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FEBRUARY 1988

HI-FI CHOICE

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

61 CD PLAYERS TESTED

20 TUNERS REVIEWED

45 CASSETTE DECKS TESTED

37 CD MIDI SYSTEMS TESTED

92 LOUDSPEAKERS TESTED

49 TURNTABLES AND
25 TONEARMS TESTED

20 HEADPHONES UNDER REVIEW

109 CARTRIDGES TESTED

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32 TUNERS TESTED

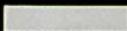
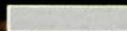
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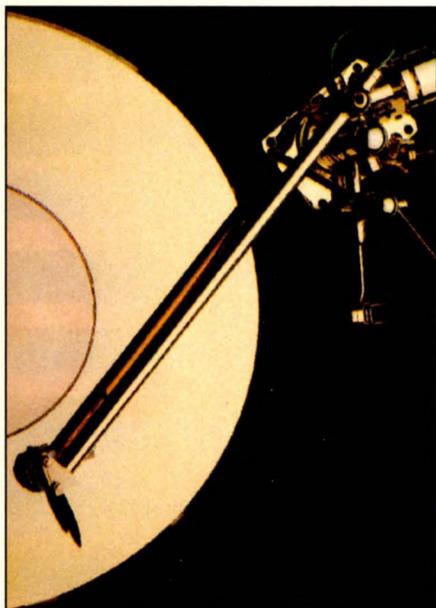


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HI-FI CHOICE

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Win this limited edition Source Odyssey in our March issue competition. See page 78 for our full review.

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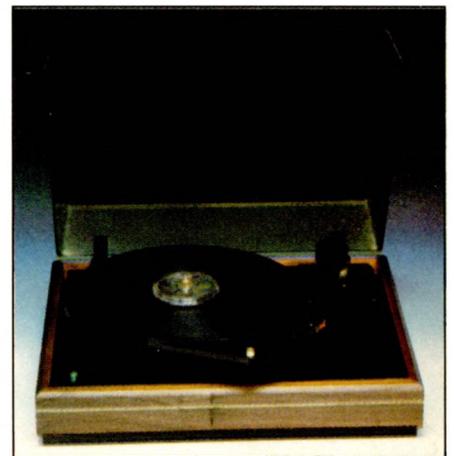
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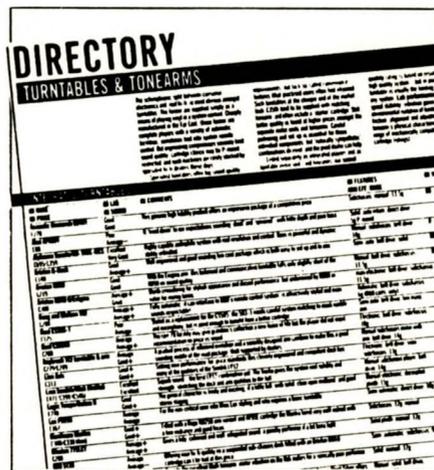
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THE CHOICE DIRECTORY



Our unique information-packed buyers’ guide to all the hi-fi products we have reviewed which are currently available.

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You don’t have to be an idiot to need this guide.

MENU

The main review theme of this issue is turntables and tonearms, and for the first time in several years a new reviewer is handling this topic – Alvin Gold stepping into Martin Colloms’ shoes. To maintain a degree of continuity, the lab test framework has been kept as close as possible to earlier reviews: the tonearm measurements were carried out in MC’s laboratory, though inevitably the turntable tests are not directly comparable, and subjective value judgements will show some differences in taste.

Manufacturers were given the opportunity to re-submit product if they wished, but many chose not to, so we have reprinted a number of MC’s reviews from earlier editions alongside the new material, retaining recommendations where appropriate. In this respect Alvin’s only real reservation was to query the current competitiveness of the two Thorens TD316 and TD320 players.

As usual we did our best to pull in as wide a range as possible. But even more than usual the politics of products and personalities seemed to provide impediment.

Our apologies therefore to Automation Sciences for blowing up the Pierre Lurné (our fault, though arguably excusable), but our irritation at those who promised to supply and failed to deliver. It is particularly exasperating to be unable to endorse the performance of the Oracle Delphi III, having contracted to give it away in our State Of The Art Competition. And we expected no less than three Helius tonearms.

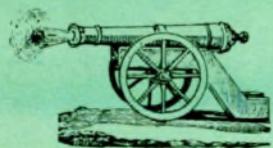
I have rather more sympathy for the smaller manufacturers like Voyd who worry that a favourable review could create embarrassing demand. But feel obliged to point out the poor track record of turntable manufacturers in achieving good overall balance in designs that may excel in one particular area – even the expensive and pretentious frequently reveals an Achilles heel under full, comparative lab and subjective scrutiny.

Happily, much less controversy surrounds the headphones and tuners which are also covered in this issue. To be able to review headphones again after a gap of several years is one of the major benefits of our new format, while tuners always seem a particular bargain, given the high standard of radio broadcasting in the UK.

Paul Messenger.

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dynamite
with a laser beam



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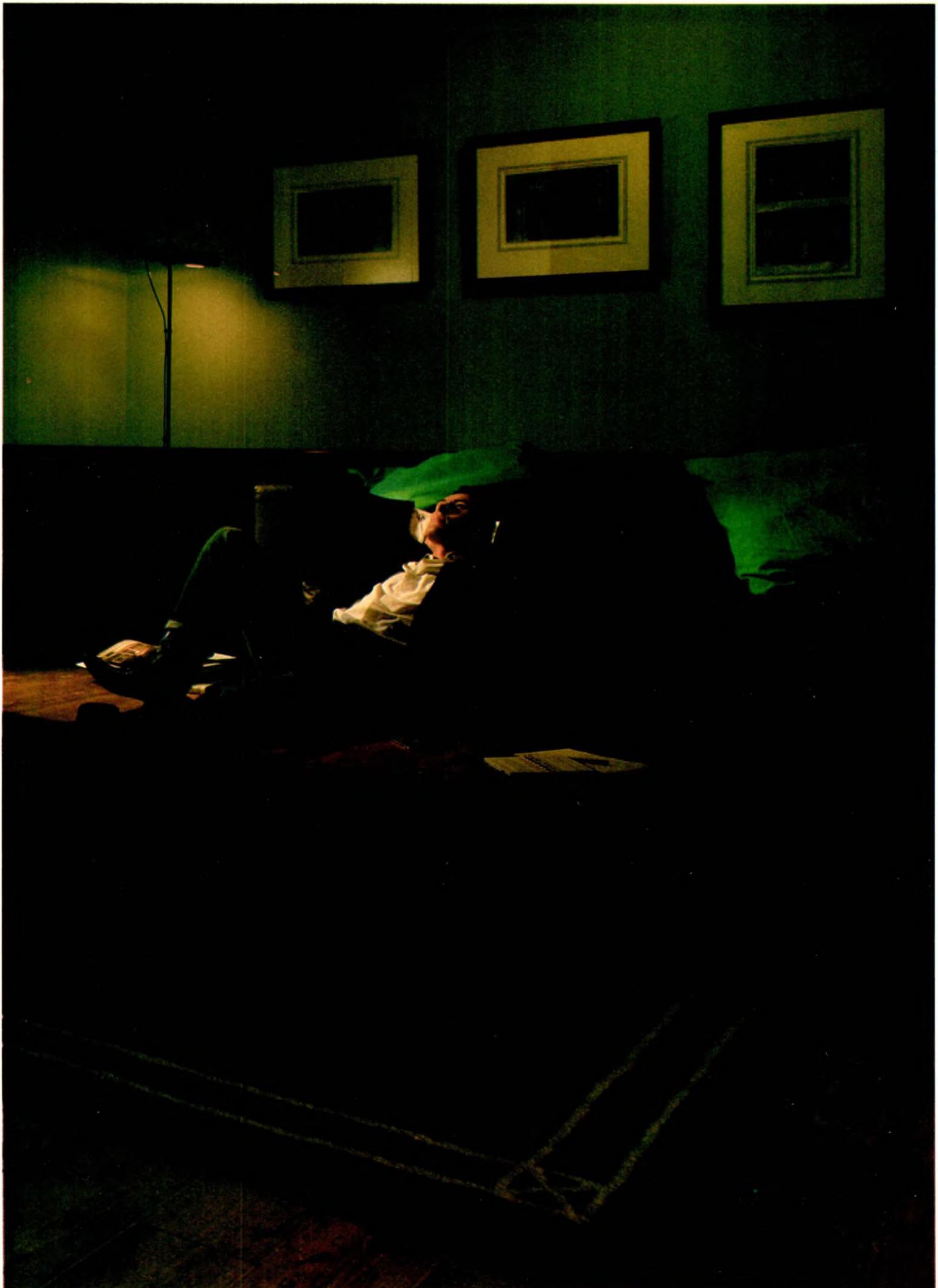
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BUSINESS TRADE

THE DESIGNER FACTORY

Linn Products, once the rebellious child of the hi-fi family who did much to turn the business on its head, have come of age. Despite retaining much of their craftsman image, they now have one of the most advanced factories in Europe when it comes to stock control.

Nobody stops for tea break in the warehouse at Linn's flash new factory outside Glasgow, because nobody works there! The whole operation is handled by a team of German robots which find the necessary components and load them onto small, bleeping 'droids' which glide around the factory delivering to the production line. Perhaps production line isn't the right term as, despite all the hi-tech, Linn operate more on the Aston Martin rather than the Ford principle of manufacture.

Product assembly and testing is handled from start to finish by small groups, for the sake of both quality and efficiency. Linn boss Ivor Tiefenbrun claims that allowing staff to build products right the way through actually allows them to make their own compensations for their weaker points. And although Linn operate a quota system, this is tied to a worker's own ability rather than run like a sweat shop.

Linn were forced to move out of their old Castlemilk plant as the product range expanded and turnover increased – despite the empty warehouse, staff levels are now higher than ever.

The new factory was designed by the outrageous and unconventional but award-winning architect Richard Rogers, and features some neat ideas. Tiefenbrun wanted space to expand if necessary, so the frame of the factory can support a hanging mezzanine floor, if needed. There is also plenty of room to expand the site itself, as the factory is isolated in the middle of farmland on the edge of a wood. Despite being bright blue, the Linn factory is pretty well hidden in the trees.

The robotic warehouse system was custom designed for Linn in



Rogers' flair on Scottish greenfield site

West Germany and is the first of its kind in Europe. Even the smallest electronic components are handled by the same large robots.

As yet the shop floor is still not properly organised, and Linn are experimenting with different layouts – they have only been in for a few months. But rapid expansion is clearly on the cards as they bring out new products, such as the tuner and integrated amplifier currently on the design computer.

Tiefenbrun is very confident about the future of Linn. Sales have increased steadily – owing, he admits, to the new interest in hi-fi brought about by Compact Disc (which some said would kill Linn off). After years of experimenting with CD, he still doesn't feel positive enough about the software to want to make a player. But he is interested in digital formats nonetheless, and is keen on the DAT concept.

It may well be that the mezzanine floor will be needed sooner rather than later.

JVC UK CD

JVC are setting up a £27m factory in East Kilbride, near Glasgow, Scotland which will eventually be used to manufacture CD players. The factory takes on 200 people this month and will initially be used for colour television manufacture, with 20,000 units a month capacity by April.

JVC expect to be producing CD players there by 1990 – increasing overall production at the factory and creating 650 jobs by 1993. All JVC hi-fi is imported from Japan at present.

The company's present CTV production has been carried out under licence by Ferguson (now under French ownership) in Gosport, Hants and Enfield, Middx. This contract has now ended prompting the move into self production. The plant will be launched by Japanese staff but the firm say they hope to employ local people in top management positions as soon as possible. East Kilbride was chosen for its light engineering tradition and skilled workforce, and the company will move into existing buildings.

JVC will be importing units from Japan while the plant builds up capacity, but hope it will eventually be big enough to service markets in Europe, Africa and some Pacific countries.

SPRINGSTEEN SINGS FOR SONY

The Sony Corporation, based in Tokyo, has bought CBS Records for \$2 billion, an offer that became irresistible following the worldwide slide in share values. The final deal is expected to be signed in January although agreement was reached between Sony and CBS boards several weeks ago.

Sony's involvement with CBS dates back to 1968 when CBS/Sony Records Inc was formed as a 50/50 venture in Japan. That has now become Japan's premier record company with sales of around \$600 million.

CBS is a record giant with outlets in over 50 countries and sales of \$1.5 billion in 1986. Sony hopes to improve even on this.

Which does not necessarily mean more Japanese tours for the likes of Springsteen, Cyndi Lauper, Michael Jackson, Barbara Streisand or Placido Domingo who are some of the famous CBS names now working for the Nipponese Yen rather than the Yankee dollar.

NOVEMBER HICCUP

Well on target to record its best ever year in 1987, the UK consumer electronics market seems to have been knocked somewhat off course. The late October simultaneous arrival of Hurricane Ethelred and the stockmarket slide could not have been better timed had there been deliberate intention to disrupt the main buying season.

On the broad front reports have appeared that the Dixons chain has 'misjudged' Christmas this year, and the share price of this market giant has taken something of a knock over and above the events of Black Monday. Profit forecasts made earlier this year have been revised downwards by 10 per cent by City analysts. Consumers looking for bargains (outside the hi-fi field of course) should pay close attention to post-Xmas stock shifting measures.

Despite DTI statistics showing record November retail sales major specialist hi-fi dealers throughout the south of England have had a disappointing month, with sales in some cases more than 20 per cent below the same month last year, putting a significant dent in 15 plus per cent overall annual growth expectations. Likely reasons are that many potential customers have spent both time and ready cash in repairing roofs, fences, TV aerials and the like and are waiting for money to come back from insurance companies, while the lack of stability in financial markets has increased caution.

over any expenditure, as the healthy building society receipts show.

Happily December appears to have started a little better, and the north of England seems to have been insulated from the shocks that have affected the south. One prominent Yorkshire retailer reported that their November figures showed a 12 per cent increase – 4 per cent short of budget, but healthy nonetheless. And the recent drop in interest rates with consequent lower mortgage payments seems to be a ray of sunshine penetrating the general financial gloom and miasma.

Not unexpectedly, the 'high end' of imported exotica has been affected worse than most. Distributor Automation Sciences are reportedly now trading as normal after restructuring, having had a particularly difficult cash flow period as a culmination of slow paying dealers, expensive hi-fi shows, slow sales and the stockmarket slump – the relationship with the Dutch van den Hul company having come under particular strain.

TIMES-A-CHANGING

The fortunes of Wharfedale loudspeakers look set for a change following a management buyout before Christmas.

The company, which has been the subject of much mulling over several months, was sold for an undisclosed sum. Fifteen members of the board and management team at Wharfedale have bought into the firm and the Independent Investment Company and Lloyds Bank have found the rest. Two new board members have been appointed: Bill Thewlis is the new Chairman appointed by ITC, and Ashley Ward is the new Vice Chairman. Mr. Ward approached the ITC through Bill Thewlis with the buyout scheme from Wharfedale's management. Neither man has experience of the audio industry.

Mr. Thewlis said his first task at Wharfedale would be to consolidate and improve relations with dealers. "I think the company rushed things too much," he said, "there were too many new products brought out; it upsets the trade to move too quickly. We now need a period of stability but there are a number of new things in the pipeline which may be shown at the Penta Show."

In becoming more market orientated, Wharfedale intend to strengthen support to retailers (encouraging reciprocal confidence) and listen to the needs of the mass market as well as developing products for the discerning end user.

Wharfedale will maintain existing distribution channels and Mr. Thewlis said the new plans, such as developing any new products, will take up to twelve months to implement.

"There is an affection in the industry, from the people I have talked to, for the Wharfedale name," he said. "we're going to build on that and you can see from the commitment – we're determined to succeed."

BOWERS BOWS OUT

John Bowers, the founder and guiding force behind B&W Loudspeakers, based in Worthing, Sussex, has handed over the running of the company to Robert Trunz, the new chairman.

Mr. Bowers has suffered recent ill-health but will remain on the B&W board in a consultative capacity.

He set up the company 21 years ago, introducing the successful line of loudspeakers which were originally made for limited sale from the Bowers and Wilkins shop, which is still going strong as Worthing's specialist hi-fi dealer.

SPEAKER MAKERS IN STOCK EXCHANGE

TGI plc, the holding company formed by the Tannoy, Goodmans, and Mordaunt-Short merger last year, will be seeking a stock market quotation in the next few days.

The group, which has an estimated \$35m turnover is hoping for a \$15m-plus listing on the stock exchange. No final date for the quotation had been set in the days before Christmas, and a spokesman for the companies said this would depend on the market situation at the time. All three manufacturers are principally involved and known for their loudspeakers, though Goodmans imports and markets products from personal stereos to

microwave ovens under its own brand name.

BRISTOL FASHION

The Holiday Inn in Bristol city centre is the venue for Hi-Fi '88, the first show of the new year. Featuring too many brands to count, it will take place over February 12, 13 and 14, and the usual show discounts and special offers will make the \$1.50 entry fee a bargain for the buyer. It starts at 2.00 p.m. on Friday and 10.00 a.m. on Saturday and Sunday – children under 14 get in for free.

BUILDING ON SUCCESS:

Beard Audio, manufacturers of exotic valve amplifiers, have been bought by Generation Securities, a firm owned by members of the McAlpine Construction company.

The unlikely marriage took place after Hamish McAlpine tried to buy Beard equipment in Tottenham Court Road last February. Dismayed at finding there was a four-month waiting list, he decided to go one better and buy the company as well.

Beard will now expand, increasing production fourfold by the spring, and promise no waiting lists by then. A delighted Bill Beard said he would continue at the company's helm with particular responsibility for product development, and a new sales team has been recruited to set off on Boxing Day for a world tour "to take advantage of market opportunities both at home and abroad".

SOFTWARE TRENDS

The BPI's quarterly survey of recorded music sales showed that the market is still healthy, with an annualised growth of 14 per cent by volume and 25 per cent by value in the year to September 1987 – the surplus increase in

value reflecting the increasing contribution of compact discs to the market as a whole.

Vinyl as a whole remains the biggest sector. CD notwithstanding, 12" LP sales remain steady, though 7" singles are steadily declining. Pre-recorded cassettes grew rapidly until the end of the first quarter of 1987, but now appear to have stabilised at around 73m units/annum – roughly the same as the total for 12" vinyl (LP plus singles).

Compact discs continue to show spectacular growth rates, currently around 170 per cent year on, and declining slightly as their overall share of the market increases. CD still represents only 10 per cent of the album market by volume, but over 20 per cent by value (and more than 25 per cent over the last quarter).

ONE FOR YOUR FILOFAX

Hi-Fi Choice has joined forces with *Time Out Magazine* to organise the audio section of the Time Out 'Live' exhibition in May 1988. The exhibition concentrates on lifestyles and will cover just about every aspect of concern to people in the 18-35 age group.

Scheduled to take place from 27 to 30 May (over the Spring bank holiday) at Olympia 2 London, Time Out are concentrating on making 'live' different from any other. "It's the first of its kind, and rather than people just gawping at stands we're trying for a hands-on approach", said organiser Jane Staley.

For our own part we are going to let you get your hands (or at any rate ears) on some juicy high-end equipment, as well as the latest in home entertainment, CD Video. And (rumour has it) we'll be giving away hi-fi in easy-to-enter competitions.

As well as hi-fi, Time Out 'Live' will offer continuous entertainment (in a specially constructed two-stage theatre), art and craft shows, aspirational sports like micro-lighting, fashion clothes for casual and sporting wear, satellite TV, holidays with a difference, cars, furniture, jewellery, previews of films (four months early), new books (with their authors to sign them) and the list goes on...

And it looks good, especially if you're able to keep within your budget in the heady free-spending atmosphere the show promises. The price for getting into this Mecca to mammon? Time Out say 'under a fiver', which seems fair considering that a lot of freebies are going to be flying about. And of course, you don't have to be a *Time Out* reader to get in.



Wharfedale buyout; left to right: chairman Bill Thewlis, MD Dennis Holden, vice-chairman Ashley Ward.

PRODUCTS

NOT ANOTHER ONE!

Yet another feature-laden Denon cassette deck has arrived with the promise of "many new features". The £290 three-head *DRM 24HX* comes with Dolby *HX-Pro*, Dolby adjust and bias level setting and constant current drive circuit recording amps (try saying that after finishing the port!). The latter is a new record amplifier that can drive the heads at the same level at all frequencies, avoiding the frequency dependency of many conventional models.

These complement (or supplement) the usual Denon features *viz*: three laser-cut heads, three-motor twin-capstan transport, controlled tape head positioning, split power supplies, auto tape select and switchable MPX filter.

GHETTO APPEAL

Young people (and those who remember a more psychedelic era) may approve of the new Memorex *iBS-1* tape. Available in C90 and C60 lengths, the normal



bias type has been developed in America. Its main selling point though is the packaging. Memorex claim to have created "obvious teen appeal" with "hot graphics" which will catch the un-glazed eye of Britain's youth.

LEAD ACID LFD

A unique new preamplifier with some innovative design features is introduced by LFD Audio, of Clacton-On-Sea, Essex, and is being marketed by ex-Essex University research student Richard Bews who was also involved in the later design stages. It is principally the brainchild of Dr Malcolm Hawksford, of Essex University's Audio Research Department, who acted as



Another feature-packed Denon cassette deck – the £289 24HX.

consultant to LFD.

The most unusual feature is the pre-amp's power supply that uses lead acid batteries throughout to ensure isolation between stages. The advantage of this non-interactive power supply is a reduction in circuit performance changes – effectively cutting out imperfections in electricity supplies – and an elimination of support circuitry, such as current sources.

The batteries are regularly recharged by the supplied automatic battery management system (housed in a separate box), but LFD say up to two days continuous play is possible between charging!

The preamplifier is of dual mono construction (three boxes in all), and the highest quality components and materials are used. These include single strand LC and PTFE insulated wiring, non-magnetic film resistors, high precision capacitor modules, hard-wired switched attenuators and full 'STAR' configuration grounding.

The switched attenuators used in the preamplifier are also available in another box for use as a passive control unit for connecting any low impedance line source to the power amplifier. Two versions, a one input and a three-input, are available. Again LFD point out reduced numbers of components, solder joints and metal to metal contacts, and say this promotes transparency of sound.

The price? The preamp costs £3,500, which may seem steep but LFD argue that the time and quality spent in its construction (parts alone cost some \$700) are justification. LFD Audio, 110 Oxford Crescent, Clacton-On-Sea, Essex. Tel: (0255) 220140.



Radical lead acid pre-amp from LFD.

THE PROTON PORTFOLIO

After many months of discussion Portfolio Marketing have taken their first consignment of stock as new distributors of Proton equipment, which had previously been handled by Hi-Fi Markets.

At a recent press conference, Portfolio's Bob Cox and Dennis Casey unveiled the new Proton range from Taiwan, which includes amplifiers, tuners and pre/power combinations. And after earlier criticism about Proton's similarity to NAD, it was clear that much had been done to change the Proton image.

Proton is owned and manufactured by Taiwanese electronics firm, Fulet Manufacturing. Most of their time used to be spent manufacturing OEM electronics for companies like NAD and Acoustic Research, but this work is being entirely replaced by their own Proton brand, with design work mainly handled by outside consultants.

The new products which Portfolio showed to the press can be split into three different groups of domestic hi-fi, and one of in-car audio. At the budget end of the market, the \$150 *AM200* integrated amp features a switchable capacitance moving magnet phono input, tone controls, loudness and bass EQ – a list that seems much more aimed at US than UK tastes. The designs aimed at eliminating crosstalk and is almost two mono amps in one. This is a characteristic of all Proton's amplifiers, and is particularly evident on the \$660

P1100/D1200 100W pre/power combination.

Proton tuners all feature the Schötz phase-locked-loop variable bandwidth detector which helps cut down multipath interference from weak stations, improve sensitivity and reduce distortion.

Also presented was the *300* series of fully remote controlled products, including amplifier, tuner and cassette deck – CD players are also on the way. Portfolio eventually aim to create complete home entertainment systems including video and TV products. Proton's range of in-car products include cassette radio units and power amplifiers.

GOODMANS GOODIES

Goodmans launched a new range of Jamo loudspeakers just before Christmas with the promise of "real wizardry" from the Danish manufacturers. They consist of three models in the *Magic Line*, three models in the *CD Power* line and *1E* and *6E* additions to the existing *Dynamic* range.

Magic 8 retails at \$139, *Magic 10* at \$139 and *Magic 14* at \$169. The *CD Power 15* is \$199, *CD Power 25* is \$249 and *CD Power 35* is \$349. The *Dynamic 1E* and *Dynamic 6E* are \$89 and \$369 respectively.

The new arrivals will please the 'enthusiastic cult following' (often called Sharon or Dave – *Ed*) that Jamo have established for themselves in this country.

AFFORDABLE CHAMELEON

Helius Designs have launched their *Chameleon HC 500* loudspeaker; retailing at \$349 it is the cheapest speaker they make. A fairly deep, mid-sized infinite baffle cabinet encloses two purpose built units designed by Helius themselves. The tweeter is a 1" polyamide dome, and bass/mid frequencies are covered by an 8" doped paper cone. The



One for Sharon, two for Dave – Jamo CD Power range.

“Amongst the finest in its area of the market – and an easy match for some much more costly players.”

(Alvin Gold – CD Review)



DCD 1700 – £649.

“... Both in terms of construction and sound quality, the DCD-1700 represents excellent value for money... Definitely recommended.” *(Paul Miller, Which Compact Disc Sept 87)*

“... the DCD-1700 possessed a marvellous sense of openness and immediacy that revealed the innermost subtleties without stripping the music of its essential warmth and delicate timbres.” *(Paul Miller, Which Compact Disc Sept 87)*

- Denon's 16 Bit 4 × oversampling
- 2 × DA Converters
- Hi-speed linear transport
- Digital output
- Absolute phase filtering
- Hi-Mass construction

Denon's new generation at an affordable price.



DCD 1500 MKII – £499.

The DCD 1500 MKII is a new highly refined version of the DCD 1500 and clearly improves upon the critically acclaimed sound of its predecessor. Much of the advanced technology developed for the DCD 3300/1700 has been incorporated and the result is an outstanding CD player for the price.

- Double super linear converter
- Denon's 16 Bit 4 × oversampling
- LC-OFC analog filter
- Optical isolator
- 4 Independent power supplies
- BMC pickup chassis
- Optical digital output terminal

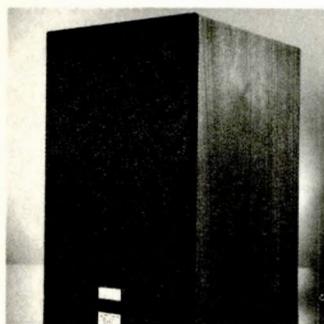
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DENON

Pure Performance!

crossover is second order for the treble and third order for the bass/mid, using air-cored inductors. Helius claim that the specifically tailored units don't require equalisation in the crossover, and thus maintain (or at least get close to) linear phase.

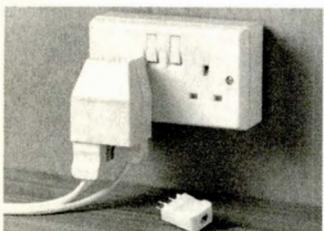
Although designed to be free standing the *Chameleons* are also



supposed to work well close to the wall and on bookshelves without severe sound quality degradation. Available in both black ash and walnut real wood veneers, they are compatible with amplifiers ranging from 15-75 watts. Helius Designs, The White House, Aldington, Evesham, Worcs. Tel: (0386) 830083.

ADAPTING STYLE

A possible solution to bulky multi plug units for the hi-fi is the Multi Adaptor which will take four cables and actually make them look neat. For those of us without



Naim systems under the stairs Cambrian Distributors have come up with the Adaptor which plugs into a normal 13 amp socket and has four mini three-pin plugs underneath. The sleek unit costs \$10.99 and is available from CD Newton, Powys, Wales SY16 4LF. Tel: (0686) 24508.



JVC VCR with on-board NICAM 728 decoding.

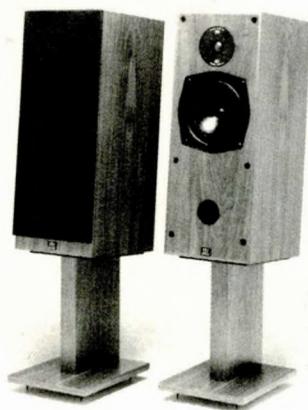
MORE METAL MONITORS FOR MO

Monitor Audio bring their latest metal dome tweeter speakers onto the market this month. The \$346.60 *R452 MD* joins its brothers and sisters in MA's range of metal dome speakers.

