, track search	BB	81
Technics RS-B665 £199	Average - Poor	Disappointing deck, below par by Technics standards. Lacks detail and neutrality due to electronics and transport limitations	Dolby C/HX Pro, track search, fine bias, mic inputs		87
Technics RS-TR255 £160	Average Average	Neat, sensibly designed middle of the road dual transport recorder, suitable where the ability to dub tapes is a particular priority	Twin transports, one records and auto-reverse, Dolby B/C	R	75
Technics RS-TR265 £170	Average + Average -	Flexibility and build quality are strong suits, and the control system is a gem, but performance is unduly compromised by the range of features and sharp pricing	Dual auto-reverse, one records, Dolby HX Pro		87
Technics RS-B655 £200	Good Very Good	Excellent middle price deck, well equipped with a not over-refined but highly articulate and crisply defined style of musical presentation	Dolby B/C/HX Pro, bias adjust, track search	BB	81
Technics RS-TR355 £200	Average Average	Serviceable middle market dual deck without serious fault but with some annoying inadequacies, notably an inability to play side A and B and then stop	Twin auto-reverse, one records, Dolby B/C/HX Pro		75
Technics RS-TR555 £300	Average + Average	Sound quality varies with mode of use, but is rarely less than competent, and is often highly enjoyable. dbx is best avoided	Dual auto-reverse/dual record/Dolby B/C/HX Pro & dbx	R	81
Technics RS-B905 £350	Good Good	Good, well set up cassette deck with a clean, accurate sound but some compression. dbx circuit sounds poor	Dolby B, C, HX Pro, dbx, bias adjust, 3 Head		57
Yamaha KX-230 £140	Average + Average +	A strong near-budget performer, the strengths include good overall sound, excellent search aids. Weaknesses: ergonomics, soggy bass with prerecorded material	Dolby B/C/HX Pro, variable bias	R	75
Yamaha KX-330 £170	Average Good	Cramped control panel but a strong, dynamic and comparatively stable performance distinguish this strong middle-price deck	Dolby C/HX Pro, optional remote control	R	87
Yamaha KX-530 £230	Good Good	Excellent all-rounder that does most things at least competently and many things well. One of the best middle price decks	Dolby C/HX Pro, 3 motors, optional remote control	BB	87
Yamaha KX-630 £300	Good Very Good	Well equipped and immaculately presented, offers fine, articulate music making with a bias towards high bias tapes, especially metals	3 head, Dolby B/C/HX Pro, optional remote	R	81
Yamaha KX-800 £330	Good Average	The present Yamaha range seems oddly inconsistent. This sophisticated model sounds fine (almost) but came a clear second best to the KX-500	Real-time counter, track search, Dolby B, C, HX Pro with play trim, bias adjust, 3 Head		57
Yamaha KX-930 £400	Good Average	Worthy but ultimately slightly disappointing mixture of fussy ergonomics and tidy but cluttered sonics	3 heads, dual capstans, Dolby C/HX Pro, remote control		87
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

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DAT RECORDERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa Excelia XD-001 £1300	Very Good Very Good	Clear and very listenable recorder roughly comparable to but slightly sweeter sounding than the Sony DCT-1000ES – but with an inferior front panel design	Track ID and search, remote	R	63
Grundig Fine Arts DAT-9000 n/a (system component)	Good Good	Conventional DAT recorder offering standard facilities. The deck is well made and equipped, and is engineered to a satisfactory quality standard. It performs to an acceptable standard, though it is not state of the art	2/4 hour recording, mic inputs, digital in/out		69
Luxman KD-117 £1499	Good Good	Slightly soggy, earth-bound sound quality, this model trails the other DAT decks tested so far	Two analogue inputs, remote twin address		63
Sony DTC-M100 £799	Very Good Very Good	Clean, clear sounding 2nd generation model with most of the features and sound of the DTC-1000ES	Midi-width, alpha-numeric display, remote, optical interfaces	R	63
Sony DTC-1000ES £1299	Very Good Very Good	Fine, consistent performer with accomplished tape handling and good build quality	Standard track ID and search, remote	R	63

CD PLAYERS

This all-digital music source is well established, despite still high disc prices and the opposition of many hi-fi enthusiasts. Compact Disc's strengths over conventional vinyl are complete freedom from surface noise with automatic and programmable play, plus track skip and fast music scan – frequently under full remote control. However, many vinyl enthusiasts find CDs sound less involving than

top quality vinyl replay. Introduced five years ago at around £500, CD players now average less than half that price, and for the main offer improved performance besides. Even cheaper players may have the latest decoding chips and the most useful play features; extra money can buy remote control, remote volume control, audio 'tweaks', plus improved build and component

quality control. Compared with many hi-fi components, CD players give impressive lab performance, though there are differences between players nonetheless. **Sound quality** variations are even more marked, particularly in a good quality system. As it behaves very like a preamp, there are no problems connecting a player to a normal amplifier.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa XC-007 £499	Very Good Good	Creditable sound despite inverted output, high tech engineering with very good lab performance. A worthy contender but not cheap	Remote, keypad, timer, digital output, pseudo 20 bit, dual DAC		64
Akai CD-55 £230	Good Average—	Budget model which fails to compare with the CD52	Remote, hdph, Good programming		83
Akai CD-52 £249	Good Good	A nice surprise from Akai, genuinely good sound from this mid-priced model. Better linearity will help further	Remote, digital output, headphone socket	BB	64
Akai CD-62 £330	Fair Very Good	Looks, build quality and the technical specification are right up to date. As it stands it sounds very good but if the indifferent lab performance could be improved, it would probably sound even better.	Remote, programme, hdph, comprehensive display etc	BB	70
Akai CD-73 £450	Good Average	A little uneven musically, the Akai tends to smother fine detail, but has first class dynamics and stereo imagery. Worth auditioning	Track entry keypad remote, menu display (switchable)		62
Akai CD-93 £700	Good Very Good	Undoubtedly a CD player of real class in build, presentation, lab performance and sound quality, but also a shade expensive for formal Recommendation – though that's not to dissuade lovers of black lacquer wood finish.	Track entry remote, menu display etc.		58
Arcam Delta Black Box £260	n/a Very Good	This rich, powerful and articulate sounding DAC transforms the majority of medium price CD players	Needs D-out CD players	R	60
Arcam Black Box II £300	Very Good Very Good	An addition to the BB I, it also offers improved sound and more inputs	Optical and wired input digital decoder	BB	76
Arcam Alpha £375	Very Good Very Good	Arcam's new star, its best CD player yet and great value	Remote, hdph, etc, coax dig. out	BB	83
Arcam Delta 70 II £600	Very Good Good	Now in Mk II form a further improvement is seen in features, performance and sound quality. Solidly built and British	Now adds simple remote vol + std features; also display off	R	76
Arcam Delta 170 Transport £600	Very Good Very Good	While no bargain, this is a well made metal boxed transport providing clean digital data for outboard decoder/processors	Transport only, display off, usual programming	R	76
Ariston CD1 £345	Good Good	Easy on the ear compact disc for those who like their music Radio 2 flavoured. And it looks good	digital output, remote control	R	87
Cambridge Audio CD3 £649	Poor Good+	Unique internal configuration gives the CD3 a fluid and detailed sound falling off at the frequency extremes. The controls and displays are primitive	Optical/electrical digital out, remote control		87
Carver TL 3100 £340	Average Average—	The sound quality did not live up to the excellent fascia. Carver's DTL did not aid the indifferent sound	DTL sound shaping, usual facilities, remote, memory		76
Carver TL-3300 £700	Good+ Poor	Carver needs to listen critically to CD sounds; in our opinion. DTL does not improve the recipe	DTL, remote, programming, digital output		83
conrad johnson DFI £1,995	Average— Good+	Setting a decent standard and including an FET line preamplifier, the unusual DFI is worth investigating	Line preamp built-in, simple remote facilities		76
Deltec PDM-Dne £500	Average Very Good	A no frills audiophile bitstream converter at an affordable price	Coax-in, special cable and mains filter options	R	83
Denon DCD 620 £180	Average+ Average—	Not competitive on performance though feature pack is good	Hdph + vol, edit, remote		83
Denon DCD820 £270	Average+ Average—	A powerful combination of features and build for the money ensures recommendation. The sound is just good enough	Well equipped, power vol, edit etc, digital out	R	76
Denon DCD 920 £320	Good Average+	Highly featured and well presented but unexceptional performance	Everything! inc remote volume		83
Denon DCD1420 £400	Very Good Average	Superbly equipped with a fine lab performance, this modern player needs a touch more sonic spice to get recommended	20-bit, very comprehensive, remote, power volume etc		76
Denon DCD-1520 £550	Very Good Very Good	High tech, high profile, high gadget content, good sounding player at an almost affordable price.	Programme, hdph socket, remote, track entry, optical digital output	R	70
Denon DCD 3520 £1000	Very Good Good+	Built like a battleship this new model takes its place at the top of the Denon range with a smooth and powerful sound, quite free of graininess	Composite 20-bit DACs, full programming features	R	72