Mo Iqbal, MA's bejewelled MD, says his latest offering is "efficient, dynamic and fast."

Monitor Audio have also introduced the \$599 *R952MD*, lighter in weight than the *R452MD*.

The *R952MD* features two doped-cone mid/low frequency



drivers either side of the high frequency metal dome tweeter. This tweeter uses a large magnet assembly, vented with a damped

cavity, with a claimed linear response through to 21kHz. Monitor Audio also point to precise amounts of ferrofluid in the gap for maximum power levels without distortion, well arranged voice coil leadouts and eight-hole vented voice coil formers claiming the sweetest sound yet.

Further details from Monitor Audio, Unit 34, Clifton Road, Cambridge. Tel: (0223) 242898.

TARDIS QUALITIES

"Turn your living-room into the Albert Hall or Wembley Stadium with Sharp's new surround sound system for £879." That is the manufacturers' caption to the pictured system which should get all would-be Time Lords reaching for their cheque books. The Optonica *SM-A75* system can be plugged into telly, CD player, cassette deck or record deck and is then promised to deliver the sound as if in a stadium or cathedral - up to 11 pre-programmed environments can be recreated.

Five speakers put you in the middle of whatever mode appeals and the whole experience is remote controlled. Of course if you are going to turn your living-room into the Albert Hall you will also need a fertile imagination, knowledge of the existing decor, consummate DIY skills, a damn good recording and someone coughing or eating sweets nearby...

TECHNOLOGY INDEPENDENT STEREO TV?

A major independent television company has been speaking out about the BBC's recent decision to postpone stereo television until 1991. During a recent press conference at their Maidstone studios, TVS sound engineers expressed great disappointment over the BBC's announcement and suggested that the onus may now be on ITV to take the lead and start broadcasting later this year.

Robert Edwards, the deputy head of sound at TVS, stated that pressure from advertisers would probably force ITV to start broadcasting blocks of stereo TV as soon as possible. He also pointed out that, despite their statements, the BBC were still running undisclosed tests of NICAM 728 stereo broadcasts from Crystal Palace, including a recent *Top Of The Pops*.

TVS have also been quietly recording some of their programmes in stereo, and are in any case having to make dual-standard soundtracks to sell in other countries already equipped with stereo. But they officially deny having tried broadcasting in stereo.

One of the problems faced by the independent stations is that they use British Telecom landlines, and booking two for stereo may result in one channel being routed a different way to the other and end up out of sync.

The NICAM system will cure all this by offering sound in sync with the pictures (I can hardly wait *Ed*). But this will require a total conversion of the transmitters around the country. Despite the work and expense involved, TVS are confident that the independent network can take the initiative and possibly force the BBC's hand.

But before you think that the 'stereo' CTVs currently available will work straight away with the new system, let us put you right. The only major manufacturer currently offering a suitable NICAM decoder as part of their flagship VCR is JVC. However, the stereo CTVs that do exist may still be worth considering for those contemplating buying a new set. Many are designed to retrofit the NICAM circuitry in the future, and all should be compatible with a NICAM VCR.

Edwards reckons that once stereo TV does come in it's unlikely to be pure stereo but more probably the type used by film makers, where the majority of the sound is in mono with only special effects, atmospheric sounds and incidental music in stereo. He also feels that the best stereo for TV is likely to use a narrowed image.

His own experience with stereo and pictures, using simple boom mike techniques, have shown that full width stereo and a swinging boom results in viewers getting 'seasick'. Experiments have also shown that the digital NICAM 728 signal suffers from very little deterioration even under poorish reception conditions.



Sharp's DIY Albert Hall kit.

A photograph of a wooden bookshelf. The top two shelves are empty, showing a warm, brownish-gold background. The bottom two shelves are filled with a dense stack of CD spines, creating a colorful, textured pattern of various colors and patterns. The lighting is soft and focused on the shelves.

**Spend £250 on CD, and you'll
Spend £250 on a cart**

When you have more than £150 to spend on a cartridge, you are into a new realm. The realm of the moving coil.

Unlike the moving magnet cartridge you are probably used to, in which magnets are attached to the cantilever, the cantilever of a moving coil has very fine metal coils wound round it. Which makes it much lighter and far more responsive to the transients cut into the grooves of a record.

As a result, a moving coil cartridge gives a much sharper, more clearly defined sound, with appreciably greater depth and spaciousness. It will also pick up the leading edges of the transients; the more detailed elements of the music that moving magnets can miss.

A moving coil is more expensive, because it demands more costly components and highly exacting engineering.

But it will not only make your records sound much better. It will actually reveal subtleties in the original recording, which you never knew existed. To say buying a moving coil cartridge is like getting a new record collection is no idle boast.

FIRST THEN. FIRST NOW. Back in 1948, Ortofon were the first people to produce moving coil cartridges. Prior to that, the company had spent many years using the same principle in the construction of state-of-the-art cutting heads.

This parallel between the manufacturing of records and their reproduction explains, in part, the superior accuracy of moving coil cartridges.

Since then, Ortofon have been consistently developing and refining them. The MC30 Super exemplifies how much progress has been made.

The stylus is the new FG Type 1, named after Fritz Gyger, the Swiss diamond manufacturers who are the only company in the world capable of cutting such a minute diamond with the necessary precision.

need a new record collection. ridge and you'll have one.

Its shape has been designed to make contact with the walls of the groove, where musical information is embedded, without touching the bottom and picking up surface noise.

The aluminium cantilever is tapered, to eliminate standing vibrations which can start distorting sound at source. And the coils surrounding the cantilever are made from pure silver, one of the finest conductors known to science.

To get the best from such sensitive components, the cartridge body must combine minimum mass with maximum rigidity, to prevent resonance. To achieve this, the MC30 uses two aluminium extrusions, bolted together for extra rigidity, and a carbon fibre base-plate, to repel static.

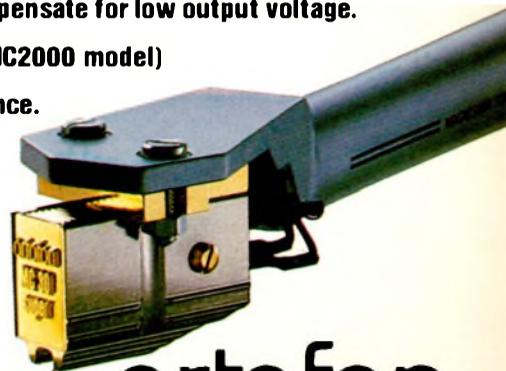
HEARING IS BELIEVING. While delivering superb sound reproduction, the MC30 Super also avoids a drawback traditionally associated with moving coil cartridges. Namely, the need for a step-up device to compensate for low output voltage.

A tiny, cross-shaped armature (originally developed for Ortofon's legendary MC2000 model) allows extra coil windings, without an increase in mass or any reduction in performance. And a more than adequate voltage output of $>0.2\text{mV}$ at 1kHz.

You can get full information on the MC30 Super and other models in Ortofon's moving coil range, by writing to: Ortofon (UK) Limited, Denmark House, Tavistock Industrial Estate, Ruscombe, Twyford, Berks RG10 9NJ.

But an even better idea might be to take your favourite album along to your nearest Ortofon dealer, and ask to hear it through an Ortofon moving coil cartridge.

The few minutes you spend doing so could make you think twice about spending years building up a new collection.



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They'd be deaf to the dynamic power and stereo imaging of the LD50 DMS speakers.

And as for the digital filtering and

16 bit 4 times oversampling of the CD 75, well they wouldn't know where to start.

Whether played as a system, or as 'separates', it's only a person who takes his music seriously who'll reap the full benefit from these components.

But then at a total cost of £649, anyone who isn't serious won't be snapping it up anyway.



marantz
Hear the music



READERS' WRITES CHOICE ANSWERS

SPEAKER CHOICE

I am about to purchase a pair of loudspeakers and would like some advice before doing so. The loudspeakers I will be buying will be either the Wharfedale *Delta 7* or the Tannoy *Mercury*. They will be driven by a Pioneer SA-970 amplifier (87 W per channel, impedance 6-16ohms). Could you please advise me on which of the two choices to buy?

MR D CHOW,

TYNE AND WEAR

With regard to selecting loudspeakers, the most logical approach is to audition in the context of your system and room. Of the two models you have selected we would recommend the Tannoy Mercury, but eventual selection should be based entirely on getting the best out of your system.

RECORDING LIVE

I have bought a Sony Walkman Professional WM-D6C which I use for recording live concerts. I want to buy a quality microphone for it. Can you recommend one?

ROBERT S KITTERINGHAM,
MANCHESTER

When the WM-D6C was reviewed by Choice last summer Sony's £30 ECM 101 electret microphone was mentioned as being 'suitable'. This is a T-shaped condenser microphone that 'plugs in' and becomes part of the Walkman itself. Sony themselves recommend their £59 ECM 909 electret which is a more conventional wire type, allowing you to leave the deck in a pocket (probably an important factor if you're up front trying not to pogo). The ECM 909 measures 115 x 24mm. Failing this Beyer, AKG and others also make small microphones which would be suitable. To explore this further, your best move would be to visit a shop which specialises in professional and semi-professional recording equipment and try out the options for yourself.

EQUALITY vs DISTORTION

Please could you help me regarding graphic equalisers. I see

from an Onkyo catalogue that they have tape deck input and output terminals. Does this mean your first tape deck could go into the equalizer then presumably via other terminals into an amplifier's auxiliary terminals and then through a second tape deck from the tape record terminals on the amplifier?

Would this make (after playing about with independent frequency bands) a difference to the recorded sound? I'm sorry if these questions seem confused but I'm not sure what these graphic equalisers are capable of doing, perhaps they are for playback purposes only. I have just bought an Onkyo TA-2130 cassette tape deck as a result of reading your book. In fact I have acquired all my hi-fi by purchasing the appropriate *Choice* books. However, in your *Best Buy Guide* you haven't bothered reviewing graphic equalisers; perhaps the systems are pure enough already.

Are Onkyo, Yamaha or other equalisers in the £100 to £160 price bracket the same as far as performance goes? I am seriously thinking of getting one of these components.

DERWENT QUINN,
SCARBOROUGH,
N. YORKS

The Americans seem to have bought the graphic equaliser phenomenon far more than the British. But then perhaps it appeals in the same vein as the flashing lights on their audio equipment, the relish on their beef and the flamboyance of their foot-and-baseball games.

The opinion of this (and other) hi-fi magazines in Britain seems to be that the less circuitry you put in the way of your source signal, the better your resulting sound will be. This is why certain 'state of the art' amplifiers don't have tone controls which are more or less the same as a graphic equaliser in that they alter the frequency response. Of course it all depends on your ears and whether you want to recreate the original sound or not.

The equaliser is really just an elaborate form of tone control, offering greater flexibility in

adjustment but probably greater signal degradation too. It may be built into the amplifier (as is common with midi systems) or purchased as an additional box as you are suggesting. In the latter case it is then connected either as a tape recorder (assuming the amplifier offers tape monitoring) or between pre- and power stages (sometimes pre-out and power-in sockets are available on the rear of integrated amplifiers). Though not usual practice it could also be used to pre-EQ a programme for recording but would need to be connected differently (eg in series with tape recorder in the same tape monitor loop).

We cannot recommend a brand of GE because we have not tested any (for reasons given). If you must have one, fair enough, but in our view modern quality hi-fi systems sound better without, so think less of getting one of these components and spend the money on some more records instead.

DUBWORTHY

I have found your *Cassette Decks and Tapes* issue most helpful in choosing a broadcast quality portable cassette deck. Clearly the Sony Pro Walkman WM-D6C came out top.

However I also need to make tape to tape dubs and require another machine to provide the necessary playback. This does not need to be portable since all recording can be done on the Walkman. Have you any suggestions?

DR CHRIS SINCLAIR,
PETERSFIELD, HANTS

If you want to make good quality copies of tapes it is important that the alignment of both machines is exactly the same, especially if you intend to play back the recording on a different deck to that on which it was made. As there are (to my knowledge) no high quality cassette decks that don't have the facility to record, I would advise you to play back the recording on the walkman and make the

copy on another machine. It is logical to use the better player as the source, and it will also be able to extract maximum information from its own recordings.

Though it's not a job for the untrained, a competent engineer could make sure the two decks have mutually similar azimuth alignments, which would be most helpful. If you have already made important recordings on your Pro Walkman, you should leave this well alone, and align the dubbing deck azimuth to give maximum treble output with your Pro Walkman tape.

As we have not tested any other cassette decks since those in the issue you mention, I can only refer you back to that issue's (No 52) Best Buys or Recommendations. You don't mention budget but at a guess I assume you are looking for something cheaper than the Walkman. This is an area where decks such as Denon's DR-M07 and Yamaha's KX-200 are very competitive, retailing for around £140.

A QUESTION OF BASS

Congratulations on the December edition of *Hi-Fi Choice*. I like the new A4 format and the inclusion of extra reviews and information. I wonder if you could settle a point of some controversy for me and several of my friends. We fail to agree on which of these three loudspeakers offers the best bass extension: Linn *Isobarik DMS*, Kef *R107* and the TDI. Reference standard transmission line speakers.

I intend to purchase a pair of loudspeakers to interface with LP and CD sources in a large room and my musical preferences are mainly for cathedral organ music. S J BRIGGS,
LOWESTOFT, SUFFOLK

It is probably true that the active EQ Kef R107 and the transmission line TDI Reference offer greater bass extension than the Linn Isobarik - we reckon 18Hz rolloffs for the former two against 25Hz for the 'Barik under anechoic

conditions (if there were a chamber large enough to check this accurately!). However, in practice each will interact differently with the particular listening room and its site therein. Frankly the relative level of the bass is subjectively much more important than the ultimate extension, and there is no easy way to predict the interactions without trying them out on site (if you can find a dealer who will cooperate!).

INTERFERING WITH MUSIC

I have a Marantz PA4 amplifier and a pair of Roksan Darius speakers. I am using my preferred cable which is DNM, but I am prone to picking up RF breakthrough. I have approximately four lengths of 5m cable to the speakers and 2

lengths of 2m to the crossover, and have been told that wrapping the cable in foil will help. But seeing that the cable supposedly works best because of the spacing, wouldn't foil cause more inductance and therefore spoil the sound heard?

R HAVAM,
BRIGHTON

There seems to be no easy answer to the problems of RF interference in modern high quality systems. Part of the trouble is that the radio spectrum is being used more and more intensively, so a situation that was acceptable a decade ago is often now problematic. More to the point, the techniques which can be used to screen the system from RF interference can, as you point out, also compromise the

sound and musical qualities.

For example Naim designer Julian Vereker offered to reduce the susceptibility of my tri-amp system, which suffered from t.a.r.s and fire engines plus the occasional overseas radio station at its busy A23 Brighton site. But he cautioned it would not sound as good as a result, so in the end I put up with the odd interference and continued to enjoy the music. Ultimately it comes down to the lesser of the two evils.

LFD AMP

As a leading European Audio Publisher I hope you can supply me with the information that I desire. I am told that there is a new very expensive English preamplifier designed by a professor which uses large batteries instead of a power supply. Would you give me the

name and address of the company marketing this product?

MR M LEVY,
SANTA MONICA,
CALIFORNIA

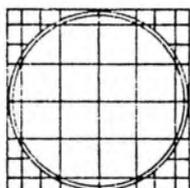
The pre-amplifier to which you refer is the LFD Audio, which has just come onto the market in Britain. It is being made and marketed by LFD Audio at 110 Oxford Crescent, Clacton-On-Sea, Essex CO15 3PZ. Tel: (0255) 220140.

The company has been set up by Richard Bevis, an ex research student from the audio research group at the University of Essex. Richard has been involved in much of the later design stages, although the pre-amplifier is the brainchild of Dr Malcolm Hawksford, who acted as consultant on the project.

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ASPIRATIONS

Owned by SME's managing director The Music Room is one of the legends of hi-fi – and the latest changes have made it more interesting still.

THE ART OF

Concealment

There can be few better known systems in hi-fi than that of SME founder and Managing Director Alastair Robertson-Aikman – affectionately and universally known as ARA (to the eternal gratitude of typesetters and proof-readers). Laying fair claim to being the least compromised domestic hi-fi system in the world, the Music Room has been described many times since its inauguration in 1976, but the constituents and components are always changing, in a perennially fascinating search for the ultimate. Indeed, the success and international reputation of SME is due in no small measure to the perpetual and infectious hi-fi enthusiasm of ARA himself.

The initials SME originally stood for Scale Model Equipment, the company starting in 1946 working to specific miniature precision engineering commissions, around the time that hi-fi itself was still in its cradle. Bitten by the hi-fi bug himself, but generally dissatisfied with both the design and engineering quality of the alternatives available at the time, led ARA and his associates to create the legendary *Series I* in 1959. Today the model is still in demand by collectors worldwide, for its sound quality and engineering excellence (not to mention a touch of nostalgia).

ARA, his family and company reside in the beautiful village of Steyning, nestling in the Adur valley beneath the Sussex Downs in the Brighton/Worthing hinterland. He commutes rapidly up and down the hills in his turbocharged Metro, from the factory to his south scarp home which overlooks rolling meadows and a lake.

The house was built in the 1950s, but for

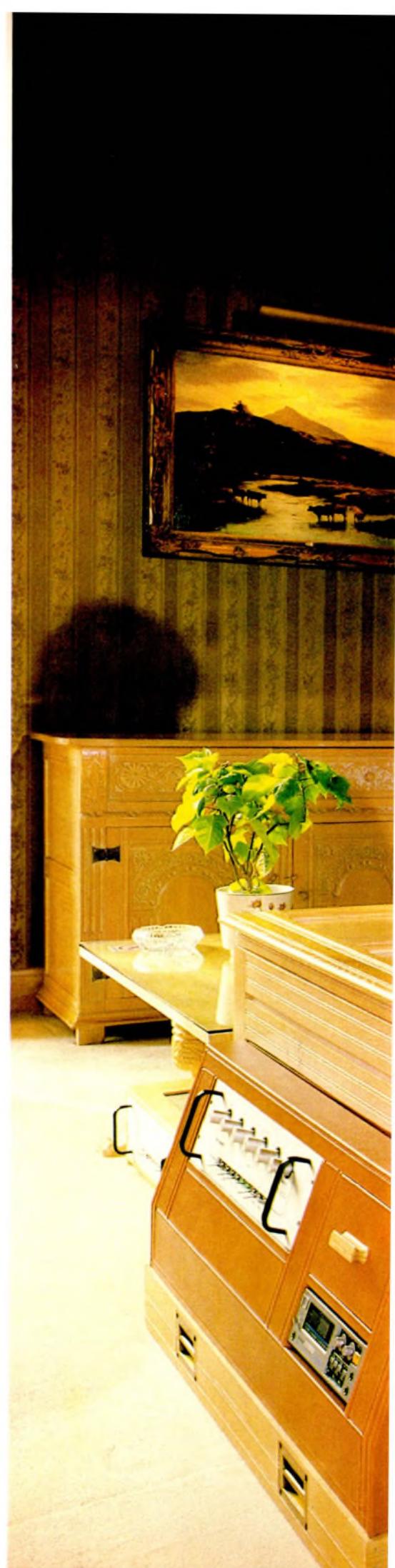
the first 20 years a modest enough lounge was home to stacked pairs of Quad Electrostatic loudspeakers. The Music Room was then built as an extension to the main building with the simple purpose of maximising the enjoyment of the hi-fi system, specifically when playing opera recordings. Whether the room or the system is the most important element in the total experience must be a moot point, but the fact that both are working together to the same end is undoubtedly fundamental.

Built on the grand scale and lavishly furnished in a decidedly rococo style complete with electric flickering crystal chandeliers, the twin curved staircases define an imposing entrance into what is, for all intents and purposes, a small theatre. The only obvious sign of hi-fi is a rather incongruously black Goldmund *Reference* turntable, whose great bulk has so far defied efforts to conceal it like the rest of the equipment.

At the south end of the room listeners are esconced in luxurious light tan leather upholstery and surrounded by heavily draped full height windows and doors. The curtaining may be adjusted as desired, either to modify the acoustics or to distract listeners with the lovely Sussex panorama. The north end consists of a full width proscenium with acoustically transparent but visually (nearly) opaque 'stage' curtaining that conceals the loudspeakers and power amplifiers.

The sheer size of the room is itself impres-

ARA standing beside operating console Percy oil paintings break up continuity of wall behind

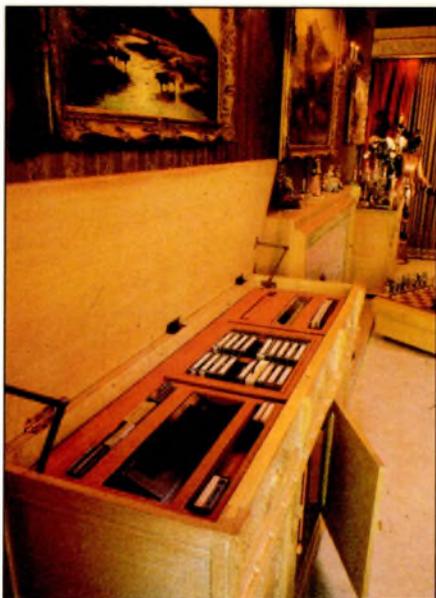






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Nakamichi Dragon, Sony PCM-F1 and ST-7 tuners are housed with records and tapes in carved light oak cabinet.

sive – eleven metres long, three metres high and approximately seven metres wide, making a total volume of approximately 240 cubic metres – but some of the other statistics that can be quoted are even more outrageous. The construction throughout is as rigid and heavy as possible, to prevent any sympathetic structural vibrations, and then the furnishings have been chosen to provide copious damping to limit unwanted reflections and control standing waves. The roof is a single span concrete casting weighing 30 tons, while it is estimated that the wool content in the carpeting and south curtaining amounts to nearly two tonnes.

The enormous Chinese carpet is a notable decorative feature that sorts out any floor-to-ceiling modes. It can in fact be rolled up to reveal a maple dance floor – but one man alone wouldn't get very far with this task because of the sheer weight and pile thickness. The exquisitely restored Victorian landscapes by Sidney Percy not only glow with a vigour unmatched in most public galleries, but serve a dual role in reducing reflections from the continuous side wall.

Most of the equipment is concealed in large, ornately carved, bleached oak cabinets whose internals are changed according to the currently required configuration. The smaller of these at the stereo seat in front of the sofa, alongside the Goldmund, contains all the main operational controls for the Audio Research SP11 pre-amp and a Sony PCM Betamax recorder (SLF-1/PCM-F1), and is powered at low voltages for added safety.

The lid in fact conceals a pair of 'spare' Oracles, which preceded the current turntable incumbent as platform for the Series V tonearm. The cartridge currently in use (and likely to remain so for some considerable time in view of its outstanding performance) is one of very few of the brand new Ortofon MC3000s to have yet reached captivity. Acknowledging the dilemma of inevitable



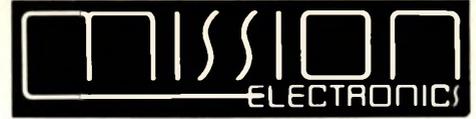
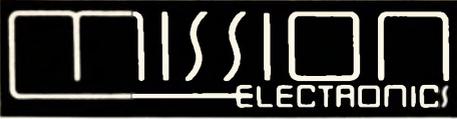
(mild) compromise, the '3000 is used with its matching transformer for the superior dynamic range this affords.

Though CD is notable only by its absence, the side cabinet contains a Nakamichi Dragon cassette deck and a Sony ST-7 tuner, along with records, cassettes and Betamax tapes. The tuner provides a broadcast source for both the recording media, but the F1 PCM system has the notable operative advantage of continuous record/playback in excess of three hours.

Down behind the proscenium and curtain is perhaps the most interesting part of all. Though previous incarnations have used literally dozens of Quad Electrostatics, with and without subwoofer systems, the current line-up is simply two pairs of (heavily modified) ESL63s, each channel driven by a massive Krell Reference monobloc power amplifier. There is no need for perfect presentation behind the curtain, so the Quads are stripped bare of stockings, dust covers and suchlike inessential (if for mere mortals very practical and visual) impedimenta (this is a 'no smoking' environment).

The '63s in each pair are placed at right angles to each other, the one facing forward to the listener, the other 'edge on'. Comparison between a single pair and this unusual double arrangement suggested that the latter offered a significant improvement in

A pair of heavily modified mutually perpendicular Quad ESL63s bracket a Krell Reference power amplifier



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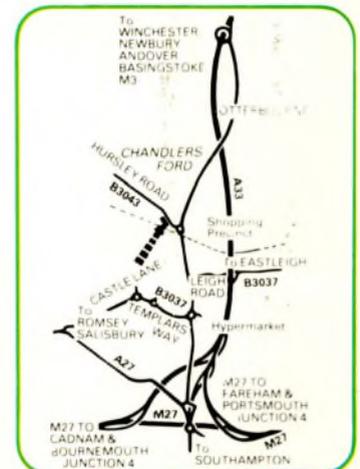
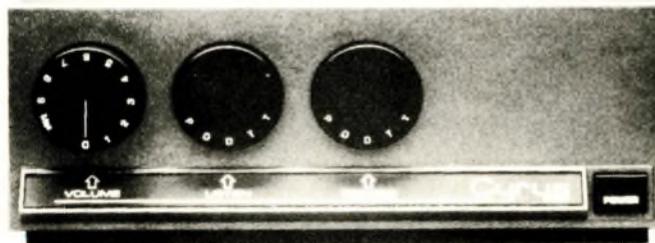
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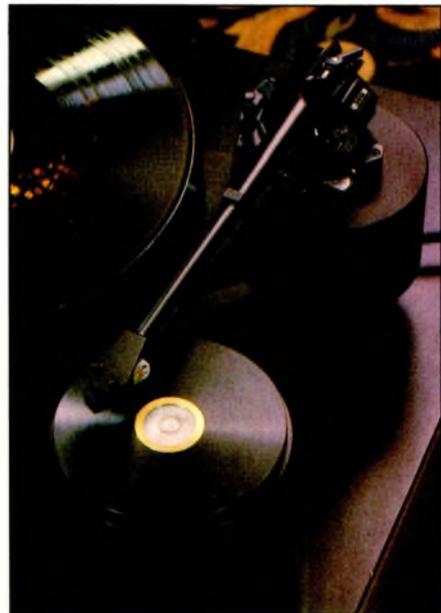


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(EXCEPT IN DECEMBER)

sense of scale without any apparent loss of precision, plus a rather more convincing total room drive. Several sound absorbing/reflecting panels are used against the rear wall a couple of metres behind the Quads, allowing significant 'fine-tuning' of balance to taste.

Like myself, ARA has great respect for both the unique stereo imaging and full range integration of Quad's *ESL63*, laced with significant misgiving regarding the low bass performance. Unlike myself, he has chosen to do something about it, using SME's impressive engineering capabilities to go far beyond the scope of the normal DIY enthusiast. Deciding that the problem lay in the structural integrity of the 'stationary' part of the speaker, he added substantial stiffening and 75lbs of distributed mass by means of six solid brass crossmembers which clamp the whole stator assembly within its frame. (Specially machined, heavily insulated cap head screws were needed to hold the arrangement together without causing HT leakage.) And as a final touch, 100lbs billets of steel are placed on top of each to further increase the overall mass loading.

Electrostatic diaphragms themselves are featherlight (literally), and it is often wrongly assumed that they therefore cause no mass reactance worth worrying about in the stator (frame or whatever), particularly as they operate in push-pull. This overlooks the fact that their very lightness provides comparatively good mechanical impedance matching to the air itself, so in fact the effective diaphragm plus air-loading mass of the Quads is more like 5lbs – more than sufficient to bring Newton's law of equal and opposite reaction firmly into the picture. The proof of the pudding naturally comes in the auditioning, and these Quads were an absolute revelation at low frequencies, even using some pretty unlikely rock music, whilst comfortably preserving their acknowledged strengths elsewhere.