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ferguson CD007 £130	Good Fair	The cheapest recommendation in the test group; don't expect the earth but the value is good	Manual, digital output, headphone socket	R	64
Ferguson CD008 £150	Fair Fair	Not as strong as its relatives, sample fault perhaps? Though performance is fair enough overall	Remote, midi digital output, 2x 0/s, timeshare 16 bit		64
Grundig CD9000 £1000	Good Good	Aimed at a market which puts external styling above sound quality. Although this player is of slightly above average competence in most departments it is expensive	Remote, programme, hdp socket, calendar display etc		70
Harmon Kardon HK7300 £199	Average Average—	Budget low bit technology, does not deliver enough for a recommendation	No remote, no digital out; basic control features		83
Harmon Kardon HK7500 £299	Average + Average	Decided improvement over 7300 in all respects. Still fairly unimpressive sound	Remote, hdp + vol, remote vol, good programming, A-B repeat etc		83
JVC XL-Z1010 £499	Good Average—	Despite some high tech design and a good lab result this model did not deliver good sound quality	32 track prog., disp off, auto fade, 2 digital op		76
Kenwood DP-8020 £500	Excellent Very Good	Fine build and finish, a fine performer in the lab, and in sound quality	Comprehensive remote inc volume, display off, opt & coax digital output, versatile	R	83
Marantz CD50SE £330	Very Good Very Good	Souped up CD50 delivers reference performance in its class. Worthy successor to the '65SE legend	Full remote, power (7 step) volume. Hdp, (fixed). FTS disc memory. Good programming	BB	83
Marantz CD60SE £380	Very Good Very Good	Luxury '50SE with superior remote volume and variable headphone socket; a fine performance all round	Optical digital output, full remote, power vol. FTS, hdp	BB	83
Marantz CD12LE £2800	Very Good Excellent	This top of the range two-box player may be very expensive but it is very well made. Technical performance is very good and the sound is the best from Marantz yet	Two box, digital processor, FTS, optical connection, hdp socket, comprehensive display, balanced output etc	R	70
Meridian 203 £495	Very Good Very Good+	Exceptionally lucid, transparent and solid sound 'bitstream' converter. Always tidy and easy on the ear, but doesn't bulldoze the craggy bits	Stand alone converter, 32-48kHz, optical/electrical i/p	BB	87
Meridian CD206 £800	Very Good Very Good	Fine build, finish and styling, very good sound, classy	Good programming, remote, coax digital output	R	83
Meridian CD208 £1490	Excellent Excellent	State of the art CD sound combined with a decent preamp and full remote control	Opt & coax dig. output, fixed and variable output. Hdp + remote level. Programming, phase invert	R	83
Micromega CDF1 Classic £1400	n/a Very Good	A very well made and stylish player from France, the CDF1 is a CD player for analogue lovers or as close as we've come across	Basic remote, digital output, suspended chassis	R	72
Micro Seiki CDM100 £3850	Very Good Good	One of the hernia inducing bricks of hi-fi, the Micro is extravagantly styled, finished and built. The good lab performance led to an 'only good' sonic display when the price demanded excellent	Balanced output, remote, display blanking		72
Mission Cyrus PCM II £400	Very Good Good+	Improvements in price and performance keep this classic remote player in the running	Remote vol, phase inv, display of, dig op. PSX option	R	83
NAD 5320 £169	Average— Average—	A low cost player devoid of features but at this low price it should still offer better sound	Budget facilities, 20 track program		76
Nakamichi OMS-1E £395	Good Good	This neat enough player doesn't really follow the Nakamichi tradition of providing exceptional sound quality while at the same time perpetuates that of selling at an above average price	Simple remote etc.		58
Nakamichi CDP-2E £495	Very Good Good	It's ergonomically superior and has above average sound, but it isn't cheap. The standard of build quality and finish is first class which isn't quite matched by the sound quality	Programming, hdp, remote track entry, digital output		70
Nakamichi OMS-5EII £1500	Good + Very Good	"... delivers near state of the art performance and build quality in a deliberately starkly functional package, but at a very high price..."	Skip and scan, simple track programming, manual control		51
Nakamichi OMS-7EII £2000	Good + Good	The only serious criticism here is of the price. And in our not always humble opinion you can get better sound quality for less elsewhere in Nakamichi's range	10 digit track entry keypad programming, headphones		51
Onkyo DX-1500 £170	Average Fair	Ruled out on the grounds of its poor DAC filter, but it's not so bad really given the price	Manual, 2x 0/s, timeshared 16 bit		64
Onkyo DX-7500 £490	Good Very Good	This comes close to the state of the art performance in many areas. It has lots of facilities and is well made too.	Key pad remote, memory, hdp, comprehensive display, optical output etc	R	70
Philips CD610 £160	Average + Average	Built down to the price the sound is OK while the package performance and features constitute fine value	Remote, hdp, programming etc	BB	76
Philips CD630 £250	Very Good Good	Large clear display with an international flavour. Strong Philips style, high value CD player	FTS, digital op, versatile programming, remote, remote vol (7 steps) hdp (fixed)	R	83
Philips CDC875 £300	Average + Average—	The changer works well and this machine is very well equipped. The sound quality is below par but may not matter too much in its likely 'muzak' application	6 disc changer/dig op remote, hdp, memory, shuffle		76
Philips CD840 £350	Good + Very Good	Philips best yet and bitstream too! Very versatile programming and easy to Recommend. Fine stereo imaging for price	FTS, hdp + vol, full remote programming	BB	83
Philips COV185 £350	Average + Average	Hard to value with the video singles facility but it all works well enough for a recommendation	Video singles + CD scart + digital out etc	R	76
Pioneer PD9300 £499	Excellent Average	A mid price flagship of excellent build and lab performance but only average sound - interesting though	Remote, 24 track programming, 2 digital op		76
Pioneer PD-91 £899	Excellent Very Good +	Close to state of the art in nearly all areas - soundstaging, clarity and simple lack of artificiality. A well made and sophisticated player	Track entry remote, calendar display, index search, etc.	R	64
Proton AC-120 £180	Average Average—	Fine styling, low price but barely average performance	15 track memory, simple design, remote, hdp		76
Radford DAC1 £895	Good Good	Fine but slightly dated and costly package in performance terms - but flexible, musical and well built	DAC with 2 electrical + optical i/p, tape out		87
Radford WS1 £1095	Good Good	This player fails only in subtle ways. It is not the most engaging of players, but it is strong, forceful and dynamic, and it remains one of the better Philips 16-bit clones	Programming, intro scan etc	R	87
Revox B126 £649	Very Good Good	Made in Switzerland so the build quality and technical performance is high but then so is the price and the sound quality is only good	Programming, Revox remote system compatible		70
Revox B226S £840	Good Average	Top quality build and finish for the Revox system enthusiast. For high value sound look elsewhere	Remote vol, hdp, 19 track memory, digital op		76
Rotel RCD-855 £250	Good Good +	Stripped for action this well built Philips technology player delivers fine performance and sound. First rate value	Remote, 20 track prog, 1 audio op, 1 digital op	BB	76
Rotel RCD-865 £300	Average Good	Curious mixture of bold musical presentation and foreshortened imagery. Grows on you though One to audition with care	'bitstream', remote control	R	87

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CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
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
Sansui CD-X711 £550	Excellent Very Good	Luxury features, finish and sound from this classy Sansui: no excuses required here	Balanced and normal op, Digital; opt & coax; hdph + vol, remote full programming	R	83
Sharp DX150 £129	Fair Fair	This is a none oversampled player which is rather outclassed for technical and sonic merit by the vast majority of the competition. Pretty enough but would you want to put discs in it?	Programmable, skip, search, repeat		70
Sharp DX750 £179	Fair Fair	It has a remote control but it's too like the 150 which is rather outclassed for technical and sonic merit by the vast majority of the competition	Remote, programmable, skip, search, repeat		70
Sonographe S01 (by CJ) £799	Good Very Good	Distinctive with oak end-cheeks, using Philips based 14 bit x 4 oversampling, Conrad Johnson electronics make this a musically rewarding player	Full search programme and timing	R	51/Coll
Sony CDP-228ESD £400	Very Good Average+	Good value, this is Sony's best mid price design and comes superbly equipped	hdph, remote, rem vol, custom file	R	76
Sony CDP-338ESD £600	Excellent Good	Only a bit better than the 228 the 338 is a good machine, but not quite good enough for formal recommendation at the price	Custom file, remote, rem vol, hdph, shuffle etc, 2 digital op		76
Sony CDP-X7ESD £1300	Good+ Average	A Sony flagship, build and finish is exemplary, styling is unusual but the sound is just average	Custom file, remote, 2 digital op, balanced audio + phonos		76
Sony CDP-R1/DAS-R1 £5000	Very Good Excellent	Sony has aimed high with the R1 and in some ways has created the reference player. Build quality is amazing and it offers a high level of facilities. One or two faults were revealed in both the lab and the listening, but it's generally excellent	Two box, dual optical connection, digital processor, FTS, remote		72
Stax Quattro £2995	Very Good Very Good	Now in mkII guise this substantial player recreated exceptionally strong and convincing bass lines together with a beguilingly musical midband	18-bit DACs, 20-track memory, full IR remote, variable o/p	R	72
Teac PD470LE £279	Average Average	With the LE upgrade the 470 has improved to a just average position	Remote, hdph, 20 track prog		76
Teac ZD880 £450	Good Fair	Decent enough in most respects with a very good build and finish. Its sound isn't competitive enough to inspire any real enthusiasm	Remote, track key access, auto space, comprehensive display, hdph socket etc		70
Technics SL-P277A £160	Very Good Average+	High value, budget priced, yet well equipped and finished, a strong example in its group	Remote, programming, hdph + level. No digital op.	BB	83
Technics SL-P550 £220	Very Good Average	Superb, slick presentation, well equipped, average sound, fine build	Remote vol (6 steps) hdph + var, remote programming, edit/fade, digital optical only		83

CD MIDI SYSTEMS

So you want a hi-fi, but you don't want to make a fuss about it. A pre-packaged system with everything matching up and no aggravation may not rank with carefully chosen separates on **sound quality**, but there's no denying the attractiveness or popularity of this approach – the market for pre-packaged component hi-fi systems is at least as big as that for separate items, even ignoring the vast numbers of low-cost single unit stacker systems.

The arrival of compact disc led to a new fashion for shelf-standing compact systems, or 'midis' as

they are known in the trade, as a replacement for earlier floor-standing rack systems (themselves the upmarket development from music centres). Only some 330mm wide, midis can more or less match full-size (430mm) rack components for performance, and are certainly cheaper to make, ship, sell and buy.