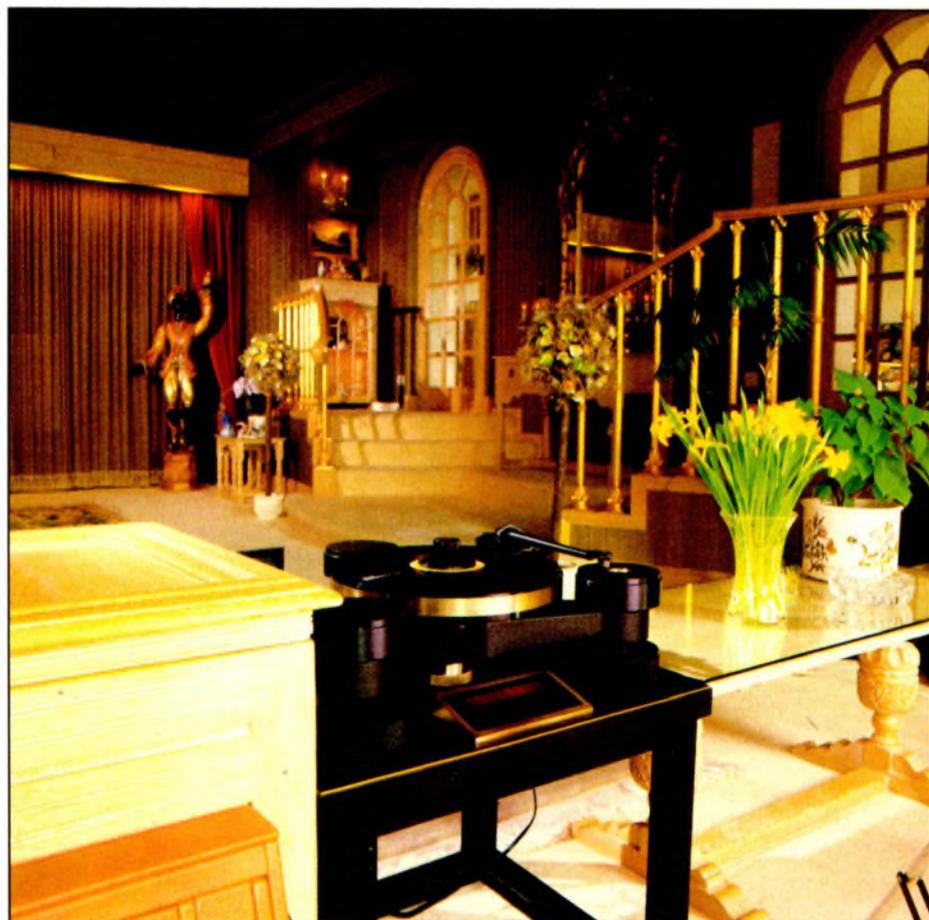
Goldmund Reference/SME Series V/Ortofon MC3000 – sternly black amidst rococo decor

The system as a whole gave a quite remarkable degree of realism, particularly on the operatic material – Jose Carreras' power and beauty sending shivers up and down the spine. Stereo was solid and precise, and the illusion that one was experiencing an event on stage and merely waiting for the curtain to be drawn back to reveal the performers was frequently persuasive.

To some extent the excellence of the system itself is responsible, as are the carefully planned acoustics of a superb and generously dimensioned room. But the 'invisible' curtained loudspeakers themselves play a vital psychoacoustic role too – one that is difficult to appreciate until it is experienced. As soon as the eye no longer sees the twin sources, the mind is far more prepared to accept the illusion that is stereo as a disembodied entity occupying the space between. But if you haven't heard it for yourself you won't believe me ...



Covered bleached oak cabinet contains records of tapes plus ancillary equipment.



SME Series V with Ortofon MC3000 on Goldmund Reference turntables

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1. Reading Reviews

Reviewers perform an invaluable service. They help to fill the gaps between the advertisements in this and other hi-fi magazines. Their comments are sometimes illuminating and often entertaining. But before you commit your hard earned cash on their say so, there are a few facts you should take into consideration:

Manufacturers are human

They like their products to review well. So, the odds are, some of them will carefully check any sample before it goes for review. If only every sample was subject to the same care and attention before it left the factory. If only you could buy the review sample.

Twins aren't always identical

Sample variance can occur. And review samples can sound better than average or, for that matter, worse. But the reviewer can only base his conclusions on a sample of one. Consequently, product consistency is never a consideration.

Marriages are not made in heaven

Products are usually reviewed in isolation. Yet compatibility is crucial. For example, an amplifier can sound exceptional through one pair of speakers and distinctly average through another. The ultimate combination will only be found through trial and error. But the reviewer has seldom the time, or the speakers, to find out.

Price doesn't come into it

The majority of reviewers write fondly of their "state of the art" system. And will often review products as part of that system. For many reasons, and price may well be one, your proposed combination may differ from theirs. Should this be the case, what you hear will almost certainly differ as well.

Mistakes cost money

Reviewers don't have to pay for their review samples. And, if they get it wrong, they don't have to pay for their mistakes. The rest of us are less fortunate.

Reviewers are human too

They know what they like. And sometimes they only seem to like what they know. But the real problem is, sound is subjective, and their tastes may be different to

2. The Other Options

Of course, there are alternatives to reading reviews. Some of the more common include:

Talking to friends

Often, this is even less reliable than reading reviews. Friends will often be prejudiced in favour of their own systems, arguably influenced by magazines, and limited in terms of their overall knowledge. Essentially, having found the hi-fi that is right for them, they will be convinced it should be right for you.

Studying the specifications

Even though products may be built to identical specifications, any comparison, no matter how detailed, will be uninformative. Only your ears, and not your eyes, can tell you anything about sound quality. Stop studying, and start listening.

Reading the small print

Guarantees seldom provide any guide to product reliability. Significantly, some manufacturers apply higher standards of quality control than others. A fact that is seldom spelt out in the small print.

Anticipating the worst

Even the most reliable product can occasionally go wrong. Again, different manufacturers have different track records when it comes to repairs or supplying spare parts. It helps to know, even if you never have to find out.

Listening in domestic bliss

Your home is not an anechoic chamber. It's where you live. And it's worth remembering that hi-fi equipment can sound quite different in different rooms, and even when placed in different positions in the same room. The final decision must be taken in the comfort of your own home. So, if you want to listen happily ever after, read on...

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3. Going To A Good Dealer

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If the only question any dealer asks you is "How much do you have to spend?", make sure it's the last. The question has nothing to do with helping you to find the right hi-fi. Instead, the answer you give will be the lowest price you will be allowed to pay before you walk out the door.

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SME *V* tonearm
Koetsu *Black K* moving-coil cartridge

Audio Research *SP-9* valve/FET pre-amp.
Audio Research *D-115* valve power amplifier
Magneplanar *MG2.5* planar loudspeakers

Alternatively, fans of parallel tracking arms and cone speakers can choose the Air-tangent tonearm and Sonus *Faber Electa* loudspeakers in place of the SME and Magneplanars. To be in the running to win this £10,000+ system, all you have to do is answer the final five competition questions printed below and send them to us along with your completed forms from Part One (December) and Part Two (January). The first correct set of answers pulled out of the bag will win.

The final month's questions are:

1) What makes Beethoven's ninth symphony unique?

2) Which was the first British loudspeaker to use Kevlar in cone construction?

3) What connection does Japanese pipe carver Yoshiko Sugano have with the hi-fi industry?

4) Where would you find Gypsum from the banks of the river Thames in Surrey?

5) What is the connection between Joseph Conrad's 'Heart of Darkness' and Wagner's Ride of the Valkyries?

COMPETITION RULES

1) All entries must be on the entry forms provided. Photocopies will not be accepted and only one entry per reader will be considered. Entrants must submit completed entry forms for all three parts, in a single envelope. Incomplete entries will not be considered.
2) There is no cash or other alternative to the prize.
3) Employees of Dennis Publishing Ltd and associated companies, or their agents, or of the manufacturers and suppliers of the prize system components or their rela-

tives are not eligible to enter the competition.

4) The competition is not open to readers living outside the United Kingdom.

5) The main prize will be awarded for the first set of correct answers opened. The Editor's decision shall be final and binding. No correspondence whatsoever will be entered into regarding the competition.

6) All entries must be received by Friday, January 29, 1988. The winner will be notified by post and the results will be announced in the April 1988 issue.

PART THREE

Please send this completed entry form, along with Part One (December) and Part Two (January) to:

**HI-FI CHOICE COMPETITION,
39 GOODGE STREET,
LONDON W1P 1FD**

PERSPECTIVES

Paul Messenger takes an overview of turntable and tonearm design and technology.

Around AND Around



Linn Soudek is the current subchassis stereotype.

SMEV provides massive rigidity with moderate moving mass.



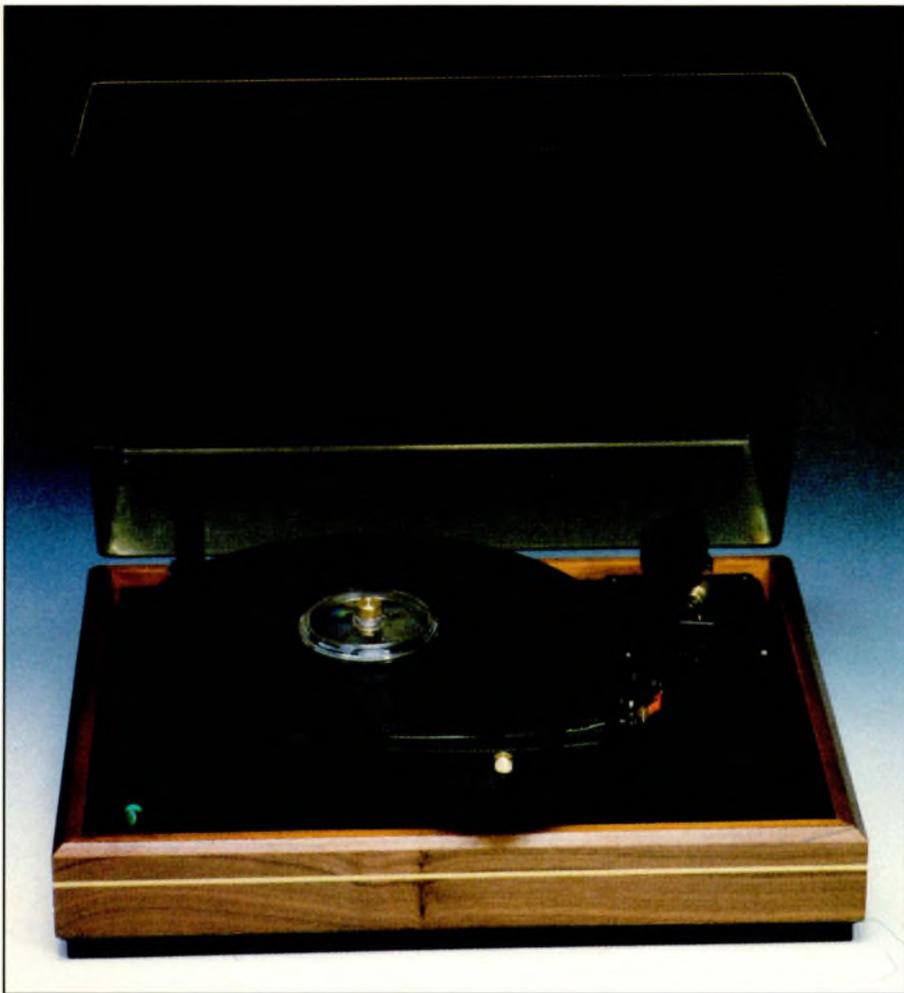
Ten years ago turntables were the most boring part of the hi-fi system. They measured a little differently from one another on basic parameters like wow and flutter and rumble, but everyone assumed that was the end of the story. Scots heretics challenged the status quo, persuaded people to actually listen to them, and found disciples and acolytes in abundance. Consequently the turntable has now come to be regarded as the heart of a genuine hi-fi system.

If Linn's *LP12* was responsible for starting the ball rolling, others have been happy to join in, providing a variety of alternatives which would have seemed inconceivable to those who were dreaming up the recipe for compact disc a decade ago. Largely as a result of increased 'turntable consciousness' amongst enthusiasts and dealers, tonearms too have taken on a new importance in the scheme of things, and exotic moving-coil cartridges that had all but disappeared by the early 'seventies have become comparatively commonplace in the 'eighties.

Turntable sceptics point to the similarities between a Linn and the earlier AR and Thorens belt drive designs as evidence of hype and lack of progress, citing little apparent change in basic measured parameters as further negative evidence. But the marketplace has already voted with its ears and chequebooks, and as the rest of this article shows, there is much more to a turntable system than the simplistic subchassis/solid configuration alternatives. Indeed, the more creative technical reviewers have worked hard to develop new meaningful tests to distinguish between the good, the bad and the merely indifferent.

LAB AND LISTENING

But the technical tests are still only part of the story, and we are still learning many of the ins and outs of the interactions of the various turntable components. Listening observation remains the prime mover, though with hindsight it is often possible to postulate that a particular subjective effect



may be the result of a specific engineering technique or use of materials, or be reflected in a particular measurement capability.

The ready availability of spectrum analysis is one reason why measurement has become more useful, though it still remains a two-edged sword. As ever, the trap lies in assuming that good measured performance necessarily translates into good **subjective** performance. This is a philosophical no no, because it implies that the measurements we (or anyone else for that matter) make define the total performance of the system. Whereas in fact they define certain aspects of performance, but are limited both by our imagination and by the capabilities of our instrumentation.

Certain measurements provide respectable cause and effect correlations with subjective observations. A **microphonic** deck will sound coloured, for example, while one with poor environmental isolation will give unpredictable results depending upon its siting. But for every parameter we can identify and isolate, there are probably several that remain obscure, or at any rate partly hidden.

Furthermore, if the UK hi-fi industry started to get switched on to the importance of turntable sound a decade or so ago, it is only in the last five years that the importance of special turntable tables started to become appreciated, and experimentation with different platforms began in earnest. A wide variety of these have since become available, and some even claim that the platform is even more important than the turntable itself. I for one am not about to brand such

Elite Rock successfully breaks all the rules, front mounting trough providing heavy arm damping at the headshell.

people as heretics, even though I feel this does overstate the case a little.

Rumours regarding the death of the vinyl LP have clearly been greatly exaggerated. Every year brings one or more new contenders for the title 'the last great analogue turntable', and as often as not these make a worthwhile further contribution to both our understanding and enjoyment.

DRIVE SYSTEMS

There are numerous ways of subdividing turntable technologies in order to deal with the different approaches. Perhaps the best starting point is the distinction between belt and direct drive. A comparatively recent phenomenon in its current incarnation, direct drive was pioneered by Matsushita's Technics brand and adopted by most other Japanese majors for their upmarket models. It looked all set to take over ten years ago, but the trend proved short-lived.

Planar represent opposite stereotypes in the international separates mass market, direct drive is now a rarity amongst serious enthusiasts. Technics' 'instant start' models remain the choice of many professional users (broadcasters, DJs), and the lesser of the two extravagant Goldmunds, the £7,000 *Studio*, also uses direct drive, but that's about the end of it.

The big advantage of direct drive is that it



Sternly styled Roksan Xerxes (top) incorporates exquisitely finished underside engineering: outer platter cutaway; platter and hub; main bearing spindle.

avoids the set-up vicissitudes and long term consistency problems of belts, and so provides a 'zero maintenance' option for applications where this is important. But experience has shown that belts are preferred when the prime criterion is sound quality, whether one is dealing with humble players like Regas and Duals, or the exotic ultra massive silk-thread and separate motor units beloved of Japanese audiophiles. Why this should necessarily be the case is harder to establish, but Linn's undeniably biased *raison d'être* of a decade ago still rings true: it is difficult enough to make a good main bearing in the first place, without suffering the additional complexities and constraints imposed by combining it with the motor as well.



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For the serious enthusiast, belt drive continues to rule therefore. And in many respects the Linn *Sondek* and the Rega *Planar* represents opposite stereotypes in their design approaches. The fact that both have been so successful indicates just how wide the scope for variation is.

SUSPENSION FOIBLES

The *Sondek* is the archetype suspended subchassis design. Itself based heavily on the original AR and Thorens *TD150* turntables, it has in turn spawned a host of imitators, amongst which one could include the current AR *EB101* and Thorens *TD160S IV* (neither of which would surely currently exist had Linn not re-blazed the trail).

The subchassis approach offers a number of worthwhile benefits, plus several compensating disadvantages. Perhaps the main advantage is that it allows the platter/arm subassembly to be isolated quite effectively from the environment – and up to a point at a frequency below the arm/cartridge fundamental resonance. This helps protect said resonance from being excited by the big bad world outside.

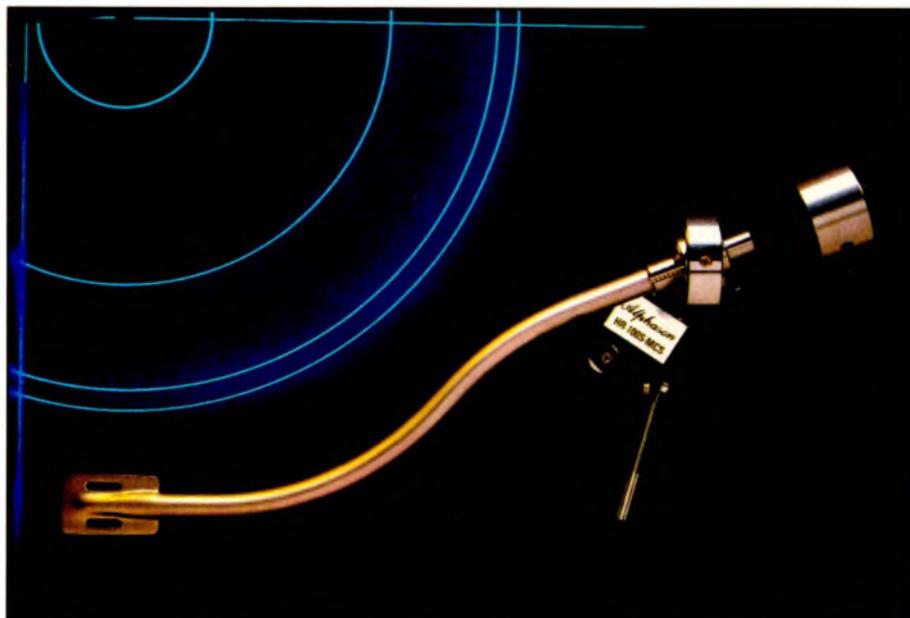
At least that is the theory. In the real world the situation is less straightforward, because no practical turntable suspension system decouples completely in all planes at a single, discrete frequency. A well designed subchassis system can place the main vertical suspension mode (between support or suspension springs and the suspended total mass) at 5Hz or below, no problem. But the lateral and torsional modes are frequently higher, complicated by the necessarily stiffer compliance of the drive belt, and often by the unpredictability of arm lead-out wires.

Another potential benefit of the belt driven suspended subchassis is that it allows the platter/arm to be mechanically decoupled *via* the belt from the main source of vibration in the system, the motor itself, which in almost all cases is plinth-mounted. But getting the right belt compliance in relation to the platter's rotational inertia to give wow-free drive is difficult. (Note the problems with the Ariston *RD90 Superior* tested in this edition, and this is but one of a whole string of models which have failed to get this factor right at least first time around.)

But coping with the sideways, asymmetric pull of a belt against what is fundamentally a vertically oriented spring suspension system is arguably even trickier to handle. Some recent designs like the Alphason, both the Voyds and the Logic *Gemini* have gone to the extreme lengths of using two or even three motors partly in order to balance out this particular effect. Others add an extra horizontal suspension spring or two, ending up with even more complex subchassis modes.

SOLID ALTERNATIVES

An interesting argument against the subchassis technique has its roots in a far from disinterested Roksan, who point out that the constantly varying drag between stylus and



Classic s-shaped elegance distinguishes Alphason's titanium tube headshell HRS-100S tonearm.

groove (itself a function of the actual type of modulation in the groove at any particular instant) applies a variable torsional force to the whole subchassis system. This interferes with the motor/subchassis relationship and affects speed stability in an unpredictable way. Which is certainly one argument in favour of the *Xerxes* (plus Rega, *Rock*, Linn *Aris*, Logic *Tempo* etc.) solid plinth approach.

Add together the combined sales of the above list, and it is clear that the solid turntable is at least as popular as the suspended subchassis (though it is probably helped by having a lower average price). Being fundamentally simpler is always an advantage in hi-fi, and this is particularly true when it comes to the tricky task of setting up turntables. The solid model is more likely to be dealer- or consumer-proof than the carefully tuned sprung subchassis – and most importantly may well prove more stable over a long period of use.

However, there's no such thing as a free lunch. When it comes to matching subchassis models for performance – as Roksan's *Xerxes* certainly does – the set-up procedure invariably turns out to be just as tricky and subtle. Ultimately, and accepting the heavily damped *Rock* as an exception (which it is in so many respects), in the author's experience solid models are more inclined to suffer feedback problems when used in systems with powerful and extended bass, so proper support becomes even more important.

Yet there is one aspect where empirical experience suggests that solid designs do have a distinct edge, and that is in coping with the latest generation of solid 'one piece' tonearm designs. Rega and SME *IV* and *V* tonearms, plus some of the exotic air-bearing parallel trackers couple considerable vibrational energy from the cartridge into the turntable structure itself, and the more sub-

stantial termination provided by the 'solid' turntable seems better equipped to handle this. Moreover, the parallel trackers by their very nature have a centre of mass that varies during the course of playing a disc, which can upset the poise of more lightweight suspended subchassis models.

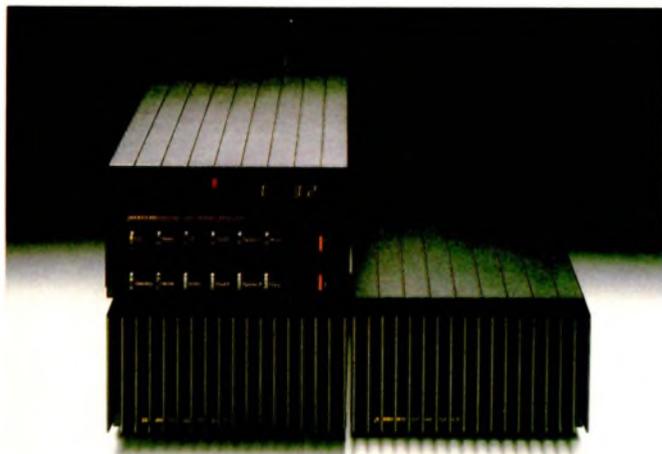
MASS

The relative masses of the various elements of a turntable play a crucial, if controversial and poorly understood role. A heavy platter with high rotational moment of inertia is one widely favoured technique for smoothing out higher frequency speed variations (flutter), and helping to overcome the sudden changes in groove drag caused by music transients, whose accurate reproduction is perhaps the most vital part of the whole vinyl replay process.

But high inertia alone is not enough (unless perhaps when taken to ludicrous extremes). Only the motor can put energy back into the system that the stylus is taking out, so this needs to have reasonable power and good mechanical coupling to the platter *via* a reasonably stiff belt. Indeed, both the Pink Triangle and Voyd designs work very effectively using low inertia platters and tightly coupled motors.

Though there is a good case for adding mass to the platter, applying the same technique to the subchassis and armboard is less cut and dried. These elements certainly need a degree of rigidity (as does the tonearm), in order to cope with the vibrational energy fed in from the cartridge as well as the turntable itself. But simply adding mass in order to provide stiffness can have the disadvantage of keeping the energy stored in the system for a longer period, which is not desirable. Still, light subchassis' like the aerolam honeycomb used by Pink Triangle, the still quite light and more lossy pressed steel plus medite sandwich of the *Sondek*, or the shaped wooden top plate of the Roksan, represent a rather more subtle approach to the engineering than the 'brute force' approach adopted by manufacturers like Goldmund or SOTA.

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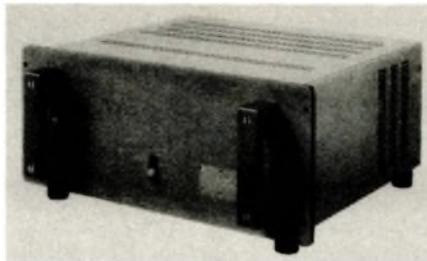
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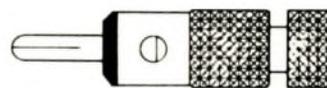
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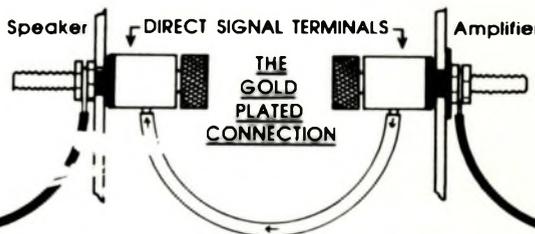


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PLATTERS AND MATS

It goes without saying that the platter needs to support the disc across its whole surface, but it is also important that it can cope with the wideband vibrational excitation caused by playing the disc. Several techniques are used to prevent metal platters from ringing like the primitive bells they basically are, and it is probably true to say that few current designs suffer serious problems in this area. Two-piece platters like the *Sondek* and *Xerxes* are one approach, others like the Oracle *Delphi* and *Omega Point* use peripheral rubber belts. Ariston's *Superior* artfully combines two metals, while the *Rock* fills up with ceramic material. Glass is another popular alternative, in the Rega and Michell designs, and acrylic in Voyds and Pink Triangles.

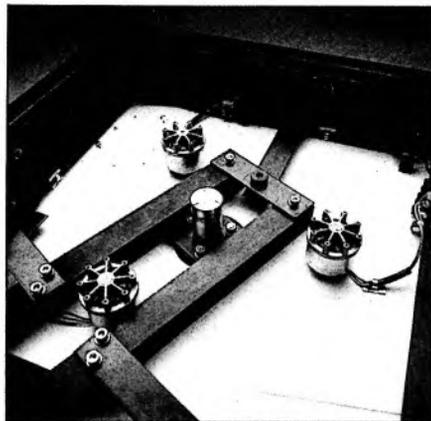
Various contradictory theories compete in coupling the disc to the platter. Some clamp the disc in place (somewhat inconveniently, but ensuring good contact), while others feel it should rest unstressed on the top. Some place the disc in direct contact with the platter, others prefer some form of intervening mat. Each solution seems to have its strengths and weaknesses, but the most convincing direct contact surfaces would appear to be the plastics that match the disc characteristics most closely (Pink, Voyd, *Rock*, Goldmund etc.), while the best mat material seems to be the resistive (*ie* non-reactive) felts favoured by Linn, Rega, Roksan and others.

TONEARMS

Like the turntable, the tonearm used to be considered a largely passive device that was the mechanical slave of the cartridge, as implied by the alternative term 'pickup arm' that was widely used ten years ago. Basic criteria such as low bearing friction and lead torque plus a low and appropriate moment of inertia (*ie* effective mass) at the headshell were considered almost the end of the story until enthusiasts started claiming substantial sound quality differences that could not easily be explained within such a simplistic view of things.

However, the evolution of the tonearm has gone chicken'n'egg in hand with changes in cartridges. The moving magnet cartridges that were popular in the early 'seventies had high compliances and inherently lossy mechanical construction. They would track anything the groove could throw at them, but mechanical integrity was widely ignored. Detachable, user-replaceable stylus assemblies were *de rigueur* and considered an important consumer feature, despite the substantial mechanical compromise inevitably involved. Plastic fixing screws and decoupling materials all served to isolate the cartridge from the outside world and reduce the relevance of high quality arms and turntables.

Revived interest in moving-coil cartridges changed the rules dramatically. The design of m-c cartridges themselves is beyond the scope of this article, but as a breed they have



Attractive if bulky, Voyd's acrylic platter conceals the three-motor arrangement (below) that ensures subchassis stability and self-alignment.

both much greater mechanical integrity and much stiffer mechanical compliances than the typical moving magnet design. As a result, they feed much more energy into the tonearm than more compliant types, and so need firm mechanical coupling to a rigid tonearm in order to get results which justify their high prices.

Indeed, the moving-coil revival was held back for years by the inadequate structural integrity of the tonearms available. Low compliance moving-coils often used to be criticised for poor tracking abilities, but I once conducted listening tests on a range of such cartridges using a tonearm of inherently superb quality but with a single deliberately slackened bearing. Under these circumstances mistracking was rife, and corresponded closely with the measured compliances of the cartridges involved – almost inaudible with the high compliance types, it became totally unacceptable with stiffer moving-coil models.

(Moreover, one could construct a similar argument that the superior dynamic range and subjective bandwidth resolution of top moving-coil cartridges was not readily appreciable until the turntable itself was of sufficiently good quality. This interdependence of the different components of the record player is a key reason for the keen controversy that invariably accompanies any discussion, and helps explain why progress

has often been haltingly slow.)

The tonearm that is necessary to accompany a top quality cartridge should therefore be infinitely rigid and stiff, with zero-play bearings that allow the main beam or tube frictionless movement in lateral and vertical planes, but no movement whatever in the other four degrees of freedom. The mechanical integrity of the tonearm must be maintained from the headshell through the various interfaces including the bearings until the cartridge body works against the combined stiffness/mass of both tonearm and turntable. The tonearm beam/headshell/counterweight should also have low enough effective (moving) mass to match the mass and compliance of the cartridge to be used.

Well those are idealised objectives, though of course there are numerous practical difficulties in the real world. Even the very best tonearm has losses and creates reflections at the various mechanical interfaces that are unavoidable in its construction, and there is no such thing as a beam which is totally rigid across the entire audio spectrum. And rigidity *per se* can even prove an embarrassment to the turntable itself, so that the best results are often obtained by a crafty compromise involving carefully controlled losses in arm and turntable – Linn's *Sondek/Ittok* combination is a notable example. Ultimately we're dealing with tonearms, not just pickup arms, and it looks like staying that way for the foreseeable future.

CONCLUSIONS

This survey set out to explore some of the ins and outs of turntables and tonearms. It seems to have covered a considerable amount of ground, yet ends up posing far more questions than it attempts to answer. Indeed, I have barely scratched the surface of even the mainstream course of development, and have left many interesting byways unexplored – the heavy arm damping used in the *Rock* and the *Well Tempered Arm*; the air-bearing parallel trackers with their fishtank motors and stunning stereo imaging (to note a few examples, and threaten a possible sequel).

I well recall a conversation between the late Spencer Hughes (of *Spendor*) and Linn's Ivor Tiefenbrun. Each complimented the other on his particular expertise in loudspeakers and turntables respectively, and each in turn commented that the more they learnt, the less they knew. Hopefully readers who have struggled to the end of this article will appreciate the significance of those comments, and will have learnt, like me, that they actually know less than they thought.

If there is a single conclusion to be drawn, it is that turntable technology is like the layers of an onion: the more you peel away, the more you find underneath. No wonder vinyl reproduction still has a great future. And no wonder actually listening to turntables is still the most important arbiter when it comes to choosing equipment for enjoying to music.

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SONY ES

MARKET RESPONSE

In our dealer survey this month Dan Houston covers the analogue front end and brings you the lowdown on the sort of turntable and arm combinations picked by dealers nationwide.

Look at some of the predictions for turntables and you'd think it was time to organise a vinyl wake. One Japanese brand, currently seeking to move upmarket, seriously contemplated developing a turntable but almost as quickly gave up the idea when they did their market projections.

But this can also give a warped impression, and in fact another Japanese major, traditionally healthy in turntables, has found itself emarrassingly oversold this Autumn, with no means of satisfying immediate demand. And certainly the specialist hi-fi dealers interviewed below are very happy with the current level of turntable sales.

What in fact appears to be happening is that the market for separate turntables as a whole is relatively static in volume terms, at a little above 100,000 units per annum (compared to nearly 400,000 for CD players), but the total value would appear to be steadily increasing, probably because CD has raised customer expectations on both performance and price points.

Market statisticians GFK report that the volume share of low cost (under £90) turntables is declining quite noticeably, from 31 per cent down to 20 per cent, while the volume share at higher prices is actually increasing – a

phenomenon that must be almost unique in the history of consumer electronics. The 17 per cent share held by turntables costing over £150 has actually increased to 20 per cent, leaving the middle market expanding from 48 per cent to 60 per cent.

To some extent this may reflect changes in price points and the introduction of new models of course, but it is a remarkable trend nonetheless. Indeed, one is tempted to speculate that the GBP is finally waking up to the fact that cheap tributes to the art of moulding plastics aren't worth playing records on anyway – or alternatively are deciding that their 'last' turntable purchase is going to be a good one.

For this month's market survey we asked dealers to tell us about their sales of turntables and tonearms. To get our best sellers list we scattered about 150 questionnaires around the country's hi-fi retailers, aiming to get as broad and random result as possible in order to be representative. We also telephoned dealers in the same random way for advice and comment on matters such as cartridge replacement, general upkeep of your system's front end and to see how that son-of-science CD was affecting its (shorter-playing) ancestor.

Our reviewing methods take a given piece of equipment and subject it to intensive examination, but they cannot take account of the performance of products once they pass into and through a dealer's hands – their reliability and consistency in terms of sound quality for instance. These are important factors to buyers, and some manufacturers satisfy more than others in these departments. So our survey complements the review topic, but is based on mostly different criteria so should not be seen to be in conflict with any review. Rather it should be seen as the accumulated experience and advice of the participating dealers – who are, after all, the only people who see (and hear) a wide range of products day in and day out.

Things have come a long way since the little dog tried to work out where his master's crackly voice was coming from. But basically the front end of the sound system that conveyed *Lilly Marlene* to soldiers in the first war is remarkably similar given the intervening 60 years of scientific onslaught. Of course electric recording has replaced acoustic, diamonds have replaced thorns and steel in the groove, and we have isolated motor units, minimal tracking weights and multifarious developments like linear tracking arms. But these are all tweaks on the original concept – a concept which is thriving still despite its main rival's arrival.

In fact, where equipment is concerned, the CD phenomenon has boosted the turntable trade according to many of 'our' dealers. Some did claim that mid-price turntable sales have suffered as a direct result of CD player competition, but twice as many said the whole market had been given a boost. So how can CD improve turntable sales? One reason, according to dealers, is that the clarity of CD has lifted consumers' expectations. This has led to increased sales of better turntables because people often have extensive record collections which they cannot afford either the time or money to replace with CD (if available). The option, it seems, especially to people over the age of 20-something, is not to have *either* CD or vinyl but to have both (or just a better turntable).

One dealer mentioned that

some customers were buying CD players and then coming back to trade them in for quality turntables. Asked why, he said: "analogue's fighting back; people say they don't like the *sound* of CD". If this is true (and we must admit only one dealer pointed it out) then the effect of CD has been to lever up the price people are now willing to pay for that 'better sound'.

RELIABILITY

Where turntables win hands down over CD players is in reliability. In spite of being relatively fragile (you certainly wouldn't want a brewer's drayman to deliver them), we found only 2.16 per cent arrive from the manufacturer as faulty – and this figure was greatly boosted by the results from our Irish correspondents who said that their/our longshoremen and the sea managed to shake up much of the stock *en route*. In fact factory quality control was greatly praised, and most faulty decks are damaged in transit.

Dealers were very reluctant to mention faults that regularly occurred with turntables, and it certainly seems that this machinery is about as reliable as the electricity that runs it. Handled well, the modern turntable will give years of lasting pleasure – which is not something you hear about some other pieces of the hi-fi system.

The only instance of regular failure in a brand that we could elicit was Rega's drive pulley, which has been known to come unstuck from the motor spindle (very rarely, and usually only under conditions of high humidity, according to Rega). This was easily remedied by the dealers in question, who re-stuck it with *Superglue!* And one of our replies states: "If there is a problem it can be a real b... r to, a) find the fault and b) fix it forever, *ie* certain turntable/arm combinations produce static through the speakers for no apparent reason".

Dealers generally expressed confidence about carrying out servicing and repairs themselves (although one mentioned that as turntables *were* so reliable, it was sometimes difficult to get spares for them when they *did* go wrong). The average time taken for repairing a turntable was just under five days, but several dealers said they could carry out

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same-day repairs if they had the parts.

Getting parts is often easier from one manufacturer than another, and here Linn's legendary back-up service came out top, being able to get parts to dealers by the next morning (in spite of Her Majesty's Royal Mail). Other luminaries in the quick-service field include Rega, Roksan, Revolver, Michell and Mission.

If the product has to be returned to the factory for repair, manufacturers take on average, two-and-a-half weeks to get it back. Here again, the British are on the ball, with Rega taking an average three days, Linn an average four, Roksan "less than a week" and Revolver, Mission and Michell "a week". Hats off to them! The slower companies were mentioned as Aiwa, Harman Kardon and JVC. Of course, if you live in the Orkneys and it's mid-winter things may take a little longer; we don't suggest these are hard and fast timings. We have also left out the odd horror story where a customer ends up without music for twelve months! Although enough to bring on a cold sweat, these are as rare and appalling as blowflies in a fridge.

SERVICING

Servicing your turntable is important if you want to get the best and most out of it. Regular replacement of the cartridge/tip, cleaning the diamond, replacing the rubber drive belt, putting it on a decent table or shelf – all these will make music more pleasurable.

It's also a good idea to take turntables into a hi-fi dealer every 18 months or so to get them looked over. Some, like the Linn LP12, need servicing every 12 months according to several dealers. One dealer recommended a drop of light (sewing machine) oil on some turntable bearings to keep them running smoothly, but another warned never to touch the bearings, or add a lubricant which might be lighter than that used by the manufacturer. Gearbox oil (used by some manufacturers) might be thinned down by addition of another oil. In the light of these contradictions we'd advise you to read the manual or consult the manufacturer, but it is obvious that badly lubricated parts are going to have a detrimental effect.

ARE DIAMONDS FOREVER?

There's quite a lot of hysteria around about cartridge

replacement. Advertisements warn about lathing away that precious vinyl with a worn or badly tracking stylus and it sometimes seems as if you should replace this piece of equipment more often than paying the rates. Using an old stylus is like "cutting a piece of bread with a blunt knife – you're just chewing away at it," says one dealer.

However there are widely differing opinions about how quickly styli wear out, as it's difficult to tell just how much anyone listens to music. We are looking for an average time, and from dealers' comments have calculated an average life expectancy of 15 months for moving magnet cartridges and 20 months for moving coils, assuming you listen from between one and two hours a day. The least amount of time someone advised us was six months or 500 hours, whereas the most was around 4,000 hours for a moving coil cartridge (which could be four or five years!). Some dealers recommend regular inspection of styli by microscope, but although 10 per cent wear on the diamond profiles can significantly alter the sound, it is also very difficult to see with normal microscopes.

Of course, where cartridges are concerned it's not a black and white situation – as one dealer said, and optimum replacement time is difficult to assess (as is seen from our maximum and minimum times above). What is important is not to use cartridges indefinitely – many dealers reported: "people coming in have had a cartridge for years and years".

CLEANING UP

We also asked several dealers what they recommended as a stylus cleaner. Of those who favoured the pneumatic drill approach, Audio Technica's AT637 Electron stylus cleaner (£16.95) was the most popular. This literally shakes the dirt off the diamond with a pad that vibrates against the tip. The only criticism was that it loosens the cantilever but dealers felt this did not cause any significant damage(!?). Other recommended methods were a brush (soaked in alcohol), and strips of green plastic-backed abrasive sheet made by the 3M company and marketed in this country by Linn Products. This is highly popular for day-to-day use and considered much more efficient than using a

finger or the unused strike strip from a matchbox or book. Incidentally, Grahams Hi-Fi told us they planned to stock a finer 'blue' version of the green paper (also a 3M product), which is recommended by Roksan as being slightly better than the green.

BELTING UP

The black sheep in the turntable-maintenance world is undoubtedly the drive belt – a black rubber band that can and should be replaced periodically to keep everything sounding sweet. The belt takes the strain of the motor when you switch on without bothering to give the platter a spin first. In time the belt becomes slack or greasy and you get a loss in turntable speed – often inaudible to those without perfect pitch but detrimental to the musical experience nonetheless. So replacement of the belt is important, but how often? Dealers again, are divided on this subject as it depends on those little things like giving the platter its pre-emptory spin, leaving the motor running for the whole of the playing session, and probably the kind of rubber used. The range in this case was between five years and 18 months, with a mean average of two years and nine months.

If you're reading this on Sunday morning and realise you have had your belt since a Labour government ran this country, then one dealer gave some useful stop-gap advice. "Just dip it in hot soapy water for a minute or so," says Pat of Billy Vee Sound Systems, "that'll make it tacky again and will do until you can get a replacement."

AND STANDING UP

Most important for the turntable and its performance is stability. Many dealers mentioned this, and Karen of the Clapham Clinic (otherwise known as RPM) told us: "relative movement is the worst enemy". Good tables with spikes can isolate your deck from the effects of that passing lorry, but you don't just need them if you live on a main road. One dealer said he could always make a cheap deck sound better than a high end turntable just by putting it on a decent table. (Of course the high end turntable would sound that much better again if that was put on a table, but it emphasises the point.) Good tables, wall brackets or a sturdy shelf in the alcove are all easy but vital tweaks that give a

turntable the chance to do its best.

THE RESULTS

These are compiled from dealers' top three selling turntables in three price ranges provided. The results are in points; three for the top seller, two for the second and one for the third and added up.

Model	Points
1) Dual 503-1	68
2) Rega Planar 2	24
3) Ariston Q Deck	17
4) NAD 5120	15
5) Rotel RP 830	12
6) Revolver / Zeta Junior	12

It should be pointed out that Revolver and Rega were always top sellers (ie consistently scoring three) with the dealers that stocked them. What this means, as far as our survey is concerned, is that if you go into a shop stocking either of these makes you are more likely to buy them than another turntable.

In the mid-price sector, from £151-£450 our top turntable/arm combinations are:

Model	Points
1) Linn Axis	33
2) Revolver	25
3) Rega Planar 3	24
4) AR EB 101	23
5) Dual CS 505-3	19

It was interesting to note here that all these top sellers were sold with their own makes of arm. Some of the arms however, such as the Linn Basik Plus and the Rega RB 300 are often sold with other decks in best selling combinations. (Rega again were consistently top with all their dealers.)

In the £450 plus price range things become much more subjective and there is a great deal more in the way of combinations to choose from. However, the Linn LP12/Ittok LVII arm combination swept the board as favourite, scoring a massive 37 points. Its only near follower was the LP12/Basik Plus combination which scored a further 22 points for Linn. The next most popular combinations in order are: Roksan Xerxes/Rega RB 300 arm, Xerxes/SME V arm, Alphason Sonata/HR 100S arm and the Pink Triangle PT TOO deck with Helius Scorpio arm.

The best selling motor units on their own in this price bracket are:

Model	Points
1) Linn LP12	50
2) Michell Gyrodec	18



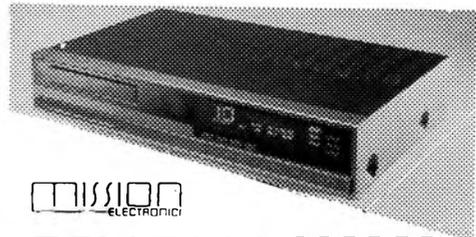
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- 3) Roksan *Xerxes* 15
- 4) Pink Triangle *PT TOO* 12
- 5) Elite *Rock* 10

We also asked dealers for their best selling compatible cartridges in three price brackets. For the budget sector we allowed up to £25; the results in order are: Dual 503: Nagaoka *MPII*, Ortofon *OM10* and Audio Technica *AT110E*

Rega *Planar 2: AT95E*, Linn *Basik* and the A&R Cambridge *C77*.

Ariston Q-Deck: The *C77* was by far most popular.

NAD 5120: Audio Technica *AT95E*.

Rotel *RP830: Audio Technica AT110E*.

In the mid-price bracket we asked for cartridges costing between £26 and £100.

Linn *Acis*: Linn's *K9* cartridge was almost universally recommended for this deck and arm.

Revolver: Audio Technica *ATF3* was favourite, with A&R *P77* following

Rega *Planar 3: Audio Technica ATF5* followed by Nagaoka *MPII Boron*.

AR *EB101*: Again the *ATF5* with

Nagaoka *MPII Gold*.

Dual 505-3: Nagaoka *MPII Boron* scored highest, followed by the Audio Technica *ATF3*.

For the top of the range we asked for compatible cartridges costing £100 plus:

Linn *LP12/Ultok: Linn Troika*, followed by *Asaka*.

LP12/Basik Plus: Again the *Troika* closely followed by Koetsu *Black*.

Roksan *Xerxes/RB300: Koetsu Black*, then Audio Technica's *AT-OC7* and van den Hul *MC One*.

Xerxes/SME V: Koetsu Red with the *Black* second favourite.

Alphason *Sonata/HR100S: Audio Technica OC7* and a mention for the *ATF5*.

Pink Triangle *PT-TOO/Helius Scorpio*: Ortofon *MC20 Super* scored most.

The results of this survey are only as representative as the comments from 44 dealers around the country can be. We don't pretend that this is the complete situation, or that our top sellers list is a necessarily true representation. The survey is a poll, and only as accurate as the people who contributed.

PARTICIPATING DEALERS

Our thanks to the following dealers for helping to compile this survey:

- Abbott Audio, Kneessall, Notts.
- Active Audio, Derby, Derbyshire.
- Aerco, Woking, Surrey.
- A. Fanthorpe Ltd, Hull, Humberside
- Analog Audio, North Finchley, London.
- Ashtons, Dunstable.
- Aston Audio Ltd, Alderley Edge, Cheshire.
- AT Labs, Enfield, Middx.
- Audio Insight, Milton Keynes, Bucks
- Basically Sound, Norwich, Norfolk.
- Billy Vee Sound Systems, Lewisham, London
- Bowers-Wilkins Ltd, Worthing, W. Sussex.
- Bridge Hi-Fi, Walsall, W. Midlands.
- Chichester Hi-Fi, W. Sussex.
- Cleartone, King St, Manchester.
- Elite Hi-Fi, Harrogate, N. Yorks
- Eric Wiley, Castleford, W. Yorks.
- Fraser Hi-Fi, Windsor, Berks
- Gilson Audio, Middlesbrough, Cleveland.
- Grahams Hi-Fi Ltd, Pentonville Road, London N1.
- Hampshire Audio, Chandlers Ford.
- Hi-Fi Corner, Edinburgh/Glasgow.
- Hi-Fi Experience, Tottenham Court Road, London
- John Marley Hi-Fi, Canterbury, Kent.
- Laskys, UK Ltd.
- Le Set, Brompton Cross, London

- Merrow Sound and Vision, Guildford, Surrey
- M. O'Brien Hi-Fi, Wimbledon, London
- Nick Dakin Hi-Fi Specialists, Nottingham
- Norman Audio, Preston, Lancs
- Nottingham Hi-Fi Centre, Notts.
- Practical Hi-Fi, Lancaster, Lancs
- Rogers Hi-Fi, Guildford, Surrey.
- RPM (The Clapham Clinic), London SW11
- Standens (Tonbridge) Ltd, Kent.
- Swift of Wilmslow, Cheshire.
- The Audio File, Bishops Stortford, Herts.
- The Cornflake Shop, Windmill St., London W1.
- The Sound Organisation, Cathedral St., London SE1.
- Tru-Fi, Aldershot, Hants
- University Audio, Cambridge
- Watts Radio, Somerton, Somerset.
- Westwood and Mason, Oxford.
- Zeus Audio, Belfast, N. Ireland

NB Any hi-fi dealer who feels aggrieved he is not on this list, and who would like to be consulted in the future, either regularly or intermittently, please write to us at 39 Goodge Street, London W1P 1FD, or telephone 01-631 1433. We didn't leave you out deliberately, and would welcome your future participation.

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CHOOSING AND USING . . . TURNTABLES AND TONEARMS

Vinyl disc is still the prime source for the hi-fi enthusiast, yet record players have to perform minor mechanical miracles, to do a proper job, as the following introduction explains.

Despite the claims of more recent rivals, the LP disc has remained the prime source for music lovers for over 30 years, building a vast historical repertoire which will ensure it continues to have a future for present and future generations. The format has not been without its ups and downs (remember quadraphony), but the last ten years have seen continual and substantial improvements, not so much in the discs themselves, but in the quality obtainable on replay.

The current situation is ideal. LP discs are comparatively cheap to manufacture and purchase, while the quality obtainable by the user depends largely on the amount of money invested in the replay equipment. As an added bonus, upgrading the equipment produces improved sound quality from all the discs in the collection, while the buoyant secondhand LP market shows that repertoire will continue to be available whatever the future development of alternative media.

During the 'bad old days' of the 1970s, the LP came under strong attack as a result of indifferent manufacturing quality control. Lack of surface defects allowed the Musicassette to make a strong challenge, but with hindsight it may be seen that much of the problem with LPs came from poorly designed and matched replay equipment. This is not to say that a good quality record player can overcome all the inherent problems of the vinyl disc, or all the ravages of time and mistreatment. But it is true to say that a carefully chosen specialist player can emphasise the musical values and go some way towards avoiding the engineering limitations.

Such a claim may sound a little far-fetched, particularly to those who suffered the worst excesses of the direct drive period of turntable design. But the marketplace itself provides the justification: ten years ago the specialist UK turntable barely existed; now a dozen or more manufacturers are competing fiercely to provide a sound quality alternative to the superficially flashy but sonically inadequate products which are typical of much of Far Eastern production.

THE VINYL PROBLEM

One trouble with vinyl is that it is too effective a music storage system. The wide dynamic and frequency range of the signals which end up embedded in the plastic are a mechanical engineering nightmare to recover properly, because they are microscopically tiny – smaller, indeed, than the stylus which is trying to 'read' them. And to make matters worse, the turntable/disc is massively heavier than the stylus which is resting on it.

The cheap record player merely recovers the top few layers of information, the loud bits and the bass bits in particular. It can handle the quiet and trebly bits too, but if a loud bit comes along it is apt to 'swamp' the mechanics of the system, creating unwanted vibrations within the arm, cartridge or turntable which are much larger than the delicate subtleties of the record groove that the cartridge is trying to read. It is therefore hardly surprising that all record players are inadequate. It's just that some are much less inadequate than others.

THE TURNTABLE

While the rest of the world blithely assumed that if a turntable measured well on simple but artificial test, it must sound good on music too, it was left to a handful of bright Scotsmen to literally rediscover the wheel, and its importance in the hi-fi system. That is history, but the turntable is now taken very seriously.

Some of the reasons behind this remain obscure, but any hi-fi dealer worth patronage should be able to demonstrate the substantial difference that the turntable alone can make. And a very good case can be made for devoting a substantial part of the total budget to this one fundamental component. Spending more money on a turntable may mean spending less on arm, cartridge, amplifier and loudspeakers. Each component has its own influence on the final sound, but such qualitative differences are hard to quantify, and to some degree come down to personal taste.

As for the turntable itself, its basic function is to rotate at

precisely the right speed and provide appropriate support for the arm and cartridge. This sounds simple enough, but what is easily stated as an objective turns out to be devilishly difficult to achieve in practice, for all manner of reasons. A turntable is a most effective seismograph, capable of detecting any vibrations in the record surface besides the information actually in the groove. So some care needs to be taken to provide isolation, both from the vibrations in the turntable motor and from any external environmental influences, and the quality of main bearing is clearly vital.

The drive function itself is far from simple, because the groove drag created between the disc and the stylus is variable, according to the loudness and frequencies of the actual music. A loud bit comes along and tries to slow the turntable down, but by the time it has had a chance to respond its speed has already fluctuated and the loud bit has finished – with a good chance of speed overshoot in the quiet bit that follows. And if more power is taken from the motor during the response, this will pump more and/or variable mechanical vibration into the system. The designer has to choose just the right combination of motor drive, pulley and belt construction, in conjunction with the flywheel inertia of the platter itself and appropriate isolation of the motor itself, all within the cost constraints of the marketplace.

Equally tricky is the support for the arm, and its relationship to the platter itself and the plinth system employed. The arm gets a good shaking from the cartridge when playing a record, and most good arms transmit much of this vibration on into the turntable top plate or subchassis structure. To some extent the arm and turntable should be considered together, in order to allow the energy to be dissipated so that it does least harm, but there are various different possible solutions, some of which may work better with one arm than another, or even with one cartridge rather than another.

There is no single right approach to building a turntable, because the end result comes

from the skillful balancing of different compromises. Belt drive and suspended subchassis designs tend to sound good, sometimes at the expense of ease of operation and the need for careful setting up. Yet some 'solid' designs have been appearing recently which can give them a run for their money, and only go to emphasise the fact that the rules, such as they are, are poorly understood and very easily broken.

THE TONEARM

Whether you call it a pickup arm or a tonearm, there is absolutely no doubt that this item, whether part of an integrated player or as a separate item, plays a major part in determining the character of sound. The performance of the tonearms is also laid bare by the unique *Choice* accelerometer impulse test, though again listening tests provide the final arbiter, and turntable termination plays a crucial role.

If it were possible to create an arm that provided a vibration-free, rigid support for the cartridge, while at the same time being light enough to allow the cartridge to follow the groove spiral, there would be no problem. Unhappily this is not possible: all lightweight pivoted beams, 7 or 9 inches long, show some vibrational modes across the exceptionally wide (three decade) span of the audio frequency range, and this is one of the factors responsible for differences in tonearm sound quality. The designer has various options in terms of bearings, tubes and termination construction, in damped or undamped operation, and in single pivot or parallel tracking. Add in the cost constraints and cook until fully baked.

Each approach has its validation in some theory or another, and sometimes even produces a result which reflects the principles employed and choices made. For example, straight line arm tubes are usually shorter and therefore more rigid for the same effective mass; free from the uncertainties of offset bias and its compensation, they give exceptional stereo imagery. But against these advantages must be set the cost and complexity, not to mention the

difficulty of ensuring rigidity in a sliding bearing, and the variations resulting from the changing bearing centre. And one can construct similar arguments for and against other tonearm modus operandi.

More straightforward is the matching of arm and cartridge, based on a simple mathematical formula so that the combination has its main mechanical resonance in the range of frequencies where it will do least harm.

This resonance is a major cause of record player ills, and cannot be avoided. Damping may be present in arm and/or cartridge, but this is no cure-all. More important is to place the resonance low enough to avoid upsetting the bass sound quality, but high enough to avoid excitation from disc warps. The generally accepted ideal range is 8-12Hz, but carefully chosen systems can operate satisfactorily a little beyond. Lowering the resonance can improve the bass reproduction, but usually at the expense of general stability at higher frequencies, and *vice versa*.

ENSEMBLE

The extensive measurements carried out in the *Choice* review programme help weed out the 'wallies', and suggest the combinations which are most likely to perform well together. Measurement also provides backup evidence for listening findings, but auditioning remains the final arbiter.

However, individual tests cannot cover all the bases. They cannot cope with every combination, nor can they take account of the quality of the setting up. Finding a competent and conscientious dealer, committed enough to get a good sound yet sensitive to an individual's own preference, can be the most important task facing the prospective purchaser.

BEHIND THE TESTS

The change in authorship was not meant to involve any sharp change in review direction, so the general plan of campaign this time around was to perform a set of physical tests which are as far as possible

similar to those of previous years – but not, inevitably, the same. All the pen charts were produced using a Fast Fourier analyser, the rumble analysis was done with a Thorens rumble coupler using the normal Din B weighting curve, and wow and flutter was measured in a similar way. However, a different W&F meter (from Kenwood) meant a different form of averaging was used, so new results here are not necessarily interchangeable with the old.

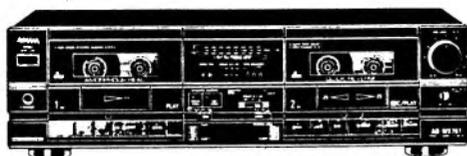
The arm measurements were done by Martin Colloms, as in previous years and without modification, except that the author assessed arm geometry differently, by checking distortion due to tracking error across the playing surface using an Elite gauge. Elite also made an appearance with the loan of a specially modified high speed Revox G36 tape deck, a master tape and a record cut from the master at one of the best cutting facilities (Island Studios). A straight comparison was performed with most of the turntables – a useful addition to

the battery of listening tests involved.

The monitoring system was a high resolution one, consisting of DNM and Musical Fidelity *MVT* preamplifiers, late sample Musical Fidelity *A370* power amplifier, and Apogee *Caliper* loudspeakers, all wired with solid core DNM cable (the loudspeakers bi-wired). For comparative purposes, several Audio Technica *AT-F5s* were used, allowances being made for its rather brash, shallow presentation (inevitable at the price – and it has other useful qualities). A Koetsu *Rosewood Signature* was also used for more critical listening with selected components. A wide range of records was employed, drawn from a substantial library of old and new material in various *genres*. Classical and rock were played in roughly 60:40 proportions in line with the requirements of the tests – and what I felt like listening to.

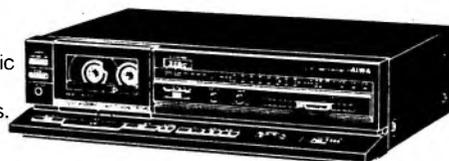
Thanks to Robert King, who played FFTs and rumble couplers, to Thorens, Kenwood, Stan Curtis and Martin Colloms.