Whereas specialist hi-fi is moving steadily towards ultra-simple 'no frills' components, midi systems tend to be sold on a feature count at a price point, usually with little opportunity for

demonstration and comparison. Our test programme includes extensive auditioning and lab testing, while making allowance for the different aspirations of designers and expectations of users. Key features valued highly by customers include system remote control, automatic switching, double 'dubbing' cassette decks, and elaborate equaliser tone controls. And the top end of the market is developing with surround sound audio/video-ready packages.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa X-D80K £550	Poor Poor	Congested and harsh sound quality, the cassette deck, amp and loudspeakers being well below par. The built-in timer adds some operational flexibility	Auto-reverse, CD synchro record, remote, timer		77
Aiwa X-D100 £1000	Average— Fair	Very fully equipped with wide ranging in and outputs but poor upgradeability. Sound quality is reasonable on the whole	Digital & optical in/outputs, dual auto reverse, disc file CD etc		77
Ferguson HFD28 £300	Poor Poor	Similar to Goodmans 5000 system but with greater power and marginally superior sound	One-piece, semi-remote		77
Grundig Studio Line 1 £330	Poor Average+/ Poor	Intriguing package with warm, woolly but attractive sound let down by poor attention to detail and suspect cassette deck. Amplifier appears to be inadequately protected	CD/cassette tuner plus preset equaliser		77
Hinari DK200 Disc Deck £300	Poor— Poor—	Confused user interface is matched to inadequate electronics. Poor – and poor value	Single unit, two cassettes, CD, tuner, remote		77
JVC Midi-W900CD £1111	Good Good+	A competent allrounder, with important convenience related features, and powerful linked recording facilities. Less strident speakers would be appreciated	Separates system, equaliser, auto-reverse cassette	R	65
JVC Midi-W91CDM £1111	Good— Average	Very well equipped (viz: multi-disc player, powerful tape related features) with acceptable but rather nondescript sound	Multi-disc player, twin auto-reverse cassette, equaliser		77
Pioneer S-11 £510	Average— Average—	Fine lower middle market system, with one useful extra – the built in timer. Only the record deck is disappointing	Twin auto reverse cassette, built in timers, one piece amp/cassette		77
Pioneer S-330D £1080	Very Good Very Good	High standard of reproduction on all sources, though mistracking with Dolby C was a limitation. There are few gimmicks and plenty of fine engineering	Dolby C/hx pro, multi-disc, amp with DAC etc	R	77
Proton AI-3000 £550	Good Good	There are a host of minor problems, including no LW, but the unit is attractively packaged and can be made to sound very good despite a woolly sounding amplifier	One piece CD, cassette, tuner and amp, remote	R	65
Sanyo 39CD £260	Poor Average—	Acceptably compromised basic low end system, offers broadly respectable if unambitious music making for those on a tight budget	One piece + CD, non-remote, manual tuner		77
Sanyo 49CD £300	Poor Average—	Similar to 39CD, but with Dolby B, preset tuning, remote control and more power. Audio wise, it's more of the same, but there's greater stature when loud and cassettes are helped by Dolby B	One piece + CD, partial remote control, digital tuner	R	77
Sanyo 59CD £380	Average— Average—	Adequate performance overall, though endemic lack of pitch integrity takes edge from tape and records. Some inconsistencies in control system too	As 49CD, + full remote, auto source select, separate turntable		77
Sharp CD-X17E £500	Average Average+	Highly specified miniature with detachable speakers. AC mains power only. Good sound let down by crude upper midband and treble. Expensive for what it is	CD luggable with dual cassette & tuner, detachable speakers		77

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CD MIDI SYSTEMS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Technics X900C0 £470	Average Average—	Good build and mostly good sound is offset by mediocre amplifier and loudspeaker and some operational oddities	Main cassette/tuner/amp, separate T/t and CD		65
Technics X1 £500	Good Good	Superb value for money from a system with solid straightforward engineering at an attractively low price	Auto-reverse record transport, auto-disc/tape editing, surround sound, remote	BB	77
Technics X5D £800	Very Good Very Good	A mainstream system offering considerable flexibility and power in a traditional suit of clothes, and embodying values that place music first	Twin auto-reverse, tuner/timer, auto record deck, digital amp	R	77
Yamaha AST-C10 £530	Average+ Very Good	Brilliant if flawed luggable with weighty, powerful bass, and a rare combination of expressiveness and clarity unprecedented from such a small package. Good features.	Mains portable twin cassette/CD/radio system detachable speakers, remote	R	77

TUNERS

The radio medium operates at a much lower profile than TV, but in areas outside pop music the BBC service is the envy of the world. Live Prom concerts can rival all other sources from a hi-fi perspective. Only the FM (VHF) bands give stereo hi-fi sound, though AM (MW & LW) are useful for receiving certain transmissions in the UK.

Something of a hi-fi afterthought, tuners are often selected merely to match a chosen amplifier

cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is well spent.

Tuners come in two basic types. Analogue models tune gradually (and usually manually) across

the bands, and can have analogue or digital displays; they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories.

(The Lab and Sound results for models tested in issue No. 65 refer to FM only. For AM results see under Comments.)

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Akai AT-52L £150	Very Good Very Good	Holds its own on FM against many much more expensive tuners, but AM is very poor	All bands	BB	65
Akai AT-93L £250	Good+ Good+	By AM standards presentable (good) while FM delivers the goods	All bands, aerial switch	R	65
Arcam Alpha £120	Good Average+ +	Attractively classic British analogue tuner with sound quality comfortably better than most	FM/am analogue	BB*	50
Arcam Delta 80 £300	Very Good Very Good	Hi-fi' sound on FM, good on AM, a dependable British all-rounder	6AM, 6FM presets, FM/mw. lw display manual tune	BB*	55
Harman Kardon TU920 £299	Good Average	Rather weak sound quality for the price despite good lab test results	16 presets, AM/fm, digital auto scan, active tracking		55
Harman Kardon Citation 23 £559	Good Very Good	Fine performance. interesting features and ease of use are this tuner's forte, and the sound quality is top notch	FM/am seek/manual adjustment muting 16 presets remote control	R	60
Linx Theta £475	Good Very Good	A Magnum Dynalab on the cheap with the hallmark styling of this small British newcomer. Some of the best midrange from any tuner	Manual analogue tuning, no presets, signal strength meter	R	72
Magnum Dynalab FT101 £599	Good Very Good	Although expensive for its fairly minimum set of facilities its excellent sound makes up for what it lacks elsewhere	Analogue manual tuning, no presets, signal strength meter	R	72
Marantz ST35L £125	Good+ Average—	It works well enough but the sound could be better for the money	16 presets, AM/fm, digital auto scan, active tracking		55
Meridian 204 £525	Good+ Good	Pleasant sounding with a fine finish but does not make the grade at this price	FM only, auto scan, digital, remote, clock timer		55
Musical Fidelity TI £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
Naim NAT 01 £1294	Very Good Very Good	There may be better sounding tuners in the world, but we have yet to hear one	No presets. Two box, flywheel tuning FM only, Analogue	R	50
Nakamichi ST-7E £750	Good+ + Good+	Exceptionally good for weak-signal areas, and good all round	16 AM/fm presets, Schotz enhanced sensitivity, auto time digital		55
Onkyo T9090 II £590	Very Good Very Good	It has most of the facilities you could possibly want and more beside. Lab performance and sound quality are both good enough to ensure recommendation even at this price	FM only, digital, 20 presets, auto scan etc.	R	72
Pioneer F91 £350	Excellent Good+ +	Easy to use, this model has excellent RF performance and scored very high ratings on the listening tests	FM/am 24 presets	R	60
Proton AT-300 £199	Good Good	The AT-300 is pretty on the outside, orthodox on the inside and rather dear. AM - poor	FM/mw only	R	65
Quad FM4 £329	Very Good Good+	Fine sound, excellent ease of use, good build and finish and a more than satisfactory technical performance	7 presets. Digital	R	50
Revox B260 £1120	Excellent Very Good	Sophisticated and expensive, the B260 is ideally suited to the rest of the Revox range and should also work well in other systems	FM - virtually everything	R	60
Rotel RT-830AL £110	Good+ Good	Fine sounding budget audiophile material, no frills, no fuss	Manual dial analogue, FM, MW, LW	BB	55
Rotel RT-850AL £160	Good+ Good+	Scoring well on listening tests and one of the best sounding tuners at its price level, it was a bit let down on AM but RF performance was good	FM/am, digital	BB	50
SAE T-102 £449	Good+ Good+	Expensive for all the radio you get, but sounds interesting. AM - poor	FM/mw only	R	65

Rating refers to original, tested model

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HEADPHONES

There are a variety of different approaches to headphone design, and examples of each turn up in this group. Amongst the more expensive esoteric models, electrostatic drivers are used in square open-backed phones such as the Jecklin and Stax models. The majority of these come with some form of transformer which takes the signal initially from the speaker terminals on the amplifier. The actual speaker cables then travel from this unit *via* a

bypass switch to the loudspeakers

The more down to earth models feature dynamic drivers in circular open-backed designs. The advantage of open backs seems to be a correspondingly open sound and a less claustrophobic feel to the music. One can also of course hear external noises and irritate people on public transport

The third category are closed-back designs,

which are useful in situations where it is necessary to block out background noise.

Another means of distinguishing different types is the way they sit on your head or ears. There are three styles: circumaural models enclose the ear and rest on the side of the head; supra-aural designs press on the outer ear (pinna); and intra-aural types rest inside the ear and are popular amongst users of personal stereos