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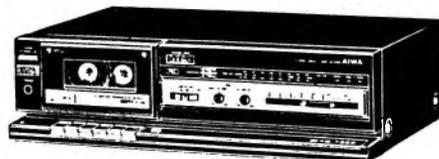
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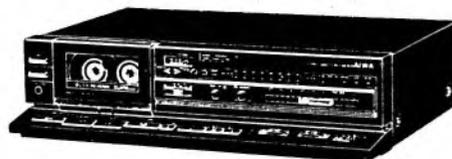


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BEST BUY



Following the successful relaunch of the classic AR deck (now the *Legend*), Acoustic Research UK developed this further *EB-101* model, with vinyl 'black ash' finish and a steel girder subchassis substituting for the aluminium original. A new arm commissioned from Japan is factory fitted to provide a complete integrated player. For the review, a modest cartridge was also included, the whole selling for around £199, a considerable saving over the original model, equivalent to throwing in the arm and cartridge free.

This deck has rather a dark appearance, and comes with a low resonance tinted PVC cover on sprung hinges. The two-piece alloy platter has been retained while tolerances have been improved on the bearing, as well as in other areas. The robust arm has a firmly clamped headshell using a locking sleeve; its bearings proved free from play, an important aspect. Fully suspended, the chassis moved very freely and promised good acoustic and vibration isolation.

LAB REPORT

The total platter mass was close to 2kg, healthy for the price category, with the two part construction offering good mutual damping. Tested for disc impulse, the initial transient was quick with a fast decay and no low frequency hangover.

Speed change is manual, on lifting the outer platter. At 33 $\frac{1}{3}$ the deck ran nearly 0.5 per cent fast, which was satisfactory, while slowing under load was held to a fine 0.25 per cent. Long term drift was negligible with the synchronous motor employed. DIN peak weighted, the overall wow and flutter was a fine 0.09 per cent, with similarly low individual contributions from the wow and flutter components. Start up was a fairly rapid 3.5 seconds, and the

player clearly had healthy torque. DIN B rumble measured very well, at -77dB. Little breakthrough was evident since the electrical and mechanical spectra matched well; just a hint of motor vibration was evident at 200Hz. The high quality suspension was demonstrated by the excellent breakthrough responses for both acoustic and vibration excitation, here the unit was clearly up with the best modern examples.

Turning to the arm, the robust headshell was nominally detachable but did not come with a plug and socket. Rotational adjustment is allowed, as well as overhang and lateral tracking angle. Effective mass was in the medium to high range at 13.5g including hardware, and consequently suited to fairly low compliance cartridges.

Charted for arm resonances with a Shure moving magnet cartridge, the first break appeared around 700Hz, with the overall behaviour looking quite tidy, particularly at higher frequencies. Bearing friction was quite low, 40mg lateral and 20mg vertical, while sensible bias levels were also established. Downforce calibration was accurate while the arm cue device operated well.

SOUND QUALITY

There was no doubt concerning the high subjective merit of this player. The sound was notably well-focused, with good stereo stage width and depth. Transients were reproduced with good speed and attack, while the overall effect was lively, with well differentiated dynamics. The bass was quite good, articulate as well as extended, with considerable detail apparent. Overall the tonal balance seemed well proportioned while the supplied cartridge was quite tidy itself and did not let the deck down.

CONCLUSIONS

This belt-driven turntable offers a remarkable package. A genuine high fidelity product, it had no significant subjective or lab-tested weaknesses. Its rigid arm, good platter and drive, with a fine, effective subchassis, are complemented by a workable cartridge, which will happily benefit from upgrading at some future date if so desired. Pricing is also very competitive, and a Best Buy rating the logical outcome.

TEST RESULTS

Motor section	
Type	belt-drive, subchassis
Platter mass/damping	2.0kg/good
Finish and engineering	very good, very good
Type of mains connecting leads	3 core/phones plus earth
Speed options	manual change, 33/45rpm
Wow and flutter (DIN peak wtd sigma 2)	0.09%
Wow and flutter (lin peak wtd 0.2-6Hz/6.300Hz)	0.1%/0.07%
Absolute speed error	+0.45%
Speed drift, 1 hour/load variation	negligible/-0.25%
Start-up time to audible stabilisation	3.5 secs
Rumble, DIN B wtd, L/R average (see spectrum)	-77dB
Arm section	
Approximate effective mass, inc screws, excl cartridge	13.5g
Type/mass of headshell	special/9.8g
Geometric accuracy	very good
Adjustments provided	tilt/overhang/offset
Finish and engineering	very good/very good
Ease of assembly/set-up/use	very good/very good/very good
Friction, typical lateral/vertical	<40mg/20mg
Bias compensation method	internal spring
Bias force, rim/centre (set to 1.5g elliptical)	225mg/275mg
Downforce calibration error, 1g/2g	-0.05g/-0.1g
Cue drift, 8mm ascent/descent	negligible, 1.0 secs/2.5 secs
Arm resonances	fairly good
Subjective sound quality	see system result
Arm damping	decoupled counterweight
System as a whole	
Size (w x d x h)/clearance for lid rear	44 x 38.5 x 16cm/7cm
Ease of use	good
Typical acoustic breakthrough and resonances	very good
Subjective sound quality of complete system	very good
Hum level/acoustic feedback	low/very good
Vibration sensitivity/shock resistance	excellent/fairly good
Estimated typical purchase price	£199 inc. cartridge

Reviewed by Martin Colloms.
Reprinted from issue 43.

SOUND SYSTEMS AND



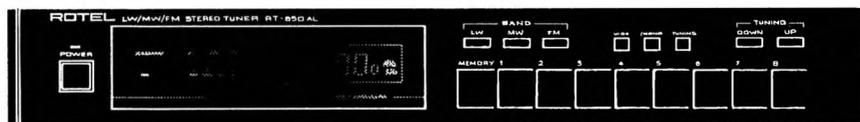
RC850 STEREO CONTROL AMPLIFIER



RB850 50W STEREO POWER AMPLIFIER

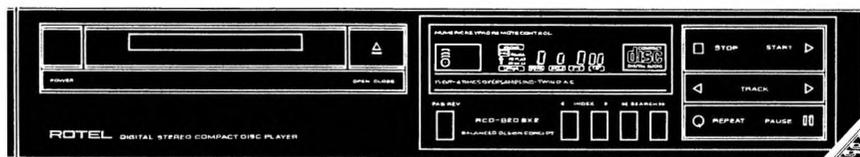
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ALPHASON OPAL

ALPHASON, 190-192 WIGAN ROAD, EUXTON, NR. CHORLEY, LANCS PR2 6JW. TEL: (02572) 76626.



The *Opal* is Alphason's contribution to a restricted list of good budget tonearm designs. Beer budget armhunters will inevitably find the *Opal* less distinctive than more expensive Alphasons, but it is still a satisfying product.

The *Opal* has a straight armtube and a permanently bolted on headshell with the necessary offset built in. The bearings are simple concentric gimbals, and the nylon lined counterweight bolts firmly to the arm tube extension. In common with other Alphason arms, the cueing and armrest assembly are flimsy and crudely designed, and again the armbase is Linn-compatible.

LAB REPORT

Effective mass is quite low, and perfectly suitable for the majority of budget cartridges. The bearings have low friction and play, but are a little notchy. All other parameters are good, including handling.

Referring to the structural resonance plot, the first identifiable effect at around 700Hz may be due to the counterweight. There are some significant peaks above 1kHz, though the arm seems well damped above this area.

SOUND QUALITY

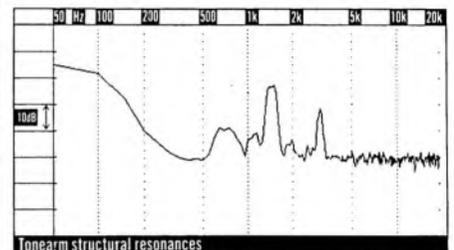
Performance is about average for the class, but the stereo staging sounded somewhat diffuse, and transients tended to be softened and blurred. Bass quality is warm, deep and open, if not especially fast or powerful, whilst the mid and top sounded detailed, but a little coarse and coloured. Used on the *Rock* turntable for this test, both with and without the damping paddle, the *Opal* rarely sounded less than poised and in control.

CONCLUSIONS

This is unquestionably a good low cost arm, but with recent price rises the *Opal* is a little less competitive than before.

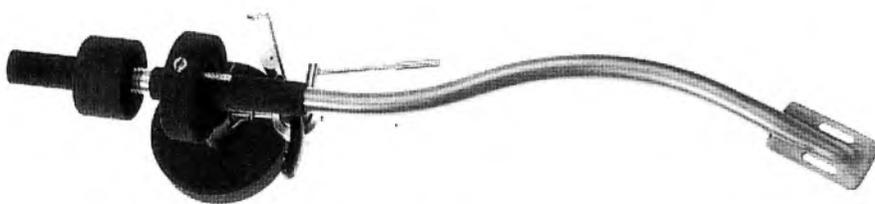
TEST RESULTS

Arm section	
Approximate effective mass inc screws, exc cartridge	10g
Type/mass of headshell	fixed, integral
Geometric accuracy	very good
Adjustments provided	overhang/lateral/height
Finish & engineering	good/very good
Ease of assembly/set-up/use	very good/good
Friction (typical) lateral/vertical	15mg/<15mg
Bias compensation method	thread & weight
Bias force, rim/centre (set to 1.5gm elliptical)	290mg/290mg
Downforce calibration error, 1gm/2gm	0.85%/0.1%
Cue rate	negligible
Cue drift ascent/descent	instant/5 secs
Arm resonances	good
Arm damping method	none
Load capacitance	90pF
Estimated typical purchase price	£110



ALPHASON XENON

ALPHASON, 190-192 WIGAN ROAD, EUXTON, NR. CHORLEY, LANCS PR2 6JW. TEL: (02572) 76626.



Apart from the black finish used on all parts aft of the armtube, it's hard at first to distinguish the *Xenon* from its more expensive *HR-100S* stablemate. The *Xenon* armtube and headshell is the same one-piece fabricated titanium component, damped internally and without any structural break until quite close to the bearings.

The bearings themselves, however, are of simpler design. They lack the hard ceramic surfaces of the *HR-100S*, but the basic layout is similar, with concentric gimbals for the two planes, and a counterweight with nylon liner that clamps rigidly to the arm rear extension. There is no tracking force scale, and the arm cueing outrigger, combined with armrest, is poorly designed and weak. Bias compensation is a thread and weight job. The version tested was fitted with silver, linear crystal van den Hul cable, and the arm will fit any Linn type mounting hole.

LAB REPORT

Downforce setting is largely dependent on the skill of the user. Apart from the cue assembly, construction is good. The bearings have little play or friction, though some notchiness was noticed. Minor arm structural breakup modes extend upwards from 1kHz, but they are well distributed and quite well controlled.

SOUND QUALITY

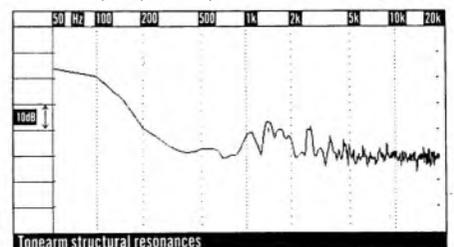
The *Xenon* has many of the hallmarks of its more expensive brother, including a quality of sonic presentation that verges on the brash (the aural signature of the titanium?), yet which is in fact extremely finely detailed and coherent. However, this one isn't as good as the more expensive *HRS-100S*: the bass is deep and true but not as substantial and full; image stability is slightly compromised; the resolution of detail is lower, though still good.

CONCLUSIONS

This model may be warmly recommended as one of very few middle price arms of any real merit.

TEST RESULTS

Arm section	
Approximate effective mass inc screws, exc cartridge	12.5gm
Type/mass of headshell	integral, fixed
Geometric accuracy	very good
Adjustments provided	overhang/lateral
Finish & engineering	excellent/excellent
Ease of assembly/set-up/use	very good/good/good
Friction (typical) lateral/vertical	variable/15mg
Bias compensation method	thread & weight
Bias force, rim/centre (set to 1.5gm elliptical)	340mg/360mg
Downforce calibration error, 1gm/2gm	0.1g/0.2g
Cue rate	instant/5 secs
Cue drift ascent/descent	negligible
Arm resonances	good
Arm damping method	none
Load capacitance	80pF
Estimated typical purchase price	£262



RECOMMENDED

ALPHASON SONATA/HR-100S-MCS

ALPHASON, 190-192 WIGAN ROAD, EUXTON, NR. CHORLEY, LANCS PR2 6JW. TEL: (02572) 76626.



Cleaned up for series production (it was originally a test bed for arm design purposes), the astonishingly heavy *Sonata* is civilised, even discreet. The wood line conceals the bulk, the top plate has a bronzed appearance, and the lid is of fine quality. The functional design is based on a massive one-piece subchassis, arm base and main bearing which is suspended from three very long springs inside the three black towers you see in the photo. The natural suspension frequency is low and scarcely damped.

The platter is a one-piece proprietary synthetic material which is 'dead' when rapped. The record is placed straight on the hard platter surface, and heavy weight is lowered on top to act as a clamp. The drive system is based on two quartz-locked synchronous motors, which apply torque symmetrically to the opposite sides of the drive hub (machined at the base of the platter). In this way the springs (and gravity) are the sole determinant of suspension dynamics (leaving aside the arm cable).

There are still a few rough edges to the product, however: the spindle seemed very slightly over-size: the cueing lever of the arm was very close to one of the suspension towers; and the base is boxed in by a resonant panel. Driving electronics are built inside, with on/off and speed change using two push buttons on the front.

The *HR-100S-MCS* is the top of the line

Alphason arm. The most important feature is a light and stiff S-shaped titanium arm tube headshell which is made in one piece up to a point just in front of the gimbal bearings. The bearings themselves are strong and rigid, using ceramic surfaces said to be ten times harder than conventional metals. The arm base is Linn compatible, and the arm cable on this *MCS* version is pure silver, linear-crystal, from van den Hul.

Not all the answers are right. The vertical bearings are not in line with the record plane, so the orientation of the cartridge changes as it rides warps. But this is still amongst the most elegant arms around.

LAB REPORT

The disc edge shock plot shows what looks like a platter rocking mode, but in fact a lot of gain was needed before anything showed. Spectral analysis of the same event uncovered one resonant peak around 200Hz, but again at a very low level.

The Alphason resists feedback well, especially at very low frequencies where other turntables are at their weakest, while shocks applied via the base are well suppressed. Rumble and electronic noise are fairly clean, though the rumble figure wasn't particularly low. Wow and flutter levels were excellent, but the deck ran about 0.5 per cent slow. Applying extra

loading to the motor, however, resulted in no further change, so dynamic wow should be negligible.

Superb control over structural resonances is shown in the arm plot. Various modes can be seen, some attributable to the counterweight and all well damped. The arm has a low enough effective mass to match relatively compliant cartridges as long as they don't weigh too much. The bearings are free from slack, and have low friction.

SOUND QUALITY

This is without question a top quality combination. The system sounds characteristically open, dynamic yet relaxed. So much so that playing records at extremely high volumes is surprisingly unstressful, yet the inherent clarity and focus is such that music also sounds satisfying even when played very quietly.

The arm does impose a slightly 'shrill' character on the sound, yet it doesn't obscure detail, and I was consistently able to hear further into records than with most others – the intelligibility of the whispered section near the start of *Carmina Burana* (EMI/Previn) was a useful test here. At the same time, the bass is big and forceful. As a whole, the Alphason combination has a lot of presence, whilst stereo imagery is well resolved in all planes and big in scale.

The combination of high levels of perceived resolution, large effective dynamic range and a usefully wide frequency response makes this a very effective combination, and one of the few that can be regarded as eligible for the label 'state of the art'. Criticisms are few and mild; nevertheless the bass end could usefully drive rhythms a little more effectively – sometimes it seemed almost in danger of being swamped during busy passages – and the arm still sounds a little 'metallic' at times.

CONCLUSIONS

This is an impressive combination. Both turntable and arm are ambitious, capable products that in unison – and with sympathetic systems erected around them – offer all but unrivalled clarity, dynamics, weight and openness.

TEST RESULTS

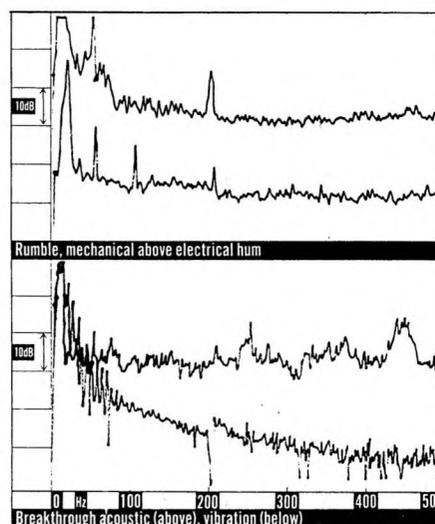
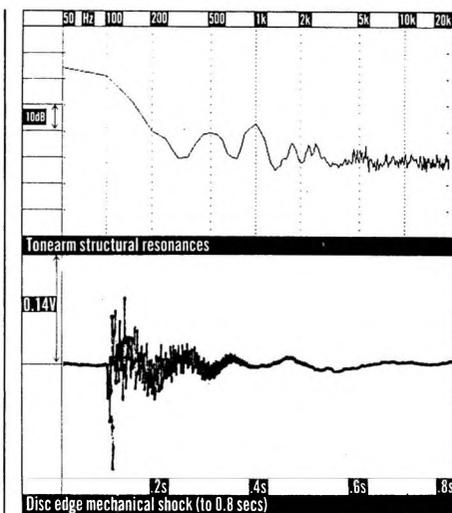
Motor section	
Type	manual motor plus arm
Platter mass/damping	4kg
Finish and engineering	excellent
Type of mains connection leads	2 core + earth
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.06%/0.12%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.12%/0.04%
Absolute speed error	-0.51%
Speed drift 1 hour/load variation	-0.25%/none
Start up time to audible stabilisation	7 secs
Rumble DIN B Wtd L/R	-71/-70db

Arm section

Approximate effective mass inc screws, exc cartridge 10gm
Type/mass of headshell integral, fixed
Geometric accuracy excellent
Adjustments provided overhang/offset/height
Finish & engineering good/excellent
Ease of assembly/set-up/use good/good/good
Friction (typical) lateral/vertical 10mg/20mg
Bias compensation method thread, pulley & weight
Bias force, rim/centre (set to 1.5gm elliptical) 250mg/200mg
Downforce calibration error, 1gm/2gm uncalibrated
Cue drift negligible
Cue rate ascent/descent instant/1 sec
Arm resonances good
Arm damping method none
Load capacitance 80pF

System as a whole

Size (h x w x d)/clearance for lid rear 16 x 46 x 26/7cm
Ease of use good
Typical acoustic breakthrough and resonances very good
Subjective sound quality of complete system excellent
Hum level/acoustic feedback average/good
Vibration sensitivity/shock resistance very good/very good
Estimated typical purchase price £695 + £359



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ARISTON Q-DECK

ARISTON ACOUSTICS LTD, FREEPORT SCOTLAND, PRESTWICK AIRPORT, PRESTWICK, SCOTLAND KA9 2TA. TEL: (0292) 76933.



The *Q-Deck* is designed to meet the non-specialist user at least half way. The player works almost straight from the box. There's no suspension to adjust; the arm is non-interchangeable; and an Ortofon *OM10* cartridge is supplied fitted. Speed change is by a discreet dome switch, the motor being driven by a simple L-C oscillator.

Operationally the deck is simple to use too, though it doesn't offer full automation. Moving the arm towards the record switches the motor on, and at end of side the arm lifts and the motor cuts, triggered by a frictionless magnetic switch.

The plinth consists of a plain sheet of Q-board. This is a laminate of medium density fireboard (MDF) with an (unspecified) visco-elastic filling, as a combination offering particularly good damping. The main bearing is now a sealed, captive unit, simplifying setting up further, and the arm is bolted to the Q-board in the familiar Rega pattern. The whole unit sits on compliant feet. The platter, topped by a thick rubber mat, is a heavy and well engineered one piece alloy casting, with finger holes to allow access for the belt. The arm itself is a straightforward Japanese sourced OEM device, with a small diameter main tube and bolt-on cast metal headshell.

LAB REPORT

Wow and flutter measured an excellent 0.06 per cent, what there is being more wow than flutter due to the considerable platter inertia. The test sample ran a little fast, but there was absolutely no drift. The deck did slow quite substantially under load, however, and some dynamic wow could sometimes be sensed though not heard on transient, pitch sensitive music.

Rumble levels are satisfactory, and the deck

has a quite good impulse response, though feedback is a little selective frequency-wise. The tests otherwise suggest a well sorted machine with good bearings.

The arm is also notably well engineered. The only real criticism is that arm lead capacitance is rather high for some of the moving magnet cartridges that may be used in such a deck. The arm resonance plot shows that the first main tube mode is delayed until 1kHz, which is better than some £300 arms achieve and extremely good for a budget arm. A sharper peak at 2kHz, however, dominates the plot, but other resonances are quite well distributed and therefore likely to be innocuous enough.

SOUND QUALITY

Sonically tainted by the occasionally brash sounding *OM10* cartridge, the *Q-Deck* is basically smooth sounding, with mildly restrained but still acceptable dynamics, a well upholstered bass, and a fine sense of timing on rhythmically 'difficult' material. Pitch information was stably presented. Whilst the deck sounded a little understated at times, music sounded varied and interesting.

CONCLUSIONS

The *Q-Deck* is an artful and largely successful compromise which offers a solid and well integrated sound plus no nonsense engineering.

TEST RESULTS

Motor section	
Type	belt drive semi-auto integrated player
Platter mass/damping	1.15kg/average
Finish and engineering	moderate
Type of mains connection leads	2 core
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Uwtd)	0.05%/0.13%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.12%/0.03%
Absolute speed error	+0.75%

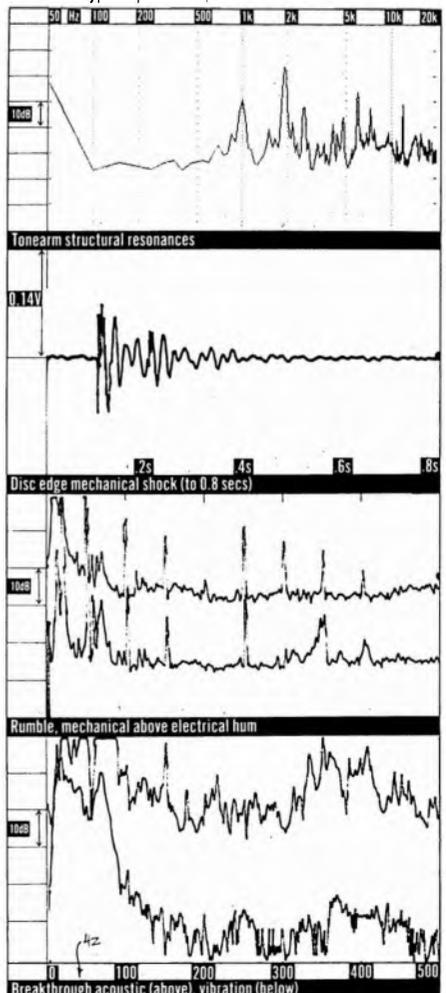
Speed drift 1 hour/load variation	none/-0.95%
Start up time to audible stabilisation	2 secs
Rumble DIN B Wtd L/R	-65.5/-71.5db

Arm section

Approximate effective mass inc screws, exc cartridge	n/a
Type/mass of headshell	fixed
Geometric accuracy	average
Adjustments provided	overhang
Finish & engineering	good
Ease of assembly/set-up/use	good/good/very good
Friction (typical) lateral/vertical	25mg/25mg
Bias compensation method	spring & dial
Bias force, rim/centre (set to 1.5gm elliptical)	140mg/170mg
Downforce calibration error, 1gm/2gm	no error/no error
Cue drift	negligible
Cue rate ascent/descent	<0.5 sec/0.8 secs
Arm resonances	very good
Arm damping method	none
Load capacitance	170pf

System as a whole

Size (h x w x d)/clearance for lid rear	13 x 42 x 34/7cm
Ease of use	good
Typical acoustic breakthrough and resonances	average
Subjective sound quality of complete system	good
Hum level/acoustic feedback	average/good
Vibration sensitivity/shock resistance	average/average
Estimated typical purchase price	£139.95



ARISTON RD60

ARISTON ACOUSTICS LTD., FREEPORT, SCOTLAND, PRESTWICK AIRPORT, PRESTWICK, SCOTLAND KA9 2RB. TEL: (0292) 76933.

BEST BUY



This Ariston subchassis turntable is available as a £220 player with the *Enigma* arm fitted. Neat, compact and attractive in appearance, in many senses it is a 'slimmed down' economy version of the *RD90*, and again the detail design left something to be desired.

The plinth is textured Q-board, whereas the subchassis is MDF, while the moulded base is fitted with sprung feet. The slim plinth and substantial composite work leave restricted space for the inverted top-adjustable springs, which consequently lack excursion. The single piece aluminium platter is driven by a decent square-section belt, with manual speed change via the grooved stepped pulley. The lid, hinged with countersprings, is lightweight styrene, the arm mounting plate overlapped the subchassis by some 40 per cent, and the armlead terminal board had been cracked when fitting.

LAB REPORT

Rumble was above average, but the spectrogram showed a substantial -33dB 100Hz component, and perturbations between 50 and 100Hz. Absolute speed was a high +0.75 per cent and drift was on the high side too. 0.18 per cent wow and flutter represents marginal high fidelity, and reflects the weak subchassis

dynamics. The disc impulse damping was satisfactory enough, while both acoustic and vibration breakthrough gave eminently satisfactory results.

SOUND QUALITY

Despite the technical criticisms, the *RD60* squeezed a 'good' rating, falling only slightly short of the more expensive '90. The sound was lively, with good frontal detail and a 'tidy' top end. The bass lacked some weight and scale, and the midrange also lacked the transparency and focus of top designs, yet it remained balanced and communicative.

CONCLUSIONS

Despite giving the impression that a potentially better turntable is trying to get out of the *RD60*, the overall performance for the price is still good, rating Best Buy with the decent quality *Enigma* arm.

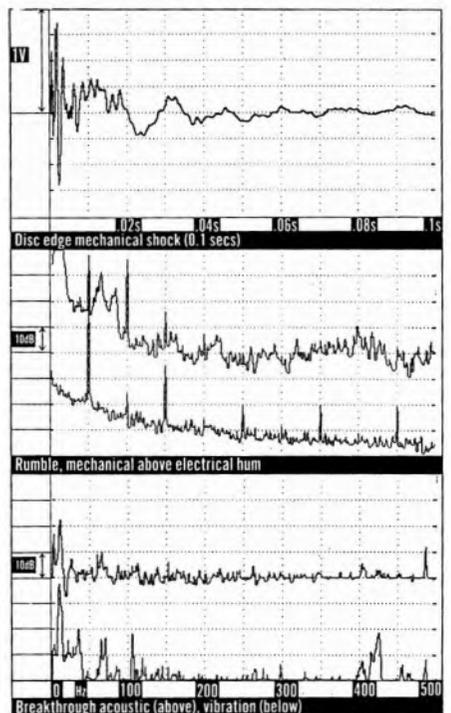
TEST RESULTS

Motor section

Type	manual, belt-drive, subchassis
Platter mass/damping	1.73kg/very good
Finish and engineering	good
Type of mains connection	leads 2 core
Speed options	33 $\frac{1}{3}$ /45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.18%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.21%/0.08%
Absolute speed error	+0.75%
Speed drift 1 hour/load variation	+0.42%/-0.1%
Start up time to audible stabilisation	3.5 secs
Rumble DIN B Wtd L/R	-72/-74dB
Size (w x d x h)/clearance for lid rear	41 x 34.5 x 13/5cm
Ease of use	good
Typical acoustic breakthrough and resonances	good
Subjective sound quality of complete system	good
Hum level/acoustic feedback	good/very good
Vibration sensitivity/shock resistance	fairly good/fairly good
Estimated typical purchase price	£219

Reviewed by Martin Collins

Reprinted from issue No. 48



ARISTON RD90 SUPERIOR

ARISTON ACOUSTICS LTD, FREEPORT SCOTLAND, PRESTWICK AIRPORT, PRESTWICK, SCOTLAND KA9 2TA. TEL: (0292) 76933.



In Ariston's gold-plated nomenclature, the *RD90 Superior* is a 'flagship' model, first seen in prototype form about a year ago. Styling is based on the *RD110*, but the '90S' is intended very much as a minimum compromise, state of the art player, and the cost is well in excess of £1,100 with an arm of commensurate ability. Finish, in a vaguely 'period' style, comes in a choice of rosewood or black ash veneer, with a brushed aluminium top plate.