NAME PRICE	COMFORT SOUND	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
Aiwa HP-X30 £30	Good Good—	A flashy personal stereo phone which alternatively could be used at home. A slight LF tonal preference slightly colours the response, but it ain't a bad can	Supra-aural, closed-back, dynamic		75
Aiwa HP-V99 £50	Good— Average+	Horn loaded in-ear miniatures with plenty of guts but not enough transparency or bass to compete with the headbanded competition	Intra-aural, closed-back, dynamic		75
Aiwa HP-X80 £50	Good Good	A headphone that's highly suited to non acoustic music and portable sources, nicely made and slickly finished. Sound quality doesn't quite match the price	Supra-aural, closed-back, dynamic		75
Aiwa HPEX-200 £90	Good Good	Modern looking and well finished the Excelias, as they are dubbed, had meaty bass and sounded reasonably open for the type	Circumaural, closed-back, dynamic		63
AKG K135 £35	Poor Fair	Despite a very appealing design the K135s don't live up to the usual AKG standards, though they do have the ability to reproduce rhythm well	Supra-aural, semi-open, dynamic		63
AKG K145/S £58	Good+ Good+	Electrostatic tweeters combine with a dynamic mid/bass unit to create very confident sounds in a comfortable headphone. Balance is on the bright side	Supra-aural, semi-open, electrostatic/ dynamic	R	75
AKG K240 Monitor £60	Very Good Good	Something of a classic these AKGs are very user friendly in all respects; sonically on the warm side of neutral	Circumaural, semi-open, dynamic	R	63
AKG K280 Parabolic £110	Good Very Good	A very revealing and unusual twin driver design that uses the same principle as a satellite dish to beam sound into the ear	Circumaural, open-backed, dynamic	R	63
AKG K340 £136	Good Excellent	Heavyweight cans in most respects, the K340 with its electrostatic tweeter is a very revealing headphone. Gives the total electrostatics a good run for their money	Circumaural, closed-back, electrostatic/dynamic	R	75
Audio Technica ATH 909 £55	Average Average	Quite impressive in the treble though a bit bass shy, the 909s worked well at highish levels	Circumaural, semi-open, dynamic		55
Audio Technica ATH 910 £65	Average Good	The closed-back 910s are an improvement on the 909s with a nice rhythmic quality rarely found with headphones	Circumaural, closed-back, dynamic	R	55
Audio Technica ATH-911 £75	Very Good Very Good	Nicely finished dynamic headphones with all the trimmings, plus a very clean and subtle sound	Circumaural, open-backed, dynamic	R	63
Beyer DT 325 £30	Very Good Fair	Lightweight in more ways than one, the 325s may be a little bright for some systems and tastes but will suit duller sources	Supra-aural, open-back, dynamic	R	63
Beyer DT330 Mk II £45	Good Poor	Not the most revealing 'phones encountered, the 330s were nevertheless enjoyable and rarely offended	Circumaural, semi-open, dynamic		55
Beyer DT550 £69	Good Good	On their own the 550s sound articulate with a slightly 'gritty' treble and 'keen' midrange; not suitable for headbangers!	Circumaural, semi-open, dynamic		55
Beyer DT880 £90	Good Good	Well made cans with a warmish sound but fairly solid midrange, though they're not that informative for the price	Circumaural, semi-open, dynamic		63
Beyer DT990 £119	Very Good Very Good	The 990s are definitely a significant pair of dynamic headphones; they have a smooth and yet revealing, neutral sound that is hard to criticise.	Circumaural, open-back, dynamic	R	55
Beyer IRS690 £200	Good+ Very Good	High quality infra-red headphones with soft comfy earpads and mellow but informative sound quality which is hard to dislike	Circumaural, open-back, dynamic	R	75
Jecklin Float Model One £79	Good Very Good	Whilst very unusual in appearance the Floats give remarkable sound quality and openness at a reasonable price	Circumaural-ish, open-back, dynamic	BB	55
Jecklin Float Model Two £99	Good Very Good	Helmet shaped and pretty unflattering but open sounding and comfortable in the long term. Note lack of adjustment means you should try before you buy	Circumaural-ish, open-backed, dynamic	R	63
Jecklin Float Electrostatic £399	Good Excellent	One version of the state-of-the-art, these electrostatics have an openness of sound rarely found in the breed, with good dynamic range to boot	Circumaural-ish, open-back, electrostatic	R	55
JVC HA-D990 £65	Good+ Good+	Good looking well made cans that offer good sound quality for the money. Sonic nature is of the easy-going, laid-back variety	Supra-aural, closed-back, dynamic	R	75
Koss TD/60 £20	Good Average	Although they're devoid of channel identification and have a decidedly Stateside approach to sound, these are very listenable phones for the price	Supra-aural, closed-back, dynamic		75
Koss K/6X Plus £30	Fair Poor	'Sixties-style' 'phones from the good ole US of A, their sonic style is unique and can make a system sound quite different	Supra-aural, closed-backed, dynamic		63
Pioneer SE-72 £30	Good+ Average—	Neat, nicely made personal stereo oriented phones along the lines of Sony V3s. Sound is on the veiled side, good for aggressive sources	Supra-aural, closed-back, dynamic		75
Quart Phone 30 £40	Good Fair	Whilst not as seductive as their PMB25 predecessor the 30s are reasonably neutral and do improve on some of the competition — though not stunning	Circumaural, semi-open, dynamic		63
Quart PMB 25II £40	Good Good	Despite a somewhat unconventional suspension system the 25s put in a convincing and enjoyable performance with warm yet lively balance	Circumaural, open-back, dynamic	BB	55
Quart Phone 70 £70	Good Good	Competent performers that were hard to criticise but lacked the life and sparkle of which some of the competition are capable	Circumaural, closed-back, dynamic		63
Quart PMB 65 £70	Good Good	Quite revealing and neutral albeit with the usual closed back sound, this competes well with more established models	Circumaural, closed-back, dynamic	R	55
Quart PMB 85 £90	Fair Very Good	These more expensive Quarts bear a striking resemblance to the Jecklin Float models and use two drivers per ear. Sound is a bit bass heavy but not bad overall	Circumaural, open-backed, dynamic		63
Realistic Pro-X £25	Poor Average—	Robust, unanimously uncomfortable and heavily veiled in sonic terms — not a great success	Supra-aural, closed-back, dynamic		75
Ross RE2530 CD £20	Average Average	Rather an 'average' £20 phone that some found uncomfortable due to high pressure on the ears. Sonic balance is on the bright side	Supra-aural, closed-back, dynamic		75
Ross RE2560 CD £25	Good Average+	If you're not too fussy about quality of finish and don't have an elfin head then these British phones warrant attention. Sound could be smoother	Supra-aural, semi-open, dynamic		75
Ross RE-2760 £35	Poor Fair	Stylish white cans from the only British firm in the business. Unfortunately sound quality is not up to par in this price range	Supra-aural, closed-back, dynamic		63
Sennheiser HD40 £20	Very Good Good—	Very light and comfortable headphones with an even sonic balance that will suit most sources. but jack is 6.3mm and not suited to personals	Supra-aural, semi-open, dynamic	BB	75

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NAME PRICE	COMFORT SOUND	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
Sennheiser HD450 £35	Good Fair	Modern, simple and lightweight phones that are remarkably robust and which turned in a relaxed if weighty performance that was at worst pleasant	Supra-aural, semi-open, dynamic	R	63
Sennheiser HD480 £45	Good Fair	Using the same shell as the 450s, the 480s were a little softened and unrevealing by comparison with their competitors	Supra-aural, semi-open, dynamic		63
Sennheiser HD520 £65	Good+ Good+	A very comfortable and musically capable headphone. If you've got this sort of bread to blow on cans, give 'em a blast	Circumaural, semi-open, dynamic	R	75
Sennheiser HD530 £75	Very Good Good+	One of the better dynamics in its group, the 530s create a sense of space that eludes most sub £100 cans, and they're dead comfy to boot	Circumaural, semi-open, dynamic	R	75
Sennheiser HD540 Ref Gold £160	Good Very Good	The 540 Golds prove that dynamic headphones can be subtle, informative and capable of creating a remarkable sense of space	Circumaural, open-back, dynamic	R	55
Sony A21L £20	Good— Good—	Forward facing in-ear drivers on a folding plastic band provide exceptional clarity for such an inexpensive phone. However, no bass, and fit isn't to everyone's taste.	Intra-aural, semi-open, dynamic	BB	75
Sony MDR V3 £30	Fair Good	Portable stereo oriented phones that are very nicely made and combine clarity with a pleasant lack of distortion	Supra-aural, closed-back, dynamic	BB	63
Sony MDR V7 £70	Very Good Very Good	Classy sounding cans that are very slick and work well with all types of music, setting the standard in their price range	Circumaural, closed-back, dynamic	R	63
Sony MDR-CD999 £120	Good+ Very Good	A very nice headphone in all respects, the 999s are worthy of the best headphone outputs and high quality sources	Supra-aural, semi-open, dynamic	R	75
Sony MDR-R10 £2500	Excellent Very Good+	Costly state of the art sealed moving coil design built to the highest standards using the finest materials. Sound quality reflects this care, being big, clear, sweet and refined	Circumaural, closed-back, dynamic	R	72
Stax SR34 £140	Fair Very Good	The least expensive Stax headphones around, the SR34s are lively and rhythmic with good tight bass and a sweet midrange	Supra-aural, open-back, electret		55
Stax SR84 £210	Very Good Very Good	The stepping stone between dynamics and full electrostatics, these electret phones are revealing, open and highly enjoyable	Supra-aural, open-backed, electret	R	63
Stax Gamma pro/SRD-X pro £296/£230	Very Good Excellent	The Gamma pros are like a stethoscope for your hi-fi, revealing subtleties that many loudspeakers fail to resolve	Circumaural, open-backed, electrostatic	R	63
Stax SR Gamma £299 (inc. SRD-6 Adaptor at £100)	Very Good Very Good	The next model down the Stax range from the Lambda, the Gamma is an excellent headphone with little to criticise but the price	Circumaural, open-back, electrostatic	R	55
Stax SR Lambda Pro £545 (inc. SRD-7SB Mk 2 Adaptor at £185)	Very Good Very Good	A bit of an industry reference the Pros are frighteningly revealing, bringing across more information than loudspeakers costing twice as much	Circumaural, open-back, electrostatic	R	55
Stax SR Lambda Pro SRM-1 energiser £360/£635	Very Good Excellent	This combination extracts layers of information that other headphones only hint at. The SRM-1 has more edge than the SRM-T1, but it's good	Circumaural, open-back, electrostatic	R	75
Stax Lambda Signature/SRM-T1 £470/£895	Very Good Excellent	The Signature when combined with the SRM-T1 valve driver must be the most transparent headphone available	Circumaural, open-backed, electrostatic	R	72
Yamaha YHL-006 £30	Average Average	Unusual personal stereo oriented phones that curl up when not in use. Earphones are like golf balls and balance is well suited to Walkmans	Supra-aural, open-back, dynamic		75

PERSONAL STEREO

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than all manner of domestic systems and as such demand some attention. Now that personal CD players have joined the ubiquitous Walkman in the market, the variety and standard of sound quality is huge, with obscurely named cassette players practically falling out of your cornflakes packet and Discmen going for £300

Despite their diminutive size personals attempt to incorporate as many gimmicks and features as

possible, cassette players often incorporating tuners, graphic equalisers and Dolby noise reduction. CD players are still relatively expensive and don't tend to vary that much on the features front, rather the amount and quality of accessories differs. Most models come with a mains adaptor and some include remote control.

Sound quality on the cassette front seems to have a proportional relationship to price and integrity of construction – wow and flutter being quite obvious on the cheaper models. CD players

become less noisy as they get dearer and also reduce in size; one drawback of the latter seems to be that immunity to shock suffers as a consequence. Cassette players do, on the whole, seem better suited to the outdoor life than their digital counterparts, as does the software. Bear in mind that the sound and lab ratings given below cannot realistically be compared to those in other categories or between cassette and CD personals

PERSONAL CASSETTES

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa HS-PL300 £110	N/a Average	Good looking, simply laid out player with a sensible selection of features and reasonable sound quality for a small player of this price	Dolby NR, chrome/metal eq, remote		78
Aiwa HS-PX303 £150	N/a Good	Chunky and macho styling combines with comprehensive features and a half decent transport to make a powerful personal	Dolby B & C, chrome/metal eq, remote	R	78
Panasonic RQ-P505 £100	N/a Poor	Very attractive and neat little player with nicely designed controls and XBS bass boost but sonically it's limited by distinct wow and flutter	Dolby, chrome/metal eq, remote		78
Panasonic RQ-P525 £120	N/a Average+	Fitted with what is effectively a bass only tone control and harbouring all the necessary features the 525 also has a knack with tape replay	Dolby B & C, chrome/metal eq, remote	R	78
Philips D6658 £30	Very Poor Poor	The low price limits sound quality, and this is not a spectacular machine, but it does a reasonable job nonetheless	Graphic EQ, AM/fm		56
Saisho PS90R £40	Poor Poor	A bit of a jumble of features and gadgets, the PS90R has on-board speakers, an extending aerial and even records, but sound quality is dubious	Graphic EQ, types I, II & IV, AM/fm, recorder		56
Sharp JC-270E £130	N/a Average—	Slightly old fashioned design combines with a basic feature count and mediocre sound quality to make an apparently uncompetitive player	Dolby, chrome/metal eq, remote		78
Sony WM-BF65 £90	N/a Average+	Regular size radio/clock/cassette player with a bright even open balance and Sony's forward facing phones. Not as glamorous as slightly more expensive models but sonically not bad	Dolby, chrome/metal eq, radio, alarm clock	R	78
Sony WM-701C £200	N/a Good—	Beautiful little machine with all the necessary buttons'n'switches and a fundamentally exceptional sound quality, marred unfortunately by wow and flutter	Dolby B & C, chrome/metal eq, remote, folding phones		78
Sony Walkman Pro £249	Good+ Very Good	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, it takes other personals to the cleaners (except on weight and power consumption)	Dolby B, C, types I, II & IV, record, line in/out, varispeed	BB	52/56
Toshiba KT-4549 £80	N/a Poor	Fully equipped with 10 preset radio and alarm clock the KT-4549 is a bit aggressive on the sonic side and the bass boost system lacks balls	Dolby, chrome/metal eq, radio, alarm clock		78

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PERSONAL CDs

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Goodmans GCD-10 £120	Average— Poor	Cheap, flashy and not short on accessories the GCD-10 is a rather noisy player that left a lot to be desired on the sound quality front	13.5 x 3.7 x 18cm, 478g, mains adaptor		66
Kenwood DPC-77 £270	Good+ Very Good	Very chunky and well made, the DPC-77 is the only player to include a digital output and sounds very good through its analogue output – a suitable domestic alternative	12.8 x 3.5 x 14.5cm, 750g, digital output, mains & in-car adaptors	R	66
Philips D6800 £130	Average Average—	A competitively priced and reasonably attractive looking player whose sonic performance is somewhat marred by a rather grainy top end	13 x 4 x 17.5cm, 516g, 3" ready, twin hdph sockets		66
Sanyo CP-12 £260	Fair Good+	Sonically amongst the more enjoyable personal CD players and capable of revealing the musical aspects of a disc in an interesting and entertaining fashion	12.5 x 2 x 12.7cm, 380g, wired remote, mains adaptor	R	66

CD PORTABLES

CD Portables or Yuppie Blasters as we classified them are basically portable stereos gone digital, ie a compact disc player is included alongside the usual AM/fm radio and single or double cassette deck. Compact disc is a novelty that seems to add a fairly hefty premium onto the price of the standard ghetto blaster, but the improved sound quality over standard cassettes may justify this for some.

In virtually every case a CD output socket is

fitted which means that it's possible to play silver discs through a domestic amplifier and loudspeakers, thus they are some sort of substitute for standalone mains machines (as are the personal CD players). One drawback with having a CD player on board is that batteries are gobbled up even quicker than usual, up to ten batteries being required in some cases. Neither are the units particularly light, the heaviest weighing eight kilos!

However they do all run off the mains too, and come with an appropriate lead for this purpose. Other useful features common to most are spare input sockets to record from an external line source such as a preamplified vinyl disc signal, and microphone sockets for recording live events (although the usual lack of record level adjustment is a nuisance).

MODEL PRICE	SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa CSD-XL25 £150	Poor	It's cheap, cheerful and not too low on features but sound quality from disc is frankly uninspiring	Twin headphone sockets		73
Bose Acoustic Wave £750	Very Good	Not exactly a CD portable as it doesn't play discs, but a highly versatile and stylish radio cassette player that has bass	Input sockets, Dolby NR, PA capable etc	R	73
Grundig RR9000CD £300	Average	Relatively slick machine with full CD function and volume remote control, low on features for price and unspectacular sounding	Remote, motorised volume pot, condenser mic		73
Philips AZ8394 £200	Average—	Stylish in a wasp like fashion, unfortunately the disc playing lets it down somewhat but otherwise it's OK	Twin decks, graphic eq., bass boost, condenser mic		73
Sharp QT-CD43 £280	Average	Quite a beefy box that comes complete with remote control for volume and CD functions. It even has a surround sound option which enhances imaging	Clock, speaker outputs, powered volume pot		73
Sony CFD-D73 £280	Good	The model we received was intended for the Japanese market and thus may not be entirely representative but it made reasonable sounds and has novel features	UHF bandwidth, input sockets, graphic eq., Megabass	R	73
Sony CFD-DW83 £300	Average	A macho looking beast capable of highish levels, but unimpressive sound for the price. Nice styling and good for scratching	Clock, timer, balance, input sockets, graphic eq.		73
Toshiba RT-8089 £200	Poor+	Square and long but rather drab on the sound quality front, as well equipped as most but rather tinny in many respects	Clock, twin decks		73

STANDS AND SUPPORTS

It's becoming more and more apparent that all the components in a hi-fi system benefit from being placed on the right kind of support. It is already acknowledged that performance of electro-mechanical transducers, such as turntables and loudspeakers, can be greatly improved by using highly rigid supports. This notion has been expanded to include electronics such as amplifiers and compact disc players, and inevitably a broad range of stands and supports have been produced to cater for this requirement.

With loudspeaker stands there seems to be two

broad schools of design. The most common is the open frame type which uses square section steel tubing (usually less than an inch square) made up to form a tripod or quadropod stand usually fitted with spikes top and bottom to ensure good coupling to both floor and cabinet. However, for reasons of domestic harmony this latter option is often not pursued as eagerly as perhaps it should be. The alternative approach is to use mass. Larger section (approximately 3 inch x 2 inch) tubing is welded between square top and bottom plates and filled with sand and/or lead shot. Again, this type uses

spikes at the base but Blu-tack or the like for coupling with the speaker cabinet.

Equipment supports generally place isolation quite high on the list of priorities and usually use a lightweight steel frame to support an MDF platform. Once again spikes are used to minimise contact with the platform and ensure good coupling to the floor. Minimising weight without compromising rigidity seems to be the aim with turntable supports but those designed for electronics often employ some form of damping to kill vibration, sometimes in the form of mass.

LOUDSPEAKER STANDS

MODEL PRICE	TYPE FINISH	COMMENTS	TOP PLATE SIZE HEIGHT	VALUE	BACK ISSUE FULL REVIEW
Appolo A820 £44	4 leg Fair	A light open-framed budget design slightly lacking in rigidity and subjectively superceded by other stands costing £10 more.	19 x 19cm 53cm		58
Appolo A10 £52.50	4 leg Fair	A robust and lightweight model, it would make an ideal upgrade for those still happy with the big boxes of old	19 x 19cm 44cm	R	58
Audio Dimensions Classic 2 £110	4 leg Average	Built in the heavyweight tradition and damped with chalk. Solid, stable, tactile sound	20.3 x 20.3 x 52cm	R	83 supp
Foundation Fred £70	2 leg Average	With sand filling the Freds made speakers sound tight and coherent with a more even balance.	19 x 19cm 36/43/59cm		58
Foundation Sir Fred £80	2 leg Good	Upgraded 'Fred' with special in-fills. Sweet sound but one that also lacks bite and edge	19 x 19 x 46.5cm		83 supp
Foundation Maggi £159 to order	Pair Very Good	Made for Magneplanar and other similar panel speakers they seem to have a healthy effect on the sound quality thereof.	50 x 2cm 2cm	R	58
Foundation Pi £269 to order	2 leg Very Good	Overpriced in material terms the Pi nevertheless has a very positive effect on the low frequency performance of conventional speakers.	20 x 20cm 25/38/46/53cm	R	58
Goldring Black Satin £65	1 leg Very Good	Screw together stand tastefully hewn from medite. Some loss of bass but still pleasantly rhythmic	18 x 20 x 46cm	R	83 supp
Heybrook Point 5 £55	3 leg Very Good	An unusual triangulated open frame stand that can help certain speakers sound more transparent and fluent – a good value stand	23 x 21.5cm 47cm	BB	58
Heybrook HBS1 £99	4 leg Very Good	With its new aluminium base frame the HBS1 fared very well in the listening tests. It allowed much of the speakers own 'sound' to remain intact.	23 x 21cm 47cm	R	58
Linn Kan II £79	4 leg Very Good	Built to support Linn's Kan speaker this stand is well suited to the task, but is less successful with other loudspeakers.	19 x 16cm 59cm		58

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LOUDSPEAKER STANDS

MODEL PRICE	TYPE FINISH	COMMENTS	TOP PLATE SIZE HEIGHT	VALUE	BACK ISSUE FULL REVIEW
Linn Sara £85	4 leg Very Good	The Sara exhibits some odd properties so its use other than with the Sara loudspeaker should be viewed with caution.	25 x 21cm 53cm		58
Monotrak Engineering M1 £58	1 leg Good	The M1 gave the mid and treble a commendably smooth and detailed presentation but bass sounded rather lacklustre and muddy.	19 x 18.5cm 48cm		58
Monotrak Engineering M4 £58	4 leg Very Good	Begging comparison with Heybrook's HBS1 the M4 maintained much of the openness and forthright detail of that model.	23 x 21.5cm 53cm	R	58
Monotrak Engineering M4S £58	4 leg Very Good	Its stature and stability would seem to mark it out as most suitable for smaller, lighter cabinets. The M4S possessed an open midband and clear treble.	20 x 17.5cm 53cm		58
Origin Live Three Leg £89	3 leg Good	An unusual tripod stand devoid of top plate and taking up more floor space than normal, subjective and technical performance was exemplary.	(support area) 22 x 17.5cm 52cm	R*	58
Origin Live Advanced £145	3 leg Good	One of three related tripod-like stands. Stable sound with good sense of depth and power	22 x 20.6 x 44cm		83 supp
Partington PP4 £60	1 leg Good	The PP4 offers a rather mixed performance, though when damped with sand infill it was less ready to embellish the overall sound and low frequencies became tauter and quicker.	18 x 16.5cm 48cm		58
QED TS22 Tristand £60	3 leg Very Good	Most tracks sounded uplifted or buoyant, never thick nor coloured. It worked well with most of the speakers tried and encouraged a fluid and revealing midband.	19 x 17cm 45/50/58cm	BB	58
Stand Design Z20 £70	1 leg Excellent	Well built and finished with optional sand in-fill. Ideally suited to Wharfedale 505.2's	16.5 x 19 x 50cm	R	83 supp.
Target T-40 £48	2 leg Very Good	Not very stable, tends to infer a slightly forward, ragged sound with diluted pitch	19 x 19 x 40cm		83 supp.
Target HS20 £60	1 leg Excellent	This monopod stand can be used either filled or unfilled and encourages different characteristics in the sound accordingly.	19 x 16.5cm 53cm		58
Target HJ15/3 £100	3 leg Very Good	Sound quality was basically very good though without the sand infill some loudspeakers may sound a little unbalanced as both bass and treble regions are subjectively exaggerated.	28 x 28cm 40cm	R	58