This floating subchassis design has three coil spring suspension units, adjustable from above. The armboard is solid brass, damped around the periphery, and the subchassis is a thick steel pressing, again with a degree of damping incorporated. The unlacquered outer platter is nothing less than a work of art: based on a heavy bronze casting, a strip is routed out of the top and replaced by a layer of aluminium prior to re-machining. The construction effectively damps the natural bell modes, but a little Q-damping is applied underneath as an insurance policy.

The 72-pole Hall effect motor has a built in tachometer for speed control. Speed change is by switch, but each speed has its own adjustment pot, tucked away on the front of the base just below the woodplinthline. The power supply is housed in a (superfluously?) smart but unscreened box, which should be kept well away from the turntable. No matching arm is available from the makers, but the Alphason *HR-100S* used for most of the listening is explicitly endorsed by Ariston.

Supplied with both a thick rubber and a felt mat, Ariston are almost certain to market the deck with the latter. My preference was strongly for the felt, and this was used for the listening reported on here. However, a small but worthwhile additional improvement can be wrought by a change to a thinner, harder mat –

the Linn or Roksan examples being ideal.

LAB REPORT

Surprisingly, the measured wow and flutter figure was rather high, and this was almost entirely due to 0.22 per cent low rate variations in the wow spectrum (<6Hz), which may be due to excessive belt compliance. High platter inertia effectively irons out higher rate variations. This deck slowed noticeably under load too, which implies marginal motor torque. However, the *RD90 Superior* recipe worked predictably well in the impulse response test, and acoustic feedback was well suppressed too apart from one discrete mode around 360Hz. The rumble spectrum was quite smooth apart from a generalised increase in LF noise, which might be improved with better bearing finish – or longer running in.

SOUND QUALITY

The Alphason *HR-100S* suited the deck well, and the felt mat helped to ensure a real sense of liveliness, resolution and clarity, without loss of control. Even so, the *RD90 Superior* sounded slightly rubbery and detached, and this was confirmed in the tape comparison. There wasn't the sharpness or alacrity that is the mark of true excellence. The bass didn't seem to integrate wholly successfully and at worst timing was suspect. The Ariston did sound powerful and controlled, and gave a big, spacious and stable backing to records, but at this price it's not unreasonable to expect a little more.

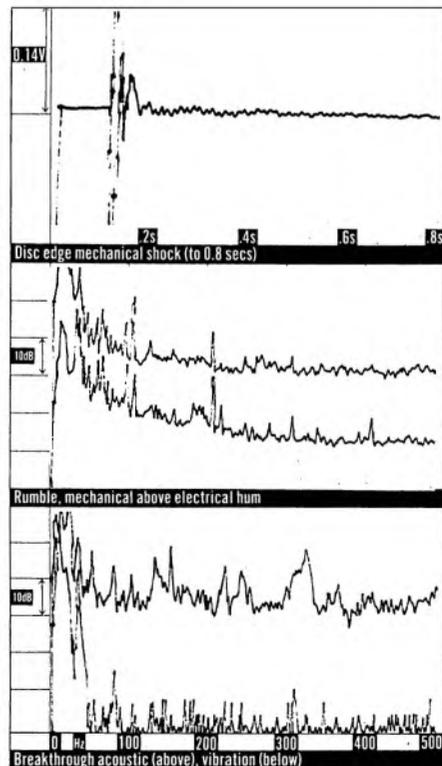
Ironically, a little more of what the cheapest of all Aristons – the *Q-Deck* – offers would have helped this most expensive model no end. Not that the cheaper model sounds better than the dearer one overall, but it does sound crisper and lighter on its feet...

CONCLUSIONS

The *RD-90 Superior* is a joy to behold and will probably last until the end of time. But some honing is needed to maximise its potential. Interesting it is, but not recommended.

TEST RESULTS

Motor Unit	
Type	manual motor unit
Platter mass/damping	high
Finish and engineering	excellent/excellent
Type of mains connection leads	3 core
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.11%/0.23%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.22%/0.05%
Absolute speed error	adjustable
Speed drift 1 hour/load variation	-0.06%/+0.73%
Start up time to audible stabilisation	4 secs
Rumble DIN B Wtd L/R	-76.5/-77dB
Size (h x w x d)/clearance for lid rear	45 x 36 x 17cm
Ease of use	normal
Typical acoustic breakthrough and resonances	good
Subjective sound quality of complete system	good
Hum level/acoustic feedback	good
Vibration sensitivity/shock resistance	excellent/excellent
Estimated typical purchase price	£900 + arm



DUAL CS 503-1

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

RECOMMENDED



The stark but elegant CS503-1 is a direct replacement for the decade old CS505, which continues for now in its more expensive DL form. Gone are the 505s eccentricities – the platter edge strobe markings, and the mechanical speed fine adjust knob. Gone too, unfortunately, is the spring suspension system.

The design has been highly er, pragmatised, to allow economical automated production. Novel materials are used, notably a new expanded polystyrene for the chassis which is claimed to sound almost identical to natural chipboard (*sic*). The interchangeable headshell is improved, being based on a proprietary locking collar design, and the high grade gimbal bearings are as good as ever.

Positive aspects of this new Dual include the lack of setting up hassle, partly because the dynamically balanced arm renders the deck unfussy about levelling. On the other hand, the Dual 'reads' the surface it stands on all too effectively – for a tight sound, a stiff, light surface helps no end. The semi-automatic arm control system is still unsurpassed in the way arm cueing is set to 'up' every time it is returned to base.

LAB REPORT

Turntable speed stability measures well, whilst speed accuracy is good, with practically unmeasurable drift. However, there was significant slowing under load. Structural analysis showed evidence of platter rock, which often has repercussions in bass behaviour. Furthermore, the Dual is both microphonic and quite resonant as measured at the stylus. Worst of all, measured rumble levels are high, not least due to electrical breakthrough.

Then there's the arm. The price provides some excuse, but the arm is quite resonant when excited. However bearing friction in par-

ticular was exceptionally low despite negligible slack.

SOUND QUALITY

Measurements notwithstanding, the Dual didn't sound as stable in pitch as expected, though it wasn't hard to find program material to mask the shortcomings. The high rumble levels were also quite audible on a wide range system, and the cartridge is none too detailed or refined.

When these shortcomings were set to one side, or masked by the music or system, and another cartridge was installed, things changed. Now the 503 sounded crisp, detailed and surprisingly agile, finally delivering on some of the promise of the design. Stereo reproduction and dynamics were both believable, and the bass was tidy and firm, if not very powerful.

CONCLUSIONS

An interesting but flawed design, the 503 is certainly Recommendable on grounds of price, and cleverly tailored to work with likely budget partners, but doesn't quite earn Best Buy ranking.

TEST RESULTS

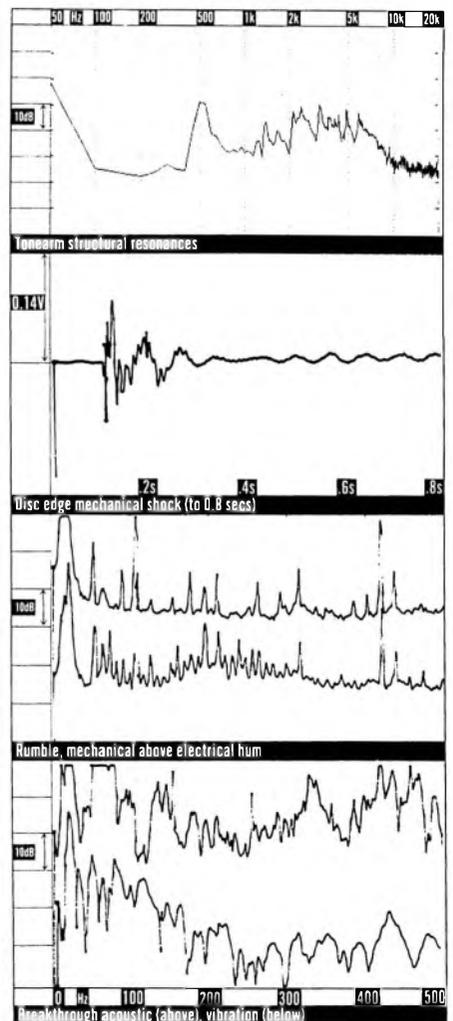
Motor section	
Type	belt drive semi-automatic integrated player
Platter mass/damping	800gm/good
Finish and engineering	good
Type of mains connection leads	2 core
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.08%/0.15%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.15%/0.03%
Absolute speed error	+0.25%
Speed drift 1 hour/load variation	-0.01%/-0.44%
Start up time to audible stabilisation	3 secs
Rumble DIN B Wtd L/R	-47/-61dB

Arm section

Approximate effective mass inc screws, exc cartridge	low (spring assist) at zero balance
Type/mass of headshell	detachable/4gm
Geometric accuracy	good
Adjustments provided	overhang
Finish & engineering	good
Ease of assembly/set-up/use	very good/very good/excellent
Friction (typical) lateral/vertical	<10mg/<10mg
Bias compensation method	spring
Bias force, rim/centre (set to 1.5gm elliptical)	500mg/550mg
Downforce calibration error, 1gm/2gm	0.05g/0.10g
Cue drift	negligible
Cue rate ascent/descent	1.0 sec/1.5 sec
Arm resonances	poor
Arm damping method	none
Load capacitance	165pf

System as a whole

Size (h x w x d)/clearance for lid rear	12 x 44 x 36/3cm
Ease of use	excellent
Typical acoustic breakthrough and resonances	poor
Subjective sound quality of complete system	average
Hum level/acoustic feedback	below average/poor
Vibration sensitivity/shock resistance	below average/below average
Estimated typical purchase price	£124.95



DUAL CS5000

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



The player capable of accommodating 78rpm discs is a rare bird these days, and no one who loves music should lightly dismiss the marvels locked in those ancient shellac grooves (remembering you need a special stylus), so Dual deserve credit on those grounds alone. (The only other we know of is a special 78-only version of the Rega.) The 5000 is a large integrated player with a real wood plinth in a real wood colour, the top edges heavily radiused to give an attractive 'styled' appearance. The manually operated arm has good bearings but a deliberately highly decoupled counterweight, and the main vertical arm pillar was disturbingly flexible. It has a lightweight plastic detachable headshell which is reasonably rigid, but ironically has extra mass loading added. Springs provide dialled-in downforce and bias compensation.

Some isolation from outside influence is provided by a large ribbed plastic subchassis, the foam-damped springing effective enough vertically but rather stiff in rotation. Moreover, the substantial brushless servo DC motor is mounted on the subchassis alongside the platter and arm. The cast alloy platter is unbelievably elaborate, with extra rim mass added and a heavy mat. A substantial low resonance lid is fitted.

LAB REPORT

The medium mass arm offers good compatibility, and good bearing friction with firm bearings besides. Bias force was set a little high, but downforce calibration was good. The early break in the resonance sweep showed yet again the inherent rigidity compromise of a detachable headshell, while the treble range is reasonable, if down a little in level.

Rumble gave reasonable results, but the spectrogram showed numerous harmonics

generated from the subchassis-mounted DC quartz motor. Start-up was pretty slow, but the other speed characteristics were all pretty good. Acoustic breakthrough was likewise respectable, but the stiff damped springs did allow some vibration through below 150Hz. The disc mechanical impulse showed quite good damping from the heavy mat, though there was some ringing in the trace nonetheless.

SOUND QUALITY

Overall, the sound was a little disappointing perhaps, rating only average and perhaps reflecting rapidly improving standards elsewhere. The sound was fairly open with some depth and fair focus, but the bass was 'softened' and 'bumpy' without much resolution, and the treble was a little untidy. Balance was fairly good, the sound seeming to suit classical material rather better than rock.

CONCLUSIONS

Full marks for the 78 facility, but a bit ordinary for the price elsewhere, the prospective purchaser must make his own choice, depending on musical taste. The 5000 doesn't merit full recommendation on price vs performance, but is pretty decent for all that.

TEST RESULTS

Motor section	
Type	electronics belt, subchassis
Platter mass/damping	1.4kg/very good
Finish and engineering	very good/good
Type of mains connecting leads	2 core socket/phones & earth
Speed options	33 $\frac{1}{3}$, 45, 78rpm
Wow and flutter (DIN peak wtd sigma 2)	0.08%
Wow and flutter (lin peak wtd 0.2-6Hz/6.300Hz)	0.14%/0.01%
Absolute speed error	0%
Speed drift, 1 hour/load variation	+0.1%/-0.15%
Start-up time to audible stabilisation	8 secs

Rumble, DIN B wtd, L/R average (see spectrum) —69dB/—77dB

Arm section

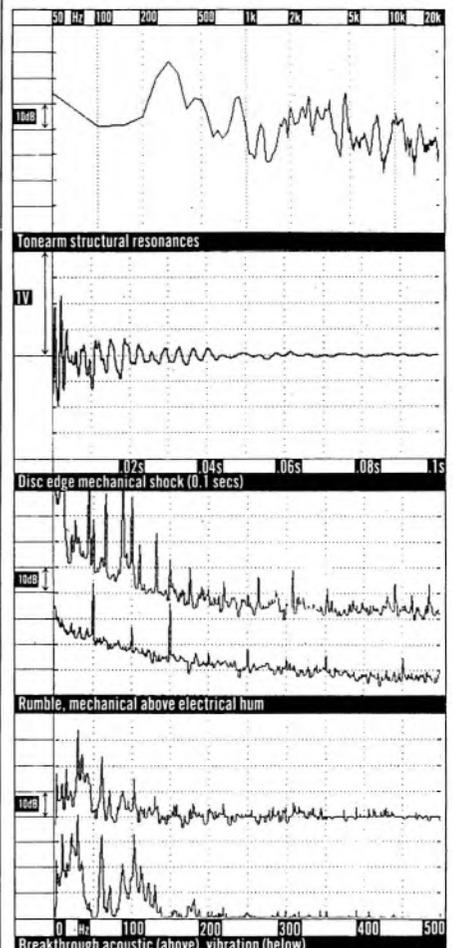
Approximate effective mass, inc screws, excl cartridge	10g
Type/mass of headshell	special detachable
Geometric accuracy	very good
Adjustments provided	overhang/lateral
Finish and engineering	good
Ease of assembly/set-up/use	good/very good
Friction, typical lateral vertical	20mg/<20mg
Bias compensation method	spring slider
Bias force, rim/centre (set to 1.5g elliptical)	200mg/200mg
Downforce calibration error, 1g/2g	-0.05g/-0.05g
Cue drift, 8mm ascent/descent	negl, 1 secs/1 secs
Arm resonances	see text
Subjective sound quality	average
Arm damping	cwt decoupling

System as a whole

Size (w x d x h)/clearance for lid rear	44 x 40 x 12.5cm/5cm
Ease of use	very good
Typical acoustic breakthrough and resonances	very good
Subjective sound quality of complete system	average
Hum level/acoustic feedback	good/very good
Vibration sensitivity/shock resistance	fairly good/good
Estimated typical purchase price	black £200, real oak £210

Reviewed by Martin Colloms.

Reprinted from issue 48.



ELITE ROCK

TOWNSHEND INT., UNIT 2, NORTH WEYLANDS IND. EST., MOLESEY RD., WALTON-ON-THAMES KT12 3PL. TEL: (0932) 246850.

RECOMMENDED



The first and so far only exponent of full scale damping at the headshell end of the tonearm, the Elite *Rock* was covered last time in close to its ultimate form, complete with wood veneered plinth, *Mertin* outboard power supply and *Excalibur* arm. Without cartridge this player combination costs £914, or £1,054 with the recently introduced isolation base. For this new edition we're looking at the least expensive way of getting a *Rock* rolling, which means no plinth and lid or outboard power supply, and a third party arm – in this case an Alphason *Opal*. Most other arms can also be accommodated of course.

Drive is from an AC synchronous motor through a two step pulley and round section belt. Appearance is sternly businesslike. The chunky looking but very tightly dimensioned 'plinth' is a pressed steel box covered with a tough black plastic and filled with Gypsum and bituminous damping. It sits on three steel capped hemispherical sorbothane feet.

The 1.8kg platter is made in the same way as the plinth. A screw-on clamp holds the record in intimate contact with the hard but well damped surface. Speed change is manual, and this can be done without disturbing the platter. The latter sits on a small sub-platter which runs on a substantial, inverted case-hardened steel bearing with phosphor-bronze sleeving. Arm damping is based on a trough filled with a silicone fluid (see photo), which must be swung out of the way to change records. The arrangement is safe enough, albeit a trifle inconvenient, if left undisturbed and away from kids.

LAB REPORT

Apart from some slowing under load, the static measured parameters including wow, flutter and rumble were fine, and the disc edge shock was very well suppressed. The rumble and

electrical breakthrough plots were clean apart from a sharp spike at 100Hz – the first mains harmonic. Microphony was very low, and you could almost stand this deck on top of the loudspeakers. The plinth design gave poor isolation from external shocks, however.

SOUND QUALITY

The midrange and top end sounded slightly coloured, but this was narrowed down to the arm's contribution; the basic nature of this deck was essentially undimmed even in this relatively low cost trim. The bass sounded tight and dry, with excellent depth but a characteristically high level of damping – some might find it excessively damped, but it is fast and true in pitch. There's little evident coloration, and the sound as a whole integrates well.

Stereo imagery is superb laterally, but the damped bass reduced the apparent reverberant content of the sound (which is typically LF rich), and the depth plane therefore tends to be compressed. Note that the manufacturer suggests re-positioning the loudspeakers for best stereo results, siting them further apart than usual and over-angled inwards.

The sound didn't 'breathe' quite as naturally as some, and the dynamic window wasn't as wide as usual. But 'local' dynamics – the subtle shadings that distinguish similar instruments, and the separateness of instruments in a mix – were all handled well. The subjective signal/noise was also very fine, and the tape test was passed with flying colours – not unnaturally!

CONCLUSIONS

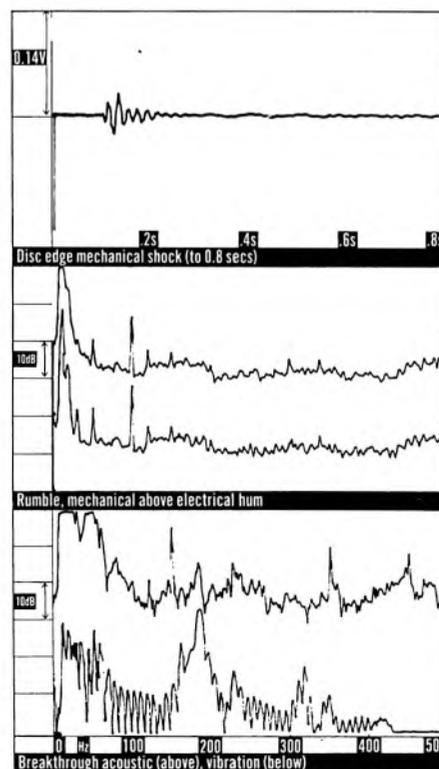
More CD-like than the majority of its competitors, the *Rock* sounds poised, articulate and very tautly controlled, but a little lacking in depth. The sound fully justifies the price in my view, though you have to be sympathetic to the

tight and occasionally stark sound quality.

A key advantage with the *Rock* is the ability to upgrade by adding extras – subject of course to demonstration – and the trauma-free setting up. Disadvantages relate primarily to the use of an open trough of thick, viscous fluid for arm damping. Remember also that there is no lid without buying the optional plinth and cover together.

TEST RESULTS

Motor Unit	
Type	manual motor unit (optional electronic)
Platter mass/damping	1.8kg
Finish and engineering	adequate/good
Type of mains connection leads	captive
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.08%/0.13%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.14%/0.038%
Absolute speed error	+0.64%
Speed drift 1 hour/load variation	-0.13%/-0.50%
Start up time to audible stabilisation	3.5 secs
Rumble DIN B Wtd L/R	-80/-82dB
Size (h x w x d)/clearance for lid rear	12 (w/o arm) x 40 x 33/no lid
Ease of use	below average
Typical acoustic breakthrough and resonances	below average
Subjective sound quality of complete system	good+
Hum level/acoustic feedback	good
Vibration sensitivity/shock resistance	good
Estimated typical purchase price	£350



HEYBROOK TT2 + ARM

HEYBROOK HI-FI LTD, ESTOVER CLOSE, ESTOVER IND. EST., PLYMOUTH, DEVON PL6 7PL. TEL: (0752) 480311.



Re-assessed for this issue, the Heybrook *TT2* has been upgraded by the addition of an out-board power supply – previously the *TT2* was driven directly by the mains – and supplemented by the introduction of the Heybrook arm, which is built on their behalf by Alphason. Because these two items are so likely to be used together, they are tested here in combination.

Design-wise the *TT2* betrays a number of influences, most obviously from Linn Products and Thorens, but nevertheless shows good quality construction using high grade fastenings and materials. Obvious compromises, inevitable at the price, are restricted to areas like aesthetics and finish, which are adequate but dull. The plinth on the other hand is more solidly constructed than might have been expected – it's heavy, being almost solid wood underneath. The diecast aluminium subchassis has an irregular cross shape, and is quite thick in section and well ribbed for rigidity. A laminated wood armboard is bolted in place and is readily interchangeable as required. The suspension, tuned to about 5.5Hz and essentially undamped, has the classic three springs, adjustable from above.

Power enters the system from a freestanding supply. Roughly finished in Nextel, with a front 33-off-45 switch, it is totally dedicated to the point of being captive wired to the turntable.

Drive is transferred from the crown pulley of a 24-pole motor through a short flat belt of lower than usual compliance, an arrangement which can be expected to reduce wow at the expense of motor vibration transmission. Perhaps to counter this, the motor is rigidly attached to the plinth, any vibration transfer in this direction being swamped by the high mass of the plinth. The platter is conventionally designed, its inner section including a well tolerated rounded bearing that sits on a thrust pad.

The new Heybrook arm has concentric gimbal bearings for the two planes. The large diameter armtube is made from aluminium and the headshell, incorporating a well designed fingerlift, is a magnesium extrusion. The bearings are designed to be tough, but there was some slack on the test sample at least. Internal wiring is a high purity copper, van den Hul *502* cable is used to connect back to the amplifier, and the gold plated phono plugs are High End Audio Devices types. A competently designed cue attached to a rather weak outrigger completes the package.

LAB REPORT

Structurally the arm is extremely well behaved, almost defying analysis. There are no overriding discrete resonances at all, except in the highest couple of octaves. Mass is highish, and only suitable for low compliance cartridges,

whilst bearing friction is about average for a semi-budget design. The downforce calibration over-reads by about 20 per cent though, and finish is best described as modest.

Various structural and more prominent electrical artefacts were present on the rumble and hum plots, though the rumble figures measured to Din B are fully satisfactory. Acoustic breakthrough and impulse responses both show some environmental excitability. However, the platter and mat damp record excitation extremely well. Both wow and flutter components are a little high, the weighted combined figure of 0.14 per cent being about double that expected of a top rank design.

SOUND QUALITY

Early samples of this turntable tended to sound rather pedestrian and lacking in life. Happily it's been in production a long while now, and the process of continual steady refinement has clearly borne fruit. The icing on the cake this year is the introduction of the arm, which in the context of the capabilities of the turntable seems to be a considerable success (bendy bits aside).

Auditioned with the Audio Technica *AT-F5* test cartridge which suited this combination particularly well, the Heybrook played music with pace and poise. Bass weight was particularly good, and both dynamics and image scale were to a high standard. What really counts though is the fact that it was accomplished almost without overhang. Imagery was good too, but is not the Heybrook's strongest point as there is some loss of depth and 'air'.

The *TT2* is perhaps finally developing into what may have been intended all along – a kind of cut price Linn. The bass end, and with it that quality often described as authority, were present in abundance.

CONCLUSIONS

The arm matches the turntable in more ways than one, and on present form, the combination has considerable poise and ability. Only slightly earthbound, it is clearly recommended.

TEST RESULTS

Motor section	
Type	manual motor plus arm
Platter mass/damping	2.8kg/good
Finish and engineering	below average/good
Type of mains connection leads	3 core
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.14%/0.20%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.17%/0.08%
Absolute speed error	none
Speed drift 1 hour/lead variation	-0.06%/ -0.70%
Start up time to audible stabilisation	3 secs
Rumble DIN B Wtd L/R	-80/-78dB
Arm section	
Approximate effective mass inc screws, exc cartridge	14g

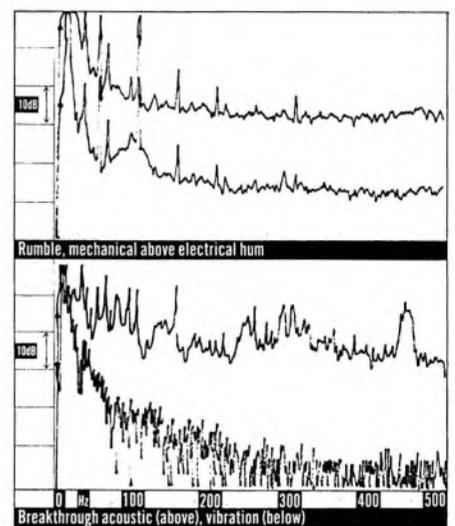
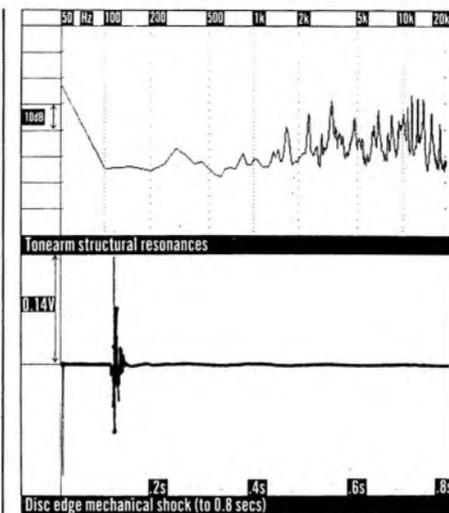
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Type/mass of headshell	integral, fixed
Geometric accuracy	average
Adjustments provided	overhang/height
Finish & engineering	fair/very good
Ease of assembly/set-up/use	average/average/good
Friction (typical) lateral/vertical	20mg/30mg
Bias compensation method	thread & weight
Bias force, rim/centre (set to 1.5gm elliptical)	250mg/250mg
Downforce calibration error, 1gm/2gm	+0.2gm/+0.2gm
Cue drift	poor
Cue rate ascent/descent	instant/8 secs
Arm resonances	excellent
Arm damping method	none
Load capacitance	110pF
System as a whole	
Size (h x w x d)/clearance for lid rear	44 x 36 x 16/6cm
Ease of use	good
Typical acoustic breakthrough and resonances	good
Subjective sound quality of complete system	good
Hum level/acoustic feedback	below average/below average
Vibration sensitivity/shock resistance	below average/average
Estimated typical purchase price	£528



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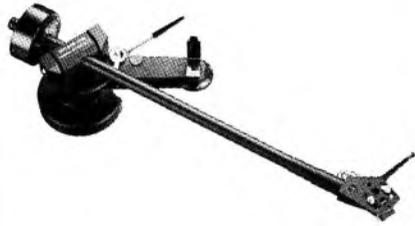
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LINN LV PLUS

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Linn felt that the detachable headshell fitting on their *LVX* represented a weakness, so decided to produce the *Plus*. Here the headshell has been rigidly and permanently factory fitted and is rigidly as well as permanently fixed. A feature of this relatively inexpensive Japanese-made product is the inclusion of the current *Basik* cartridge, a competent performer which retails at £18 when purchased as a separate item.

LAB REPORT

Effective mass with hardware was around 13g, balancing a typical cartridge and suited to low or medium compliance. The geometry was fine, and it proved easy to set up, and a current sample showed fine friction levels. The bias correction was estimated at an appropriate 230mg rim and 260mg centre.

Downforce calibration was fine, though cue

descent a trifle slow. Measured with the *Basik* cartridge installed, the cartridge-coupled arm resonances were charted. The result was notably smooth, showing good resonance behaviour with the first mode at 620Hz.

SOUND QUALITY

Comparative listening tests showed an improvement over the *LVX*. Midrange coloration was reduced, with an improvement in clarity, detail and punch. Upper bass transients were more articulate, while the treble sounded better integrated as well as more incisive. The arm attained a fine standard for the price.

CONCLUSIONS

A worthwhile revision, the *Plus* was a fine tonearm, which in its latest form, and taking into account the inclusion of the *Basik* cartridge, earns a warm recommendation.

TEST RESULTS

Arm section	
Approximate effective mass, inc screws, excl cartridge	13g
Type/mass of headshell	fixed
Geometric accuracy	very good
Adjustments provided	height/overhang/offset
Finish and engineering	very good
Ease of assembly/set-up/use	very good
Friction, typical lateral/vertical	35mg/10mg

Bias compensation method	internal spring
Bias force, rim/centre (set to 1.5g elliptical)	230mg/260mg
Downforce calibration error, 1g/2g	+0.1g/+0.15g
Cue drift, 8mm ascent/descent	1.0 secs/3.5 secs
Arm resonances	good
Subjective sound quality	good+
Arm damping	decoupled counterweight
Estimated typical purchase price	£129

Reviewed by Martin Colloms.

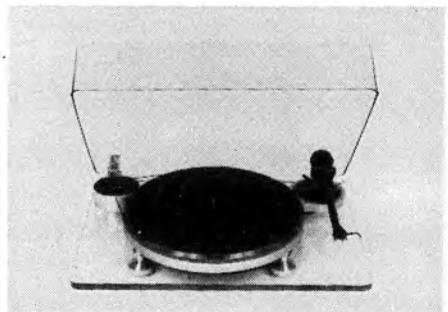
For graph references see issue No. 40.



LINN SONDEK LP12



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BEST BUY



Doubtless driven by the determinism of a decade's healthy growth, Linn finally released a medium priced integrated turntable, their unparalleled reputation ensuring that it receives considerable attention. From first sight the \$300 *Axis* is immediately and obviously a Linn, neater, smaller, more compact and modern-looking than the timeless *Sondek*. The plinth is finished in a classy textured 'black ash' vinyl; the top plate is a chameleon grey piece of 12mm MDF; and the lid is a cheap polystyrene affair. The arm is the familiar detachable-head *Basik LVX* model, with a neat leadout wire clip on the plinth.

Internal design and engineering shows a thoroughly impressive combination of innovation, cost effectiveness and excellence. The motor (a series wound version of that used in the *LP12*) and elaborate power supply are PCB-mounted with heatsink cooling at the rear of the plinth. The 33/45 supply uses a bi-phase oscillator and voltage ramping to provide high initial start-up voltage, reducing the power and consequent vibration when the player is up to speed. The crown wheel pulley, hub, bearing and platter are all familiar to those who know the *LP12* - the only significant compromise being the substitution of less dense aluminium for Mazak in the platter/hub.

Instead of *Sondek's* classic suspended sub-chassis operating below the arm/cartridge resonance, *Axis* has a clever system which isolates the top plate, platter and arm above about 20Hz, using a self-centring rubber membrane arrangement, a foolproof (even dealer-proof) arrangement that should ensure a long term accurate set-up.

LAB REPORT

The arm has been covered extensively in the past. The detachable head comprises tube

rigidity and resonance behaviour compared to the *Basik Plus* and others in its class, but bearing quality, geometry, calibration and the like are all up to the mark.

Rumble measured well enough, higher frequency motor breakthrough being notably absent. Start-up time was slow, and slowing under load only reasonable. Weighted wow and flutter was very good, but linear wow measured a poorer than average 0.24%. The disc impulse showed the expected felt mat effect on the initial transient, with only slight, low amplitude ringing thereafter. The breakthrough results were both very good, except at very low frequencies.

SOUND QUALITY

Axis not only looks like a Linn, it sounds like one as well, rating 'good' overall, which is impressive for the price. Lacking the full weight and authority of the *LP12*, the bass was still very even and tuneful.

Essentially lively in character, with good dynamics, 'speed' and timing, there was slight treble 'coarseness' and midband 'thickening'. Stereo imaging was a little 'forward', but with decent focus and depth.

CONCLUSIONS

Setting new performance standards for \$300 this cleverly engineered and thoroughly competent performer has a sound quality that is not far behind the *LP12* in many respects. The hassle free set-up is a major consistency benefit, and the competitive price could give new impetus to the vinyl disc medium. Frankly, it deserves the *Basik Plus* tonearm, but is strongly recommended nonetheless.

TEST RESULTS

Motor section

Type	electronic, belt, semi-subchassis
Platter mass/damping	1.5kg/good
Finish and engineering	very good
Type of mains connecting leads	3-pin socket/phonos and earth
Speed options	variable, 33 $\frac{1}{3}$ /45rpm
Wow and flutter (DIN peak wtd sigma 2)	0.05%
Wow and flutter (lin peak wtd 0.2-6Hz/6.300Hz)	0.24%/0.07%
Absolute speed error	+0.47%
Speed drift, 1 hour/load variation	0%/+0.2%
Start-up time to audible stabilisation	10 secs
Rumble, DIN B wtd, L/R average (see spectrum)	-74/-78dB

Arm section

Approximate effective mass, inc screws, excl cartridge	12.5g
Type/mass of headshell	special detachable/7g
Geometric accuracy	very good
Adjustments provided	height, overhang, lateral
Finish and engineering	very good/good
Ease of assembly/set-up/use	good/very good
Friction, typical lateral vertical	50mg/10mg
Bias compensation method	dial spring
Bias force, rim/centre (set to 1.5g elliptical)	150mg/150mg
Downforce calibration error, 1g/2g	-0.1g/-0.1g
Cue drift, 8mm ascent/descent	negl, 1 secs/3 secs
Arm resonances	good
Subjective sound quality	good
Arm damping	c/wt decoupling

System as a whole

Size (w x d x h)/clearance for lid rear	44.5 x 14.5 x 36cm/6cm
Ease of use	very good
Typical acoustic breakthrough and resonances	very good
Subjective sound quality of complete system	good
Hum level/acoustic feedback	good+
Vibration sensitivity/shock resistance	very good/good
Estimated typical purchase price	£313

Reviewed by Martin Colloms.

Reprinted from issue 48.

LINN SONDEK LP12/ITTOK LVII (TROIKA)

LINN PRODUCTS LTD., FLOORS ROAD, WATERFOOT, EAGLESHAM, GLASGOW G76 0EP. TEL: 041 644 5111.



In the past we've usually looked at the Linn LP12 and Ittok as separate entities; in this case we've taken the opportunity to assess them as partners, with and without Linn's matching Troika cartridge.

Detail improvements to the current LP12 this year include a new armboard design (a Formica/Medite sandwich), improved springs (again!) to allow easier and more consistent setting up, and a new main bearing liner which is less temperature sensitive, and therefore allows tighter tolerancing.

More significant than the changes, however, is what remains the same. The LP12 is by now almost certainly the longest continuous running high grade turntable on planet Earth. So there is a wealth of experience on tap from a well supported *corpus* of specialist dealers, which makes it an unusually safe long term purchase.

For visiting aliens, however, the major design elements of the LP12 are as follows. The plinth is a solid wood open box structure with a hardboard base and a steel top supported on three sides. The platter main bearing and arm board are attached to a relatively lightweight steel subchassis, hung from the top plate by three springs which have slightly eccentric cam-like actions in rotation to facilitate centering. Both this and height adjustment can be accomplished from underneath - by a trained dealer only, please.

The main bearing spindle, attached to the sub-platter, is beautifully engineered and ground to a concentric 'point'. The motor is a synchronous Impex (Philips) model powered by a smoothed quartz referenced supply (known as *Valhalla*) contained within the

base. Inner and outer platter assemblies are substantial Masak castings, engineered to a high standard, the discontinuity between them effectively damping both components. The platter is topped by a thin felt mat.

The Japanese-made Ittok arm has not been changed significantly since last time around in *Hi-Fi Choice*. The main features are a wide diameter straight armtube beam to which a diecast headshell is permanently bolted. The bearings are fully enclosed, and rigidity is of a high order. However, time is beginning to catch up with the Ittok, which now looks rather over-endowed with physical breaks along the length of the armtube; ditto with the wiring. But in manufacturing consistency, longevity and finish, the Ittok still probably matches the best. The bearings are particularly well engineered, though not the strongest around.

LAB REPORT

The Ittok is still well enough behaved when assessed for resonant behaviour, but no longer sets the pace. The first arm breakup mode appears around 1.3kHz, which is good. Above this, however, the arm becomes rather excitable, with several sharp resonant modes suggesting an inherently under-damped structure.

The LP12 rumble is not unusually low, but the spectrum is clean. However, the deck offers poor footfall isolation, reflected in the rising LF trend in the appropriate test. The deck is also rather less accomplished in avoiding feedback-type effects than many. On the other hand, the platter and mat quickly damp energy fed in by the stylus, the disc damping plots showing some initial movement of the suspen-

sion, but no resonances. Speed stability is excellent on all counts, including linear wow and behaviour under load.

SOUND QUALITY

The player was used with and without the Troika cartridge to help isolate the properties of the different items. Although it differed in timbre, balance and midband analysis, the Troika had something of the architectural qualities of the Koetsu Red Signature, used amongst others as a reference point for this test. It is a poised, refined and dynamic cartridge, very much in keeping with the Linn.

Stability and scale are properties of the LP12 itself. In combination, the LP12/Ittok/Troika has a blend of life and authority uncommon at even double the price. Current production has acquired greater stature and stability, to judge from the test sample. The bass is sharper and tauter, there is less overhang, and the once slightly diffuse upper bass quality has been honed down into something more purposeful. From memory I'd suggest that the ease with which low level information can be followed during *fortissimo* passages has been enhanced.

Nothing's perfect of course, and the arm displays a touch of temperament at times. It's a little coarse, though the graininess that results tends to add to the perceived level of detail, and there is absolutely no 'smear'. Careful listening suggests that both deck and arm do lose more information than the best of their competition, which results in a loss of stereo depth and 'air'. But the shortfall is subtle, more subtle than ever.

CONCLUSIONS

Linn aren't resting on their laurels. The LP12 especially is demonstrably evolving, the current version adding usefully to the established repertoire of virtues, not least in the area of low end control and focus. The Ittok hasn't changed, and is just beginning to sound perceptibly dated, but still ranks with the best half dozen arms around. The Troika, finally, is clean, open and authoritative. The three together match well and are very easy on the ear, especially at low and medium volume levels.

TEST RESULTS

Motor section	
Type	manual motor unit
Platter mass/damping	4.1kg/good
Finish and engineering	excellent
Type of mains connection leads	3 core
Speed options	33 (optional kit for 45) rpm
Wow & flutter (DIN peak Wtd/Uwtd)	0.06%/0.10%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.13%/0.05%
Absolute speed error	+0.13%

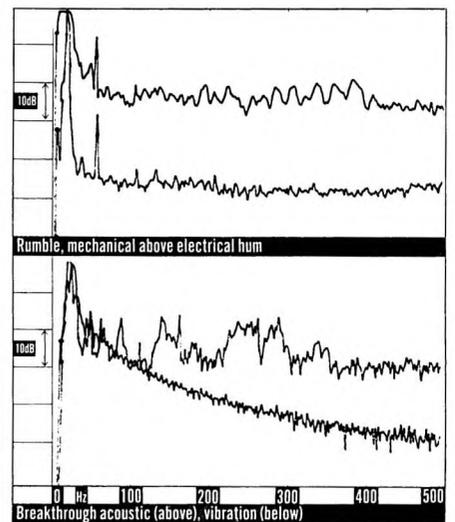
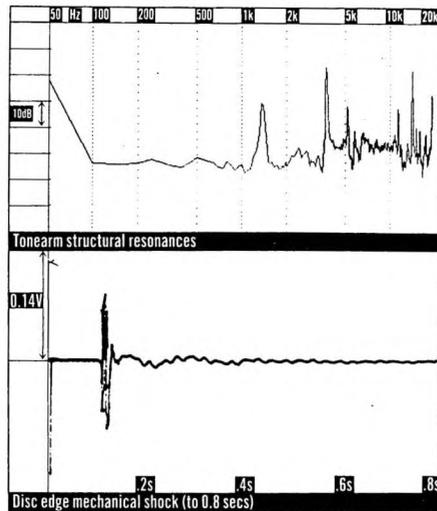
Speed drift 1 hour/load variation none/—0.04%
 Start up time to audible stabilisation 7 secs
 Rumble DIN B Wtd L/R —74.5/—75dB

Arm section

Approximate effective mass inc screws, exc cartridge 14g
 Type/mass of headshell fixed
 Geometric accuracy average
 Adjustments provided height, lateral overhang
 Finish & engineering excellent
 Ease of assembly/set-up/use very good/very good
 Friction (typical) lateral/vertical <10mg/<10mg
 Bias compensation method dial & spring
 Bias force, rim/centre (set to 1.5gm elliptical) 160mg/190mg
 Downforce calibration error, 1gm/2gm —0.2gm/—0.3gm
 Cue drift negligible
 Cue rate ascent/descent instant/6 secs
 Arm resonances very good
 Arm damping method none
 Load capacitance 107pf

System as a whole

Size (h x w x d)/clearance for lid rear 15 x 45 x 36/7cm
 Ease of use good
 Typical acoustic breakthrough and resonances average
 Subjective sound quality of complete system excellent
 Hum level/acoustic feedback excellent/average
 Vibration sensitivity/shock resistance below average/average
 Estimated typical purchase price
 LP12 £471/Ittok £399 (Troika £546)

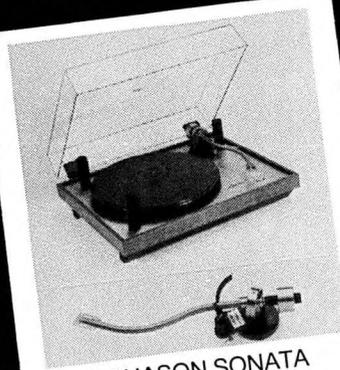


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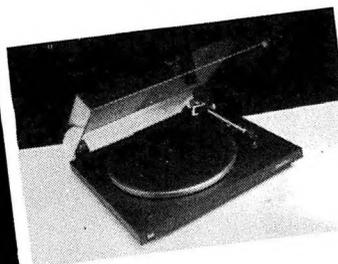
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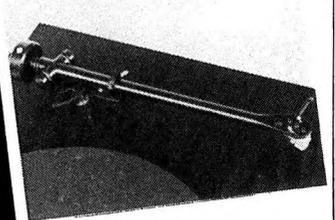
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BEST BUY



After a brief absence, Logic have revived the *Tempo* as their popular-priced turntable, and offer it with mains or electronic drive, and with *Datum II* or *Datum S* arms, at a corresponding range of price points, none of which makes reviewing any easier.

Tempo is unusual in having a large solid plinth which floats on softly sprung legs. This confers slightly inebriate handling qualities but also gives good vibration rejection. And fine arm termination afforded by inch thick MDF. The plinth-mounted motor is carefully decoupled at its mounting, and the lid is good quality vinyl with sensible hinges, but the main bearing did allow 1mm play at the platter edge. Suspension adjustment is straightforward.

Datum II has a highish effective mass better suited to lowish compliance cartridges. If lacking some of the engineering subtlety of the *S*, it offers the same rigid tube and bearings with a substantial headshell and tightly decoupled counterweight. The compact base matches a Linn cutout.

LAB REPORT

The *II* had tight bearings and negligible friction. Geometry and downforce calibration were both accurate, but bias compensation was a little high and cue descent rather slow. The resonance trace shows the first main mode at a high c900Hz, with quite good control through the midband, and rather 'peaky' but well maintained treble energy.

Rumble was quite respectable, on figures and analysis. Wow and flutter was good though linear wow could be improved. Slowing under load was also below par, and recovery caused some overshoot. The system's good stability and the vinyl damping effectiveness of the phenolic platter is seen in the disc impulse spectrogram. Both acoustic and vibration

breakthrough were very good, and largely comparable with a good subchassis design.

SOUND QUALITY

The various *Tempo* variations ranged from 'above average' through to 'good', largely according to price but also depending upon personal preferences – the turntable upgrade tending to improve bass and mid, the arm change mid and top. The general character is lively and exciting, a little 'full' perhaps, but with a solid, clear and open midband, with good stereo staging. Treble was a bit 'tizzy' and lacked a little 'crispness' (*Datum II*), but was still better than most at its price.

CONCLUSIONS

The complications of permutations are made easier to handle when it is clear that all work very well at their respective price points, and the various upgrades were logical and effective. Good engineering and presentation, simple set-up, decent measured performance and fine sound quality for the price merit Best Buy rating, each and severally...

TEST RESULTS

Motor section	
Type	manual electronic belt, decoupled plinth
Platter mass/damping	1.5kg/good
Finish and engineering	very good
Type of mains connection leads	2 core/phonos and earth
Speed options	variable, 33 $\frac{1}{3}$ /45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.06%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.18%/0.06%
Absolute speed error	+0.05%
Speed drift 1 hour/load variation	negl/0.3%
Start up time to audible stabilisation	3.5 secs
Rumble DIN B Wtd L/R	-72/-76dB
Arm section	
Approximate effective mass inc screws, exc cartridge	15g
Type/mass of headshell	fixed
Geometric accuracy	very good

Adjustments provided	height overhang, lateral
Finish & engineering	excellent
Ease of assembly/set-up/use	good
Friction (typical) lateral/vertical	20mg/10mg
Bias compensation method	dial spring
Bias force, rim/centre (set to 1.5gm elliptical)	225mg/275mg
Downforce calibration error, 1gm/2gm	0/+0.1g
Cue drift, 8mm ascent/descent	mild, 1 sec/4 secs
Arm resonances	fairly good
Subjective sound quality	good
Arm damping	none

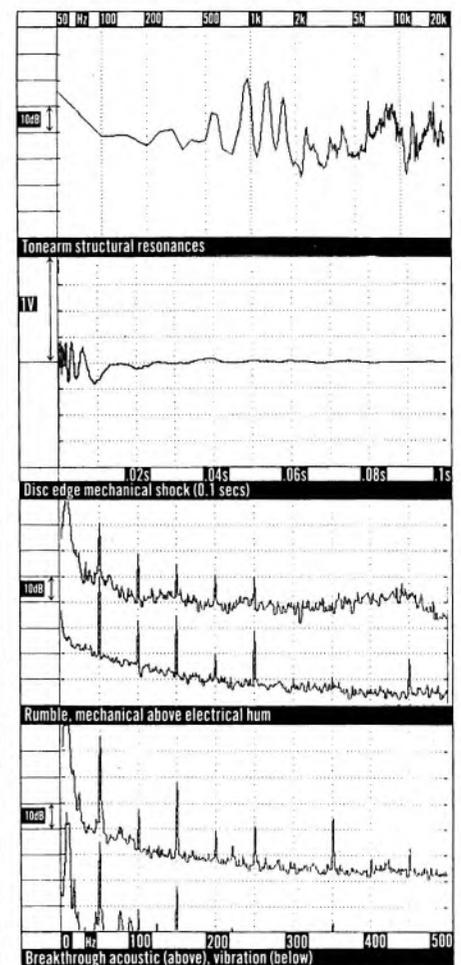
System as a whole

Size (w x d x h)/clearance for lid rear	46.5 x 36 x 15/5.5cm
Ease of use	fairly good
Typical acoustic breakthrough and resonances	very good
Subjective sound quality of complete system	above average good+ (see text)

Hum level/acoustic feedback	very good
Vibration sensitivity/shock resistance	very good/fair
Estimated typical purchase price	from £240 manual inc D/I

Reviewed by Martin Collins

Reprinted from issue No. 48



MICHELL SYNCHRO

J. A. MICHELL ENGINEERING LTD., 2 THEOBALD STREET, BOREHAMWOOD, HERTFORDSHIRE WD6 4FE. TEL: 01 953 0771.



Visually in keeping with the flagship *Gyrodec*, the more affordable *Synchro* is smaller, neater and undoubtedly better looking. Like its bigger brother, it's based on a massive acrylic base which stands on three adjustable feet, and which supports a subchassis *via* three upwards facing springs. This subchassis is an aluminium die-casting in the form of a spoked 'wheel' which supports the main bearing at its hub, and through that the felt-topped acrylic platter. The arm is mounted on an interchangeable baseplate on an outtrigger. Most arms can be accommodated *via* conventional mounts that require rebalancing in the usual way (see *Gyrodec*).

The platter is driven around its edge by a thin rubber cord from a synchronous motor linked directly to the mains. Two pulley diameters enable the deck to run at 33 and 45 rpm, speed change being manual. The plinth (if you can call it that) has radiused corners which match the rounded off moulded cover, but the latter is rather microphonic and ideally should be removed for listening.

The *Synchro* has remained virtually unchanged both in price and specifications since day one. The only change of note is that the coil springs are now terminated by PTFE 'O' rings, which are harder and said to sound better. A range of arm adaptor plates is available as suggested, and setting up is easy and unimpeded, but the majority of *Synchros* are sold with Rega *RB250s*. Students of trivia might like to know that Michell is the only OEM customer for the *RB300*, which can be supplied with this turntable if required.

LAB REPORT

The *Synchro* was tested with a Michell arm, which is otherwise identical to the Moth arm reviewed separately. Despite a relatively light-

weight platter, wow and flutter was excellent on test, the absolute speed error being a modest 0.1 per cent fast with well contained drift and slowing under load. Din B rumble is more than satisfactory. Shocks applied to the disc are well damped by the platter. The acoustic breakthrough plot is a bit peaky, whilst the impulse vibration breakthrough response is good except for one prominent mode around 200Hz. Electrical breakthrough is relatively high, however, partly because the structure of the deck and platter offer little electromagnetic screening.

SOUND QUALITY

There were initial difficulties achieving a hum free result with the Musical Fidelity test pre-amp, which is particularly fussy about the integrity of earthing arrangements, but once those problems were ironed out the deck performed to a high standard.

Pitch and image stability were firm and true, important prerequisites in both cases. The characteristic sound of the player is distinctive in the way it combines two major features: good resolution of fine detail, and a lack of obviousness that could be mistaken only until you notice that the *Synchro* also manages to sound outgoing and powerful, with good bass depth and transient attack, and excellent differentiation of subtle dynamic shadings, and between the different instruments in a mix. However, the *Synchro* did suffer from a small amount of overhang – the bass end never seemed to be totally quiescent.

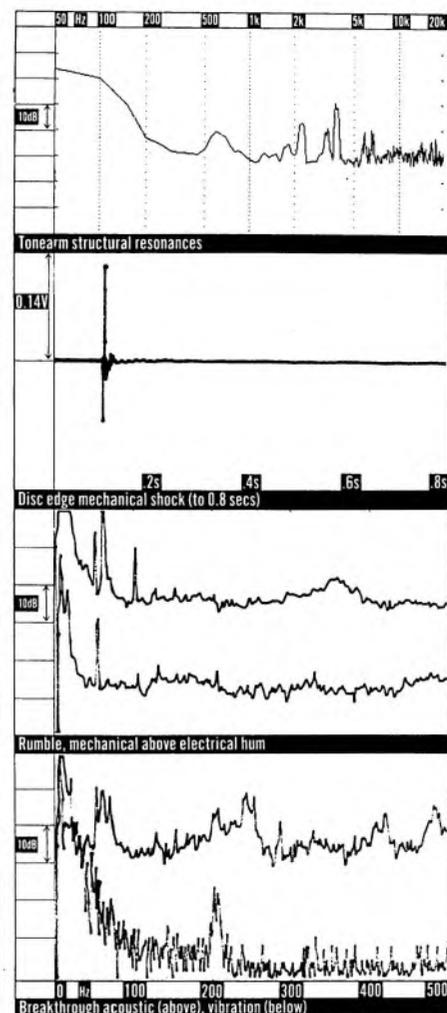
CONCLUSIONS

This startlingly attractive package is also a surprisingly clean sounding and capable one. Available for use with almost any arm, it is an excellent vehicle for the Regas, the inherent

hear-through clarity of the motor unit allowing the arm to do its job without masking.

TEST RESULTS

Motor Unit	
Type	manual motor unit
Platter mass/damping	2.1kg/good
Finish and engineering	very good
Type of mains connection leads	2 core
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.065%/0.11%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.11%/0.025%
Absolute speed error	+0.10%
Speed drift 1 hour/load variation	+0.29%/-0.41%
Start up time to audible stabilisation	2 secs
Rumble DIN B Wtd L/R	-76.5/-79dB
Size (h x w x d)/clearance for lid rear	16 x 47 x 34/10cm
Ease of use	good
Typical acoustic breakthrough and resonances	below average
Subjective sound quality of complete system	good
Hum level/acoustic feedback	below average/average
Vibration sensitivity/shock resistance	below average/average
Estimated typical purchase price	£235



MICHELL GYRODEC

J. A. MICHELL ENGINEERING LTD., 2 THEOBALD STREET, BOREHAMWOOD, HERTFORDSHIRE WD6 4FE. TEL: 01 953 0771.



The new *Gyrodec* looks very similar to the design that was launched back in 1981 but features a completely new and lighter weight platter in a new material – a heavily carbon and vinyl-loaded acrylic with good self-damping, and which is close in mechanical impedance and other properties to the records that will sit on top. Six gold plated weights slung underneath add rotational inertia. The platter is very slightly dished, and the record is held down by an elegantly designed clamp that attaches and detaches in an instant. The springs have also been changed.

The plinth, a massive slab of clear acrylic 12.5mm thick, sits on three adjustable feet, and supports the sandcast aluminium chassis, which is weighted to provide dynamic balance regardless of the arm in use. Power is fed from a small outboard transformer – a better one which will give a smoother feed is due for release shortly at extra cost – to a low voltage non-cogging Papst synchronous motor which drives the periphery of the platter *via* two (!) belts, which can be repositioned for 45rpm.

About 50 arm mounts are said to be available, each automatically taking up the correct geometry when fitted. No rebalancing is required either. The motor can be repositioned so that a second arm can be accommodated. repositioned so that a second arm can be accommodated. An alternative tinted finish with black metal parts is available at a small additional charge.

LAB REPORT

The high speed motor makes a constant background 'drone', which was perfectly audible during *pianissimo* passages at several feet (at the test site). This was reported to the manufacturer who says that a cure is in hand. Some low level hum was reduced but not eliminated

when an earth lead was strung between the motor and subchassis. This was largely responsible for the poor measured rumble figures, which improved by a full 6dB when power was removed from the deck. Perspex turntables with non-metal platters don't offer a lot of screening, so Deccas, Grados, and the like are best avoided.

Wow and flutter measured low without being exceptional, whilst running speed (at 33rpm) was a little fast, with negligible drift and a small amount of slowing under load. Acoustic feedback is not something the *Gyrodec* owner need worry about, but there was something in the turntable that resonated around 400Hz (it appears to be associated with the suspension tower covers) – a minor blot on an otherwise fine copybook. The rumble spectrum suggests fine bearings, the spikes in the plot being electrical. However, although the clamped disc design ensures that shock energy is quickly damped, a fast oscillation set in on test which may be a rocking mode associated with the bearing and platter.

SOUND QUALITY

The *Gyrodec* worked extremely well with a sample of the Rega *RB300* arm, which was recommended by the makers for test. It offered a smooth, almost liquid quality through the midrange, and although of no greater inherent resolution than others, it did sound more progressive in its response to dynamic shadings, if not quite as hard hitting during the really loud bits.

Much as with the midband, the bass end is a little lacking in weight and forcefulness. What it offers instead is a blend of lightness and accurate and stable pitch information, which is far from being a bad thing on test. Combined with the musical qualities of the midband, the result

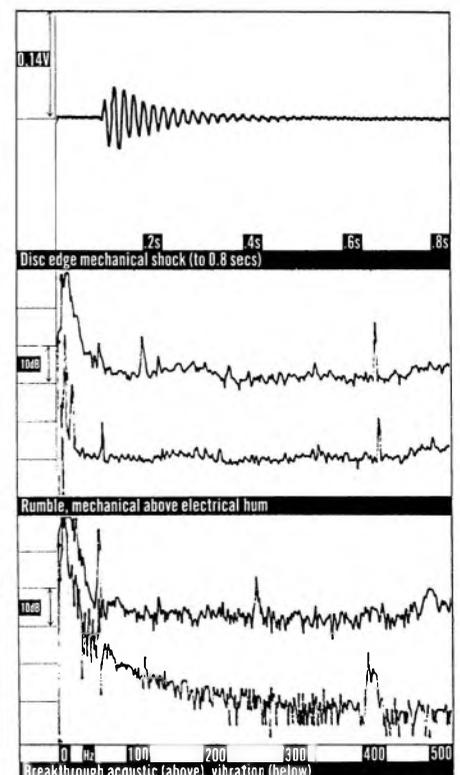
is extremely listenable. It has a light touch, but a sure and refined one too. Stereo placement and focus is stable. Lack of really strong dynamics and moderate resolution prevent it matching the best, but it remains a fine and likeable turntable.

CONCLUSIONS

A smooth and sophisticated sounding turntable, the *Gyrodec* may also appeal for its startling visual qualities and exquisite finish.