EQUIPMENT SUPPORTS

MODEL PRICE	TYPE FINISH	COMMENTS	SIZE (H x W x D)	VALUE	BACK ISSUE FULL REVIEW
Alphason New Concept £99	Rack Good	A heavyweight structure with stressed MDF shelves, ideally suited to the Sonata turntable	82 x 60 x 39.5cm	R	83
Audioquest Sorbothane Feet £40 for four	Feet Good	These large gumdrops are very useful for damping vibrations in amplifiers and especially CD players.	6.5 x 2.5cm (circular)	R	57
Cornflake TCS6 £60	Shelf Good	A squat and rigid frame supports a Medite top board with four adjustable spikes, better suited to suspended sub-chassis turntables.	43 x 23 x 33cm		57
Foundation Stable Table £100 (with Super Board)	Table Good	Similar to Stand Design's table though less well finished and certainly less stable	64 x 46.5 x 36cm		83
Origin Live Skyline Super £100	Table Good	An asymmetric table that helps provide a quick, lucid and solid sound with most decks	41 x 50 x 40cm	R	83
Roksan Equipment Table £169	Rack Good	An upgradable/expandable system suited to Roksan's Xerxes if not other competing turntables	65 x 52 x 38cm		83
Sound Organisation Table £55	Table Very Good	A deceptively simple structure that just happens to be engineered in a thoughtful, and ultimately successful manner.	37 x 45 x 35cm	BB	57
Sound Organisation Wall Stand £40	Shelf Very Good	The first of its ilk and still amongst the best, this simple framework represents a vast improvement over standard furniture shelves	27.5 x 43 x 35cm	BB	57
Sound Organisation Z022 £97	Table Excellent	A small but costly table made from thin steel tubing. Suited to the LP12 but not other decks	49 x 45.5 x 36cm		83
Stand Design Duplex £75	Table Very Good	Well made and nicely finished, this table is broadly compatible with most heavy turntables	63.5 x 46.5 x 36cm	R	83
Target TT1 £46	Shelf Excellent	This rigidly braced shelf offers both good sound quality and material value for money	26 x 46.5 x 35.5cm	BB	57
Target TT2 £55	Table Very Good	Standing up to the best in most areas, the TT2's only real foible concerns a slight loss of bass 'slam'	52 x 46.5 x 35.5cm	BB	57

* rating refers to original tested model

CABLES AND CONNECTIONS

Although cables and connections are sometimes thought to be the least important items in an audio system there has been a growing awareness in recent years that they have a significant effect on sound quality. To this end there is now a vast array of exotic cables and interconnects available to those interested in experimentation. The key observation on cables is that they are much more than mere accessories. Carrying the audio signal, just as any amplifier does, it's really not too surprising that they can influence sound quality

The characteristics of any cable are determined by the materials and topologies utilised in its construction. The purity of the conductor, nature of the insulator dielectric, mechanical construction, physical geometry, RF characteristics, efficiency of screening and finally the connectors themselves, all play vital roles in the sonic character. These factors tend to vary more with interconnect cables which are used to carry the signal between active components like pre and power amplifiers. The interconnects summarised here were tested in 1m

terminated lengths and therefore the results and prices relate to that length - some cables may well perform differently when used in longer lengths. What's more most cables are significantly cheaper if you are prepared to fit plugs yourself

The features column contains information on the material make-up of the different cables with the following abbreviations: OFC - oxygen free copper, OFHC - oxygen free high conductivity (Audionote define the HC as high crystal), PC-OCC - pure copper by ohno continuous casting, LC-OFC - linear crystal oxygen free copper.

INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Audioquest Livewire Topaz £35	Good Fair	Sounding 'bigger' and faintly richer than Reference 2, Topaz was also slightly grainy at the top end.	Gold-plated plugs, OFHC copper		59
Audioquest Livewire Ruby £49	Fair Good	Smother sounding than the Topaz, the extended crystal Ruby is less grainy and coarse, better able to resolve complex passages.	FCL copper twin axial	R	59
Audio Technica AT6115 £40	Very Good Fair	This cable sounds somewhat 'quieter' than the original LC-OFC interconnect, but is also less transparent and three dimensional.	PC-OCC copper coaxial		59

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INTERCONNECT CABLES

MODEL PRICE (per metre)	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Audionote Copper ANC £44	Fair Good	ANC sounded punchy with a faintly lean but tightly-focused bass character. This crystalline precision waned slightly at higher frequencies.	OFHC copper twin-axial	R	59
Audionote Flexible Silver ANS £99	Fair Very Good	ANS scored a hit with its transparent midband and revealing but quite unforced treble quality. Bass transients were slightly softened.	Silver signal & Copper screen	R	59
Audionote Silver ANV £154	Poor Excellent	Far weightier-sounding than the flexible ANS, ANV interconnect also possesses a fair degree of treble clarity and sparkle.	21 strand silver Litz		59
Budget Patch Cords see text	Fair Poor	As thrown in gratis with cassette decks and the like – frequency extremes were restricted and performances were veiled.	Thin coaxial		59
Budget OFC circa £7	Fair Fair	Subjectively, this cable did lift much of the aural fog experienced with scrawny standard hook-up leads.	OFC		59
Chord Mono-t £27/1.2m	Average+ Average+	Offers a slightly rolled-off treble but its rich sound is an upgrade from patch-cords	Unsymmetrical 4-conductor cable		83 supp
Deltec Slink £32	Good Very Good	Ideally used in lengths of under 4 metres, it errs on the lean side of neutral but has an uncommon transparency in the midrange.	4 silver plated OFC strands PTFE dielectric	BB	59
Deltec Black Slink £152	Excellent Excellent	Inherently neutral the cable faithfully reproduced broad and deep stereo soundstages with precise focus and a sense of tactility.	8 silver plated OFC strands PTFE dielectric	R	59
Deltec Gortex Black Slink £152	Very Good Excellent	A true reference quality cable providing an exceptionally detailed and transparent sound	Symmetrical, 8-conductors, Gore-tex ins.	R	83 supp
Denon LC-0FC 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-0FC, non-magnetic gold plated plugs		59
DNM Solid-core £23	Fair Good	Transparent in the midband and full of sparkling detail in the treble, low bass was slightly curtailed (unterminated price £2.30 per m.)	Single strand nickel-plated copper. Unshielded	R	59
Isoda Electric HC-05-PSR £54	Good Good	A pleasantly lively and fluid sounding cable though softens some subtle, midband detail	Aluminium + brass multistrand cable	R	83 supp.
Kimber Kable PSB £41.40	Very Good Very Good	An exceedingly transparent midband but slightly 'clanky' treble. It always managed to sound remarkably uncluttered and open.	OFC, PTFE dielectric	BB	59
Kimber Kable KC-1 £65.55	Very Good Fair	Tonally faintly leaner and brighter than the more open-weave PSB, KC-1's treble detail was just too sharp and grainy.	Multi-gauge PTFE dielectric		59
Kimber Kable KC-AG £390	Good Very Good	Treble detail resolution was perceived in a slightly abrupt if wholly controlled fashion. Depth re-creation and lateral separation were excellent.	Multi-gauge silver, PTFE dielectric	R	59
Monster Interlink 300 £24	Average+ Average	A big, larger-than-life sound but with some emphasis of midband detail and loss of bass	Screened, symmetrical cable		83 supp.
Monster Interlink 400 £34	Good Good	Bass is solid and punchy, counterpointed by a slightly overblown midband which tends to make vocalists sound larger-than-life.	Multi-gauge	R	59
Origin Live Soli-Core Super £60	Good Fair	Improves over previous Soli-core samples in stereo depth and bass weight, but a 'loud' treble presentation remains.	Solid-core gold-plated AT plugs		59
QED Incon P1-Gold £15.95	Good Good	A lively open presentation that just borders on the lean side of neutral, the quick and lucid delivery affording considerable musical insight.	OFHC, gold plated Deltron plugs	BB	59
QED Incon Graphite GP1 Gold £18.95	Fair Fair	A shielded version of Incon P1, it sounded thicker at the frequency extremes, the top end being coarser and more out of focus. Good for long runs though.	OFHC Graphite shielding	R	59
Sterling £250	Fair Good	Possessing a neutral if faintly rich overall balance it supplies a pleasantly open and transparent perspective. (Reviewed in pre-production form.)	2 silver strands per conductor		59
Supra EFF-1 £60/0.75m	Average Average	A new, costly and mildly disappointing addition to the range. Edgy, smeared sound	Screeded, symmetrical dir. cable		83 supp
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 £45	Poor Good	It tended to highlight some upper mid detail, but a generally open and spacious acoustic proved its saving grace. Slightly soft at LF.	Silver plated single strand VdH plugs	R	59
van den Hul MCD-1021II £69	Good Good	Possessing the same endearing qualities as the D300 it presented open and transparent soundstages and improved timbral resolution	Twin axial silver plated copper	R*	59
van den Hul Thunderline £150	Good Fair	Thunderline essentially parallels the sonic performance of the cheaper D102. HF is occasionally tainted by a 'tizzy' 'coarseness', bass is tight and dry.	Silver plated 'matched copper'		59
van den Hul MC-Gold £250	Fair Good	It possesses a rich and beguiling treble balance that matches a weighty, slightly warm bass character. Seductive balance may prove worthwhile in some circumstances.	Silver & gold plated copper		59
van den Hul MC-Silver £750	Good Good	Although remarkably transparent for an asymmetric design this costly cable was not considered to be of 'state-of-the-art' standard, and is bettered by cheaper models.	19 silver plated copper strands		59
Vecteur 8045 £49	Very Good Good	Sounding solid and forthright it might seem slightly cold in some systems but the treble 'edge' is mercifully clean. Very low frequencies were a little lacking in 'slam'.	LC-0FC signal & screen	R	59
Yfere LC-0FC Quad £85	Very Good Very Good	New cable with a very refined sound. Very transparent with good sense of focus and space	Symmetrical, star-quad with screening	R	83 supp

LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Absolute Wire Force 4 £4.75 per metre	Good Fair+	By current standards there was a loss of fine, sharp detail at the frequency extremes, but it has a big and friendly sound	744 OFC strands, PVC dielectric		64
Audio Innovations OR-200 £16 per metre	Fair+ Fair+	Open and detailed throughout the midband but a grainy coloration tended to corrupt subtle timbral information at very high frequencies	200 LC strands, polyurethane and cotton dielectric		64
Audionote AN-SP £100 per metre	Average— Excellent	A clean and open sounding cable that offered a deep and pleasantly detailed perspective. Bass was slightly restricted, but seemed tight and coherent nonetheless	15 silver strands, polyethylene dielectric		64
Audioquest Livewire Black £15 per metre	Good Good	It proved clear and punchy but with some grain across the treble. Nevertheless Black remains an interesting concept and proved better than Livewire Green	OFHC, surface only – foam core construction	R	64
Audiospec Latitude L4 £3 per metre	Average+ Average+	Warm, ruddy but also mildly muddy sound with some slight emphasis of bass notes	Figure-of-eight multi-strand, PVC dielectric	R	83 supp
Audio Technica AT6120 £10 per metre	Fair+ Fair	Compared to earlier LC-0FC cables this PC-OCC derivative sounded smoother and less aggressive	PC-OCC, PVC dielectric		64
Bellwire 12p per metre	Poor Average—	Broadly speaking it delivered a bright and tizzy sounding treble with a fairly open and detailed mid with little or no bass resolution	0.5mm single strand, PVC dielectric		64
Deltec 8S £144 – 5m pair	Good Good+	The unerring transparency and detail resolution of 8S throughout the midband makes it a far cleaner and more spacious sounding cable than others at the price	4 silver plated OF copper strands, PTFE	R	64

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LOUDSPEAKER CABLES

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Deftec Gortex Black 16 £528 – 4.5m pair	Very Good Excellent	Improvements in bass resolution, transparency and treble poise maintains status of this cable	Silver-plated OF copper with Gore-tex ins.	R	83 supp.
DNM Solid core £3 per metre	Average Fair	A good general-purpose solid-core, though too bandwidth limited for high-end applications. Sounds great in some systems	0.65mm single strand, webbed PVC dielectric	R	64
Exposure £2.50 per metre	Good Good	It could sound a trifle matter of fact but this emotive flattening was also somewhat dependent on the music program. It is also highly suited to long runs	56 OFC strands, webbed PVC dielectric	R	64
Furukawa FS-2F09 £6 per metre	Good Average +	Some loss of bass weight but otherwise offers a fresh and open sound. Good value	Multi PC-OCC stranding, PVC dielectric	R	83 supp
Furukawa FS-2T15S £50 per metre	Good + Very Good	An advanced solid-core cable with a highly fluid, detailed and inherently musical sound	Single 1.5mm Super PC-OCC strands	R	83 supp
Kimber 4VS £7.15 per metre	Average + Average	Similar construction to 4TC but dissimilar materials infer a slightly tizzy sound	Open-weave, multi-strand with PVC ins.		83 supp.
Kimber Kable 4PR £54 – 5m pair	Fair Fair +	This directionally marked cable benefitted from an open and airy treble quality but seemed notably leaner than 4TC. Bass was well round and satisfyingly taut	4 x 7 copper strands per conductor, PVC dielectric		64
Kimber Kable 4TC £17.65 per metre	Good Good +	4TC made a great impression in the listening tests with an open midband, a smooth and unfatiguing treble with slightly rich but suitably weighty bass	OF copper, PTFE dielectric	R	64
Linn K20 £2.20 per metre	Good Fair	Subjectively it erred on the forward and bright side of neutral but enjoyed an essentially clear and punchy delivery	56 OFC strands, webbed PVC dielectric		64
Marantz ML-55S £30 – 10m	Fair Fair	Subjectively this cable offered a loose and splashy treble which, though not overtly bright, did compromise both tonal and timbral accuracy	30 OFC strands, 3 conductors PVC dielectric		64
Mission Cyrus £2.50 per metre	Average + Good	Because of its impedance characteristic this cable will deliver a smooth and unfatiguing treble balance with loudspeakers offering an easy load	0.8mm single strand, PVC dielectric	BB	64
Monitor PC Silverline PC4 £5.75 per metre	Good Average	Sonically it laboured under a heavy and claustrophobic balance, lacking the see through transparency and lucidity of the better solid core cables	2072 x 0.07mm silver plated copper strands		64
Monster SCI 16-4 £3 per metre	Average Average	Not as thick-sounding as early Monster cables but still slightly unbalanced. Versatile construction	4 x 16-gauge conductors, OF copper strands		83 supp.
Monster Original £4.50 per metre	Good Fair +	Original sounded relatively congested and murky at higher frequencies but possessed weight and conviction in the bass	Multistrand		64
NVA LS1 £6 per metre	Average + Good	A light and breezy sounding cable best suited to short lengths, NVA benefitted from a clear and transparent outlook	7 x 0.25mm silver alloy strands, PTFE	R	64
Origin Live Soli-Core Ordinary £1.80 per metre	Good Fair +	Subjectively it bettered the performance of the costlier Super version, affording a pleasantly detailed and spacious soundstage with firm bass but slightly coarse treble	1.8mm and 0.5mm single strands	R	64
QED 79-Strand £1 per metre	Good Fair	For much of the last decade QED 79-Strand has been the first port of call for enthusiasts on the upgrading ladder, a tradition that should still hold true today	79 strand, PVC dielectric	R	64
QED Incon Graphite £2 per metre	Fair + Fair +	This graphite version of Incon sounded cruder and generally more heavy handed than the cheaper unshielded type. Overall presentation was mildly restricted and cloaked in a faint aural fog	OFHC, polymeric screen		64
QED Flat 200 £2.20 per metre	Good Good	I detected a degree of confusion at low frequencies but this did not stifle the acoustic atmosphere which remained open and positive	200 strands, flat webbed PVC dielectric	R	64
Rotel Supra 4 £2.57 per metre	Good + Good	Ideal for both long and short runs, it furnishes a big sound that benefits further from a smooth, unfatiguing treble	1,036 OFC strands, webbed PVC dielectric	R*	64
Rotel Supra 10 £6.91 per metre	Good + Good	Supra 10 provided a very free and open sound that was unhindered by any excess at low frequencies. Worth its weight in scrap copper!	2,562 OFC strands, webbed PVC dielectric	R*	64
Solid core mains cable 36p per metre	Fair + Good	It enjoys much of the smooth treble and articulate midrange usually associated with the better solid core derivatives. Lean but taut and rhythmically coherent	1.5mm square, 3 cores, PVC dielectric	BB	64
Sterling £99 per metre	Fair Fair	This pre-production sample possessed a strangely muddled and reserved sound quality. It suffered from a progressive instrument modulation	Pure Silver, PTFE dielectric		64
Townshend Isolda £400 – 5m pair	Fair + Good	Isolda possessed a truly dark background out of which rose a very solid and extended bass together with an excellent sense of transparency through the upper octaves	8 coax cables per conductor – very thick	R	64
van den Hul CS-122 £5.95 per metre	Fair + Good –	Characterised by a driving and powerful bass, CS-122 proved to be a heavy sounding cable. Mid treble detail was refreshingly clear but there was a slightly muted air about the extreme treble	19 x 0.45mm silver plated strands, webbed rubberised dielectric	R	64
van den Hul CS-352 £12.95 per metre	Good Fair +	Subjectively it sounded like CS-122 only more so, the deep rumbling bass tending to overwhelm subtle musical details. It also appeared a trifle peaky in the treble	7 x 0.76mm + 168 x 0.125mm silver plated strands, rubberised dielectric		64
van den Hul SCS-12 £29.95 per linear metre	Good + Good +	SCS-12 set a high standard with a tight and well focused soundstage populated with tactile stereo images. Bass wasn't as extended or resolved as some other cables	19 silver plated strands of 12 different guages, PTFE dielectric	R	64
van den Hul SCS-2 £99.95 per linear metre	Good + Good +	Overall it was commendably neutral and transparent but nothing less would be acceptable bearing in mind the tremendous cost of a stereo pair	665 silver plated matched crystal copper strands, PTFE dielectric	R	64
Vecteur R-CV30 £4.99 per metre	Fair Good	Subjectively the better of Vecteur's three-strong cable line-up offering a neutral overall perspective but with a slight loss of detail resolution at both frequency extremes	4 x 0.8mm LC-0FC PTFE insulated strands	BB	64
Vecteur S-CV90 £69 per metre	Fair + Fair +	It seemed both less transparent and integrated throughout the midband than R-CV30, though both frequency extremes were spruced up with a tighter sharper delivery	6 x 0.7mm LC-0FC strands		64

THE WORLD'S NO 1
GUIDE TO BUYING HI-FI

THE DIRECTORY

IN-CAR ENTERTAINMENT

In-car entertainment is an area not usually associated with the esoteric world of domestic hi-fi. However, it represents a source of musical entertainment that many of us are exposed to every day. The majority of new cars are fitted with some form of radio before they leave the showroom and in many cases this usually very basic player is taken for granted and accepted as representative of in-car audio standards.

For the price of a budget amplifier or more, there is a wide variety of in-car machines to choose from,

including cassette, CD and even DAT players. The majority of sub £300 players are integrated units featuring a cassette player, AM/fm tuner and amplifier, all in one remarkably compact standard sized box. At this price level the cassette players tend to be fairly basic affairs, although autoreverse and noise reduction systems are both fairly common. Tuners are usually of the digital variety with varying degrees of sophistication in signal tuning and presetting, with some machines featuring as many as 18 FM presets. The emphasis is on the frequency

modulated band and AM often suffers as a consequence, but fortunately for radio enthusiasts there are some exceptions.

The amplifier is usually designed to drive two pairs of speakers mounted fore and aft of the vehicle, and a fader is fitted to adjust the balance between the two. The dearer machines feature separate bass and treble controls which can be quite handy given the unusual acoustic of the car environment and the variety in balance and presentation to be had from car speakers.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Alpine 7282L £250	Good Very Good	A very attractive and seductive sounding player. The matt surfaced transparent preset keys are especially sexy.	Bass/treble controls, 12 FM 6 AM presets, chrome eq., clock, 8W	R	61
Alpine 7905M/3539 £650/£350	Excellent Excellent	An easy to use and attractive CD/tuner, partnered with a powerful and flexible amplifier to give an effortless source of in-car entertainment.	Bass/treble controls, 12 FM, 12 AM presets, slide-out, 150W	R	68
Clarion 916HP £160	Good Average	With its rubbery buttons and touches of white this is a modest looking player let down by a weak cassette.	Bass/treble controls, 5 FM, 5 AM presets, 9W		61
Clarion 946HP £250	Very Good Very Good	A good FM side let down slightly by AM performance. This Clarion is particularly nice to use with its nifty SAM tuning system.	Bass/treble controls, 12 FM/6 AM presets, Slot-in, 15.1W	R	61
Clarion CDC7000/10028HA £650/£250	Very Good Excellent	Despite a slightly off-beat cartridge system the Clarion combo put in a performance that had the sonic edge over other CD/tuners in its test group.	Bass/treble controls, 12 FM, 12 AM presets, security code, 80W	R	68
Goodmans GCE229 £150	Fair Average	If knobs, switches and legends are your bag then the GCE229 is the one for you – a lot of gizmos for the price and it even sounds OK.	Bass/treble controls, 6 FM/6 AM presets, Chrome eq., clock, MSS, 10.1W	BB	61
Nakamichi TD-400E/PA-300 II £495/£329	Very Good Very Good	If you want your in-car entertainment to compete on sound quality grounds with your domestic system, this combo offers a very strong challenge.	Bass/treble controls, 5 FM, 10 AM presets, uni-directional, chrome eq., Dolby B, C, 75W	R	62
Nakamichi TD-700E/PA-300II £874/£329	Very Good Excellent	For those who appreciate the wonders of analogue there are few in-car players to really compete with this superb cassette/radio. You can even adjust azimuth.	Bass/treble controls, 6 FM, 6 AM presets, music search, Dolby, 75W	R	68
Panasonic CQ-497 £117	Fair Poor	The CQ-497 has a traditional style analogue tuning system making it easy to use. AM reception was good but the other sources are less encouraging.	Bass/treble controls, chrome, NR, 7W		62
Philips DC680 £180	Average Good	A colourful and musically competent player that despite a gammy volume knob is well worth checking out.	8 FM, 4 AM presets 3.5W	R	61
Pioneer DEX-M300/CDX-M100/GM-3000 £300/£450/£280	n/a Very Good	Separate control unit and boot mounted multi play autochanger make this a bit of a hefty installation but it uses the same magazines as their domestic players and sounds fine.	Bass/treble controls, 18 FM, 6 AM presets, 80W, removable fascia		68
Proton 214CD/D275 £300/£175	Very Good Very Good	This Proton cassette/tuner offers good power and a level of fidelity appropriate to its price. Musically it has a Decca-like charm that is very appealing, plus a sensitive radio.	Bass/treble controls, 8 FM, 8 AM presets, Dolby B/c nr, chrome eq., 85W	R	68
Sharp RG-F816E £200	Poor Average	Nothing if not novel the 816, with its unusual anti-theft system is custom built for the furry dice brigade, but is sonically a bit lacklustre.	Four band graphic, 8 FM, 16 AM presets, ASP, Dolby, MSS, 10.9W		62

RECEIVERS

Purists will look down their noses at the very idea of combining two functions into one box, and indeed they always have done. But unless we're talking about the exotic elite, the creme de la creme of amplifier and tunerdom, intrinsic technical shortcomings simply aren't an issue.

One obvious reason why you should buy a receiver if you were otherwise considering an amplifier and a tuner is that there are savings, ie of

size. Generally you end up with one box in place of two similarly sized boxes, which has got to be a good idea. Receivers are also simpler to operate, in principle anyway. At the very least you save on one power switch, and typically you are presented with an integrated control system that is bound to oil the wheels of ergonomics.

But there is one important point to watch. Because receivers don't sell in vast quantities in

this country, and because this is one of the very few countries to use Long Wave for public service broadcasting, many – no, most – receivers on sale in this country cover FM and MW only. Remember that LW is the home of Radio 4, where it can be heard on the all too frequent occasions it is not on FM.

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Harman Kardon HK330Vi £259	Average Average—	No LW, and FM section best suited to strong, local transmissions. The amplifier is quite powerful but favours the treble. Bass is tuneful but lacks weight.	5 inputs (inc 2 tape), FM/mw tuner		70
Harman Kardon HK440Vxi £299	Good Good	Clear, dynamic, slightly bright sounding design, a little grainy in extremis. Mono switching and LW missing from tuner, which otherwise performs well.	5 inputs (including 2 tape) with FM/mw tuner	R	70
JVC RX-777VL £500	Good Good	Sharp, lively but euphonious sound quality from line and phono source is matched to a high grade tuner. However, many half-baked facilities blunt value for money.	A/v capable with 6 inputs, equaliser, digital ambience, FM, MW/lw		70
JVC RX-1001V £770	Average Poor	Power output is well below spec, and sound quality is cluttered and messy on all inputs.	Digital ambience processing, Dolby Surround, 2/4 speaker, 40 FM/mw presets		70
Revox B285 £1782	Average Average—	Sophisticated and capable tuner is married to a muddled, compressed sounding amplifier, which also has low sensitivity preventing the amplifier being driven fully in many situations.	70 watts/ch, 4 inputs (inc 2 tape), 29 FM/mw/lw presets		70
Rotel RX-850AL £230	Good Good	Well built and sensibly equipped receiver with outstanding sound quality for the price via the tuner, phono and line sources alike. It majors on subtlety however, and may not impress the heavy metal brigade.	4 inputs (inc 1 tape), FM/mw/lw tuner	BB	70
SAE R102 £599	Average— Average	This is an uneven but mostly good performer. It sounds constrained but musical, but the tuner is weak on both wavebands.	4 inputs (inc 2 tape), FM/mw tuner		70

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 128

Personal Messages

Our loudspeaker reviewer's loudspeakers have some competition.
Could Darius replace Isobarik?

I'm not given to changing loudspeakers very often. In twenty five years of hi-fi addiction, I've only owned four different pairs: Spondor BC1s and BC3s, the original Quad *Electrostatics* and Linn *Isobariks*.

The last changeover to the 'bariks happened about a decade ago, largely because the Quads (even two stacked pairs thereof) lacked the low frequency welly and dynamic range to handle the sort of material I was starting to play. However, I'm under no illusions that both BC1 and ELS leave the 'barik standing when it comes to minimising coloration and creating a stereo soundstage.

Loudspeakers are like that. All is compromise. If there is a perfect one, I have yet to find it, and almost certainly couldn't afford it anyway. Over the past three or four years, especially since taking over *Choice's* loudspeaker reviewing, I must have tried well over a hundred of the current crop. The majority represent pretty good value for money, and a handful or so show a real spark of excellence in one area or another. But very rarely have I been seriously tempted to trade in the 'bariks.

However, such temptation did arise a month or so back, the ensuing angst providing the subject of this month's column. The loudspeaker that so got me going was itself a bit of a surprise, since I had already tried and found it wanting two years previously. You'll find my formal review of the Roksan *Darius* in last month's edition. That provides the skeleton: in this more personal context I can put a little more flesh on the bones.

It all started when Roksan's MD and designer Touraj Moghaddam drove from deepest Wales to darkest Kent early one morning, to make absolutely sure I knew how to set them up correctly. The latest Roksan turntable package complete with *Artaxerxes* RIAA step-up amplifier and a *Shiraz* cartridge was also on hand.

Keeping my Naim amps in the middle I spent a fascinating day with some of my favourite records. The sound wasn't the same as my own system by any means, but it certainly wasn't obviously inferior. To my ears there wasn't quite the bandwidth, authority or loudness, but the considerable midrange magic, delicacy and transparency and superb stereo imaging went a long way towards compensating.

Blinded by prejudice, I immediately assumed that the main cause of the differences lay at the turntable end of things, though back on my 'barik system the Roksan player sounded less obviously impressive. Meanwhile, I started to get to grips with the *Darii*.

Clang!

I must confess it took a while for the penny to drop: maybe the prejudice acquired from experiencing the screaming treble balance of the original version is an acceptable excuse. Although the heart of the loudspeaker (enclosure and drivers) is virtually the

same as before, the crossover changes are so dramatic that the current *Darius* must now be regarded as totally new.

The penny slipped from my fingers when I tried bi-amping. In much the same way as the similarly insensitive and current hungry Apogee *Caliper*, the *Darius* improved dramatically. Then it finally hit the deck with a resounding clang when I went directly from the *Darii* back to my 'bariks.

While enjoying the extra scale and loudness my active system can deliver, I certainly found myself missing the *Darius'* extraordinary midrange delicacy, transparency and stereo imaging. There's little to choose between them on speed (which itself is a major point in the *Darius'* favour), but my ageing 'bariks sounded boxy and thick (at least until I had a go at tightening up the tweeters, which helped significantly, even though it's something I do pretty regularly anyway!).

What I'd completely failed to appreciate on that first day was the extent to which the *Darius* was complementing

the strengths of the Roksan turntable – just as the *Isobarik* exploits the characteristic strengths of the *Sondek*. That each will work very capably with either is proof enough that all are fine products in isolation. But when combined sympathetically with their natural stablemates, there's no denying the resulting symbiosis.

Power hungry

The Achilles heel as far as I'm concerned remains the low sensitivity. The obvious retort is to use a larger power amplifier than the 70W rated Naim 250s that are my personal choice. With a tolerably open mind I drafted in the Bryston 4B which Roksan imports – an apparent bargain at £1,500 for its 250W rating. With this power house installed, limited loudness is no longer an issue, but I quickly found myself missing the precision and coherence of my 250s.

One of the bottom lines is that I've yet to find a high power amplifier I could happily live with, so low sensitivity and efficiency remain an important issue for me – and an even more important one for triode valve fanciers like Jason. Indeed I could probably make a strong case for the assertion that the quality of an amplifier is far more closely related to its power divided by its price than by its price per se, but the (August) weather is too hot for such philosophising. . .

But any loudspeaker that can deliver a fair measure of the transparency and delicacy of a Quad or an Apogee (albeit without quite the smoothness), much of the precise stereophony and bass extension of a BC1 (albeit without quite the neutrality), plus speed and timing that can stand up against an *Isobarik* (albeit without quite the authority or loudness) deserves to be taken very seriously indeed. The *Darius* has now evolved into a truly remarkable speaker that could well become a classic of our time.



Roksan Darius: fast and agile, but current hungry too.

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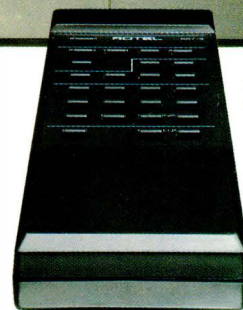
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