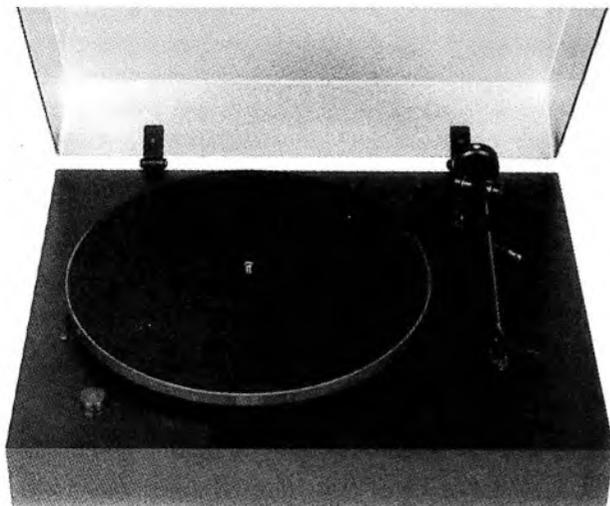
TEST RESULTS

Motor Unit	
Type	2 speed universal motor unit for 1 or 2 arms
Platter mass/damping	3.6kg/excellent
Finish and engineering	excellent
Type of mains connection leads	2 core
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.08%/0.13%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.14%/0.038%
Absolute speed error	+0.64%
Speed drift 1 hour/load variation	-0.032%/ -0.57%
Start up time to audible stabilisation	2 secs
Rumble DIN B Wtd L/R	-71/-69dB (see text)
Size (h x w x d)/clearance for lid rear	19 x 54 x 41/6cm
Ease of use	good
Typical acoustic breakthrough and resonances	average
Subjective sound quality of complete system	good
Hum level/acoustic feedback	poor/average
Vibration sensitivity/shock resistance	average/poor
Estimated typical purchase price	£595



MANTICORE MANTRA

MANTICORE SYSTEMS ENG. LTD, THE COURTYARD, 56c SHORTMEAD ST., BIGGLESWADE, BEDS. SG18 0AP. TEL: (0767) 318437.



This £300 integrated subchassis player has a version of the fine Rega *RB250* tonearm, and was also supplied with an *AT95E* cartridge. While the black wood veneer finish is rather bulky and severe, initial inspection was very promising from an engineering point of view. Rega's influence is again seen in the thick plate glass platter and felt mat. These rest on three metal studs in the top of the belt-carrying plastic inner hub; the tight main bearing is a hardened steel shaft running on a thrust ball in a brass housing.

The motor has a stepped crowned pulley, allowing manual speed change by moving the fairly elastic flat belt. The subchassis is metal, with additional girder reinforcement, and was properly set-up with generally favourable spring characteristics. The armboard is MDF wood composite, the lid heavy, non-resonant PVC, and the overall standard of finish entirely presentable.

LAB REPORT

The arm is already well known. It has fine, tight, low-friction bearings and good calibration and ergonomics. The single-casting headshell/beam/bearing housing shows impressive rigidity with good resonance properties, albeit with minor awkwardness in adjusting arm height. An effective mass of 12g suits most good cartridges.

Most of the rumble spectrum spikes are hum-related and due to the test rig, but the motor contributed a -46dB component at 200Hz. In other respects the rumble performance was very competent. Though start-up is quite slow, variation under load is commendably slight, indicating good motor torque characteristics. Absolute speed is very slightly slow, while wow and flutter speed variations measured very well.

The acoustic breakthrough spectrum is very good indeed, while the vibration breakthrough is also good though it is possible to detect some spring harmonics of the main 3-5Hz subchassis modes. The mechanical disc impulse test shows an initial behaviour typical of a felt mat system, plus some continuing mild platter rocking.

SOUND QUALITY

Used 'straight from the box', the results were surprisingly good, considering the very modest cartridge fitted. Replacing the latter (with something costing about 100 times the price!) confirmed the favourable initial impressions. All listeners commented on the clarity and openness of the sound, particularly in the mid-range, where detail and focus are pretty good by even the best standards. The bass received a little criticism, 'speed' and 'slam' being rated a trifle below the best.

CONCLUSIONS

Whatever water may have run under the bridge, it is clear that the *Mantra* is a very fine package, deserving strong recommendation. Sound and sensible engineering is reflected in the competent lab performance, while its own particular character gives a sound quality as good or better than its immediate price competition, and better than a number of more costly designs. The fine tonearm completes the player.

TEST RESULTS

Motor section	
Type	manual, belt-drive, subchassis
Platter mass/damping	2.46kg/average
Finish and engineering	very good
Type of mains connecting leads	3 core/phonos
Speed options	33 $\frac{1}{3}$ /45rpm

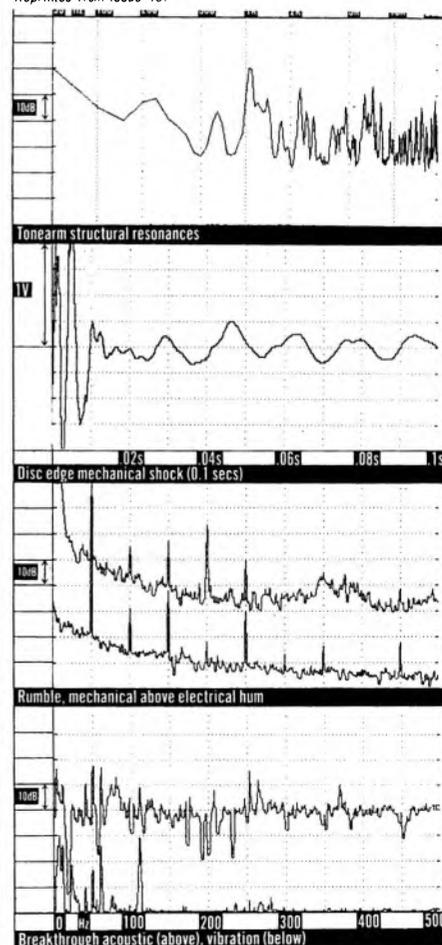
Wow and flutter (DIN peak wtd sigma 2)	0.05%
Wow and flutter (lin peak wtd 0.2-6Hz/6.300Hz)	0.16%/0.08%
Absolute speed error	-0.38%
Speed drift, 1 hour/load variation	-0.13%/-0.10%
Start-up time to audible stabilisation	5 secs
Rumble, DIN B wtd, L/R average (see spectrum)	-72/-76dB

Arm section	
Approximate effective mass, inc screws, excl cartridge	12g
Type/mass of headshell	n/a
Geometric accuracy	very good
Adjustments provided	overhang, lateral angle
Finish and engineering	excellent
Ease of assembly/set-up/use	very good/good
Friction, typical lateral vertical	<20mg/<20mg
Bias compensation method	magnetic
Bias force, rim/centre (set to 1.5g elliptical)	150mg/220mg
Downforce calibration error, 1g/2g	<0.15g/<0.2g
Cue drift, 8mm ascent/descent	low, 1 sec/3 secs
Arm resonances	good+
Subjective sound quality	good
Arm damping	some c/wt decoupling

System as a whole	
Size (w x d x h/clearance for lid rear)	46 x 78 x 15cm/7cm
Ease of use	average
Typical acoustic breakthrough and resonances	very good
Subjective sound quality of complete system	good
Hum level/acoustic feedback	good+/very good
Vibration sensitivity/shock resistance	good/good
Estimated typical purchase price	£330

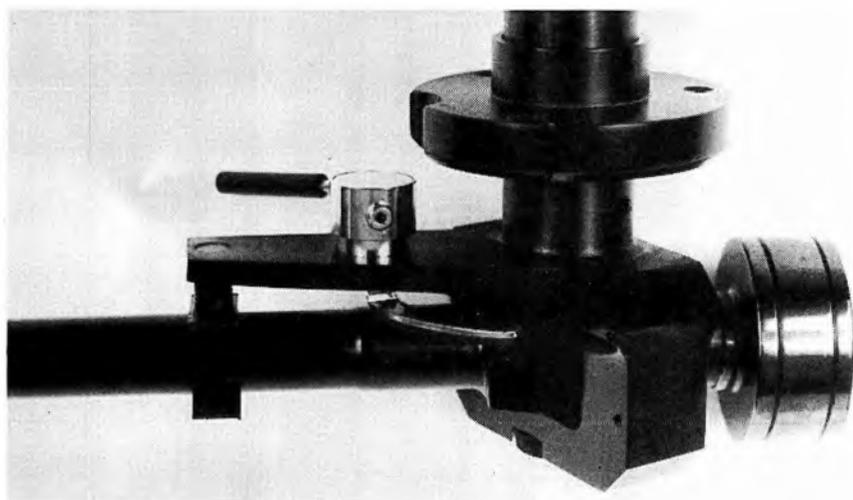
Reviewed by Martin Colloms.

Reprinted from issue 48.



MISSION MECHANIC

MISSION ELECTRONICS, STONEHILL, HUNTINGDON, CAMBS PE18 6ED. TEL: (0480) 57477.



The most surprising point about the *Mechanic* is the mere fact of its existence. Elsewhere, Mission have switched emphasis from analogue to digital replay. They no longer even list a turntable, and when they did, it wasn't the full-blooded audiophile design you'd expect to partner an arm like this.

The most newsworthy feature is the arm tube, which complete with headshell, bearing block and rear extension for the counterweight is machined in one piece. The *Mechanic* is amongst the most complete exponents of the single piece concept, and is presently the only arm to have been machined from the solid rather than diecast.

The *Mechanic* has one of the widest diameter arm tubes in the business, with the required offset angle provided at the headshell. This is supplied with a detachable fingerlift which Mission recommend is left off for the best sound. The counterweight has detachable mass rings to accommodate a wide range of cartridge masses whilst still keeping the counterweight close to the pivot point and so minimise the effective mass.

Tracking force is set by counterweight position but you must supply your own gauge (or learn the gentle art of setting tracking force by ear). The bias compensation is spring actuated via a poorly calibrated dial. The instructions, by the way, suggest that a blank disc can be used for bias setting, which is complete nonsense.

The arm base fitting is Linn compatible, and the leadout socket orientation is adjustable so that the cable and its angled plug can be dressed effectively. Overall, the *Mechanic* has a solid chunky feel – the bearing block is particularly businesslike in appearance – but finish is rather home made when examined from close up.

LAB REPORT

Arm resonant behaviour is encouraging, the first undamped structural break appearing at 2kHz, though some damped resonant behaviour can be seen a couple of octaves below this, probably due to counterweight decoupling. Most of the measured effects are above 6-7kHz, but the average level here is a little high. Effective mass (11gms) is a straight medium, so the arm should be almost universal in its application. The cueing works well and handling quality is excellent. But the bearings, which even Mission describe as fragile, are notchy, and friction levels vary in the lateral plane up to 250mg – way too high.

SOUND QUALITY

Tested on a Roksan *Xerxes*, the *Mechanic* proved to be a curate's egg. The basic character of the sound was without question extremely fine. The *Mechanic* is characteristically solid and weighty, with a deep, forceful bass and good dynamics, yet also with a gentle touch when required. The mid and top sound well integrated, and at low to moderate levels were extremely articulate, with good differentiation of instruments and a wide range of tonal colours.

However, the measured bearing problems may be responsible for two mild but noticeable effects. One was an inability to focus a stereo image coherently. There was a diffuseness, especially around the straight ahead position, that shouldn't have been there. The other was a marginal lack of consistency with level, individual instruments and voices tending to lose their specificity when tracking very loud passages.

CONCLUSIONS

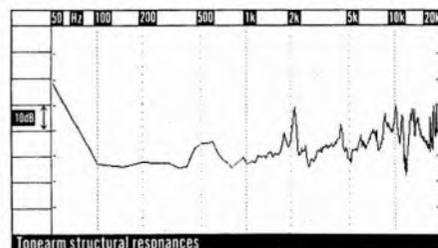
An unequivocal recommendation must be withheld unless and until Mission can at least cure the bearing problems. This could so easily have been a top ranking arm.

TEST RESULTS

Arm

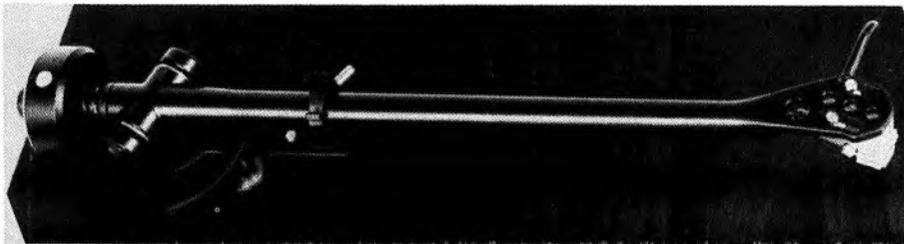
Approximate effective mass inc screws, exc cartridge	11g
Type/mass of headshell	integral/fixed
Geometric accuracy	excellent
Adjustments provided	height, overhang
Finish & engineering	good
Ease of assembly/set-up/use	good/very good/very good
Friction (typical) lateral/vertical	15-250mg*/20mg
Bias compensation method	dial & spring
Bias force, rim/centre (set to 1.5gm elliptical)	160mg/250mg
Downforce calibration error, 1gm/2gm	uncalibrated
Cue drift	negligible
Cue rate ascent/descent	instant/7.5 secs
Arm resonances	good
Arm damping method	none
Load capacitance	73pF
Estimated typical purchase price	£600

*depending on position (and presumably sample)



MOTH ARM

MOTH MARKETING, 47 ARMSTRONG CLOSE, WILSTEAD, BEDFORD. TEL: (0234) 741152.



The Moth arm is the OEM version of the Rega *RB250*, itself closely related to the *RB300*. The major differences between the two Rega arms are that the *RB250* has higher effective mass due to economies in the counterbalancing, and uses less exactly specified bearings. The arm tube is still diecast in a single piece from the headshell to behind the main bearing (the threaded counterweight extension is plastic), eliminating structural breaks, and the same applies with the arm wiring. Bias compensation is magnetic. Considering the £65 price tag, the build quality is superb, although there are minor flaws in the finish. Arm height is fixed, but spacers can be made available.

LAB REPORT

The only operational problem concerns earthing. The Moth arm doesn't have an earth separate from the signal screens, and some care could be helpful when setting up.

Effective mass is moderate at 12gms. Bearing slack is negligible, yet friction levels are very satisfactory in both planes. The arm resonance plot shows the first main structural break around 1.5kHz – good for any arm, and exceptional for one so cheap. The arm handles well too, helped by a well designed fingerlift and cueing mechanism.

SOUND QUALITY

In a nutshell, the sound quality is superb. Although clearly inferior in stereo and detail resolution to Rega's more expensive *RB300*, the Moth arm still equalled or bettered a number of supposedly no-compromise arms at several times the cost. It sounds particularly refined and articulate, and has an almost understated quality that in a low resolution system might be confused for blandness or lack of transient ability. Nothing could be further from the truth. The Moth is simply right – it's

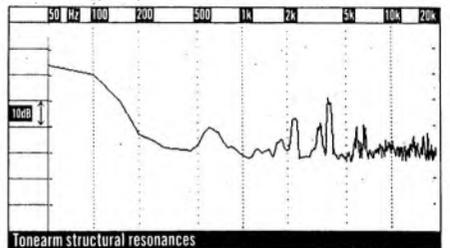
unexaggerated, lacking both 'edge' and 'grain'.

CONCLUSIONS

One of the great bargains, like Rega's more expensive *RB300*. If you can't buy one, buy the other – Best Buy rating is mandatory.

TEST RESULTS

Arm	
Approximate effective mass inc screws, exc cartridge	12g
Type/mass of headshell	integral, fixed
Geometric accuracy	excellent
Adjustments provided	overhang
Finish & engineering	very good/very good
Ease of assembly/set-up/use	very good/good/very good
Friction (typical) lateral/vertical	15mg/<20mg
Bias compensation method	magnetic
Bias force, rim/centre (set to 1.5gm elliptical)	260mg/300mg
Downforce calibration error, 1gm/2gm	0gm/0.1gm
Cue drift	negligible
Cue rate ascent/descent	instant/3 secs
Arm resonances	good
Arm damping method	none
Load capacitance	100pF
Estimated typical purchase price	£65 (spacers £1 each)



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BEST BUY



Amazing considering the £90 price, this Czech built turntable has a true floating subchassis. The suspension needs no alignment, employing B&O style leaf springing. The lightweight pressed alloy platter is beefed up by a substantial hard mat insert, bringing total mass to a still-modest 1.15kg. The moulded plastic inner platter drum is belt-driven from a slow speed synchronous motor of the usual type. One control actuates the speed change and another cueing; stop and lift-off are automatic. The non-resonant lid is acrylic and the plastic plinth is supported on hard rubber feet.

LAB REPORT

This player achieved presentable wow and flutter results, 0.1 per cent DIN peak weighted, while the separate flutter and wow contributions were well balanced. Absolute speed was acceptably close and slowing under load a satisfactory -0.28%. Rumble was poorer than expected at -68/-64dB, DIN B weighted; spectral analysis showed some motor harmonics at 100 and 200Hz, sufficient to affect the DIN reading.

Vibration isolation was pretty good, but the light platter did not provide very strong acoustic breakthrough rejection, which peaked at 360Hz. The disc impulse response was also unpromising; the initial transient was handled well, but the platter continued ringing at several frequencies thereafter. Suspension dynamics were fairly good, if a touch 'whippy' in rotation.

Arm effective mass was 9.0g, suiting the supplied cartridge, while lateral friction measured a rather high 0.3g; as a result the bias compensation value had to go unrecorded. Downforce calibration was on the low side, which is not the best direction in which to err. The arm's resonant behaviour was considered

poor, the graph being charted with the supplied Ortofon cartridge and hence representative of typical use conditions. The major break at 350Hz was particularly severe, but there were no problems over the rest of the range. When used as instructed the damper proved effective and was a useful extra in improving tracking and stability.

SOUND QUALITY

Rating below average, this is still a fine result for the price, and comfortably better than the immediate competition. There is some sense of scale, and balance, coloration and articulation are quite competent. The bass is bouncy enough, but also in a 'rubbery' sense, and imagery and focus are rather 'softened'.

CONCLUSIONS

Clearly a Best Buy offering 'near hi-fi' sound quality at an almost ludicrously low price, the reservations are the rather indifferent build quality and poor horizontal arm friction, which the customer should try to check personally. (Get the arm zero-balanced, using the stylus guard, and Blu-tack if necessary, and check for lateral freedom from friction.)

TEST RESULTS

Motor section	
Type	semi-auto, belt-drive, subchassis
Platter mass/damping	1.15kg/average
Finish and engineering	very good/good
Type of mains connection leads	2 core/phonos and earth
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.1%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.12%/0.12%
Absolute speed error	+0.25%
Speed drift 1 hour/load variation	synchronous/-0.28%
Start up time to audible stabilisation	2.5 secs
Rumble DIN B Wtd L/R	-68/-64dB
Arm section	
Approximate effective mass inc screws, exc cartridge	9.0g

Type/mass of headshell	non-detachable/-
Geometric accuracy	good
Adjustments provided	overhang/offset
Finish & engineering	good/fairly good
Ease of assembly/set-up/use	very good
Friction (typical) lateral/vertical	320mg/<20mg
Bias compensation method	spring
Bias force, rim/centre (set to 1.5gm elliptical)	see text
Downforce calibration error, 1gm/2gm	-0.15g/-0.3g
Cue drift	<0.5 secs/2.5 secs
Arm resonances	poor
Subjective sound quality	average-
Arm damping method	effective silicone dashpot
System as a whole	
Size (w x d x h)/clearance for lid rear	42 x 35.5 x 11/3cm
Ease of use	very good
Typical acoustic breakthrough and resonances	average+
Subjective sound quality of complete system	below average
Hum level/acoustic feedback	good/good
Vibration sensitivity/shock resistance	good/fairly good
Estimated typical purchase price	£90 (inc OM10 cart.)

Reviewed by Martin Colloms
Reprinted from issue 40

OMEGA POINT SILVER/BLACK

PRESENCE AUDIO, THE OLD POSTHOUSE, PLUMMERS PLAIN, HORSHAM, WEST SUSSEX RH13 6NU. TEL: (0403) 76777.



"One of the reasons why the Omega Point turntable sounds so good is that you get so little turntable for your money," gushes the press release promisingly. The work of Tom Fletcher, previously responsible for the *Image (née Dais)*, the Omega Point is a conscious attempt at minimalism for the sake of functional purity. Here's what you don't get: a suspension, a platter mat, a cover (though a cover for the platter only is supplied), an on/off switch and a power-on indicator.

The heavy white painted diecasting is the chassis to which an inverted main bearing is fixed, plus mounting points for the mains driven synchronous motor, for the arm and for the cable clamp. Speed changeover is manual, having first removed the main platter. The outer platter extends inwards to the spindle and is a simple and not especially heavy flat alloy casting, damped by two rubber 'O' rings that fit around the periphery. It simply rests on top of a heavyweight sub-platter.

The central assembly sits on three adjustable spikes, which rest in recesses on a flat chip-board bedplate, and which in turn meet the outside world through three foam pads. Different arms can be accommodated *via* interchangeable collets, which take the place of the arm manufacturer's own arm base – a useful simplification. Setting up is straightforward and commonsense, but the deck as a whole is heavy.

Although generally well made, the lacquered base of the review sample was poorly finished, and the white chassis colour looked rather out

of place (black is an option). More seriously, the mains lead is interrupted close to the deck by an in-line plug/socket arrangement, ostensibly to allow different mains leads to be tried. This still means the best part of a foot of the original lead is in place, however – and this on a deck where the mains switch is omitted for sound quality reasons. Why not fit a standard mains socket?

The *Black* tonearm is a unipivot design, in this instance undamped and with a captive bearing. It has a wide diameter tube into which a cast slotted headshell is bolted. The counterweight is effectively decoupled on a thin rear arm extension. No calibrations are available for tracking force or bias, the latter provided by a cantilever mechanism.

LAB REPORT

The arm resonance picture is clean, the only feature of note being a torsional break-up mode which is delayed to an unusually high 1.7kHz. Effective mass is about average at 11gms which makes it suitable for a wide range of cartridges, but friction levels are not as low as many conventional arms.

The turntable is sensitive to environmental LF noise, both as a result of vibration transmission through the feet and *via* the mechanism of acoustic excitation. Apart from some 50Hz and 100Hz mains noise, the rumble figures are low. A possible source of dissatisfaction, however, concerns the platter, which if used nude and clamp-less (as intended) interfaces poorly with records. A Fourier transform of a shock

impulse to a record showed severe discontinuities in the frequency domain, perhaps a result of the record (microscopically) 'rattling around'. Wow and flutter levels are also poor, almost entirely because of excessive sub-6Hz wow.

SOUND QUALITY

The Omega Point was an intriguing product on audition – good in many ways but uneven in the final analysis. Temporally the deck sounds slow; tempi drag, though pitch relationships seem well resolved. The highish measured wow figure was reflected at times in a mild 'warbling' effect on sustained notes.

Records sounded as clear as a bell through the midband and up into the treble, but there was an element of hardness and compression too, which was all but cured if a thin felt mat was interposed between record and platter. Stereo reproduction was explicit, and control (as in the ability to 'switch off' after a transient has passed) was always first class.

At its best, the deck had an attractive, slightly distant yet refined quality, but a degree of top end compression made the system sound rather muted, whilst bass lines lacked drive. Nevertheless there was also a certain sweetness and lightness of touch when used in a high resolution system – midrange quality really is very good. With further development, for example to the drive system (to reduce wow levels), and with the addition of a sensible mat or clamp, this could be a top ranking combination. It's no coincidence, I feel, that the manufacturer favours Decca cartridges, which in practice drive the frequency extremes hard and do much to minimise the Omega Point's weaknesses and reinforce its strengths.

CONCLUSIONS

On balance the Omega Point is a fine sounding deck. My reservations are that it is a little uneven in its virtues and limitations, and that cheaper combinations can do as good a job – sometimes better, and often with greater polish and style.

TEST RESULTS

Motor section

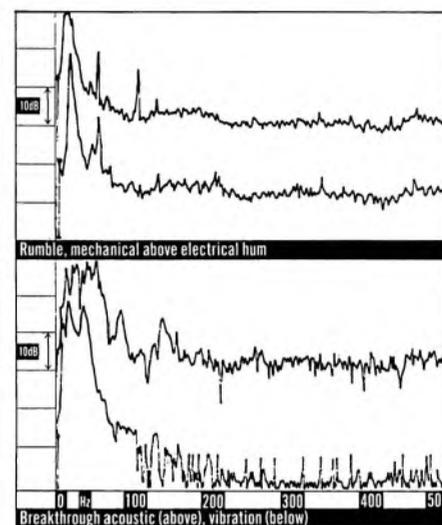
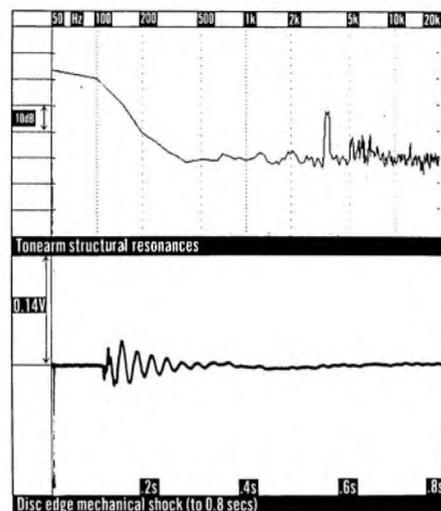
Type	manual motor plus arm
Platter mass/damping	5kg/good
Finish and engineering	below average/good
Type of mains connection leads	3 core
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.16%/0.32%
Wow & flutter (Lin peak Wtd/6-300Hz)	0.25%/0.045%
Absolute speed error	none
Speed drift 1 hour/load variation	-0.06%/-0.51%
Start up time to audible stabilisation	5 secs
Rumble DIN B Wtd L/R	-79/-80dB

Arm section

Approximate effective mass inc screws, exc cartridge 11gm
 Type/mass of headshell fixed, integral
 Geometric accuracy good
 Adjustments provided height/overhang/lateral
 Finish & engineering very good/very good
 Ease of assembly/set-up/use very good/good
 Friction (typical) lateral/vertical 25mg/30mg
 Bias compensation method lever & weight
 Bias force, rim/centre (set to 1.5gm elliptical) 100mg/100mg
 Downforce calibration error, 1gm/2gm 1gm/2gm
 Cue drift slight
 Cue rate ascent/descent instant/2 secs
 Arm resonances excellent
 Arm damping method none
 Load capacitance 200pF

System as a whole

Size (h x w x d)/clearance for lid rear
 15 (to top of arm) x 46 x 36/10cm
 Ease of use average
 Typical acoustic breakthrough and resonances good
 Subjective sound quality of complete system above average
 Hum level/acoustic feedback good/below average
 Vibration sensitivity/shock resistance average/below average
 Estimated typical purchase price £895/£295



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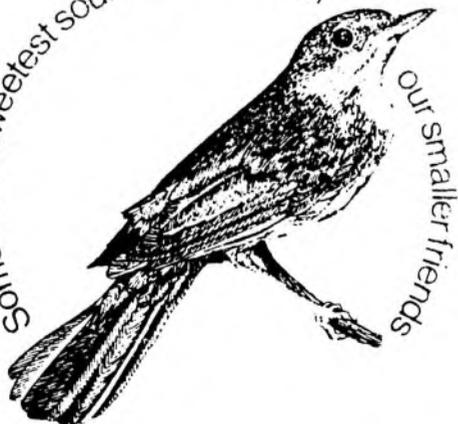
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PINK TRIANGLE PT TOO

PINK TRIANGLE PROJECTS LTD, 4 BRUNSWICK VILLAS, CAMBERWELL, LONDON SE5 7RR. TEL: (01) 703 5498.



The current Pink Triangle *PT TOO* features an electronic 2-speed power supply, a high power, low music synchronous motor and a large acrylic drive pulley. The turntable uses a large acrylic drive pulley. The turntable uses a remote power supply, but speed switching is fitted on the plinth, using a special sensing lead. The familiar neat styling and bare acrylic platter with black plinth and Pink logos were reinforced on our sample by distinctive pink edging within the heavy fabricated cover, giving both good performance and a contemporary 'Art Deco' appearance.

The Pink people have been paying much attention to the terminations required to optimise the performance of various top arms, our sample being fitted with a baseplace for fitting the SME *V*. Another change is the fitting of phono sockets to the plinth and special flexible arm wiring within the plinth, so as to have as little influence as possible on the dynamics of the very lightweight Pink subchassis. The new motor too seemed notably free of vibration, but a mild disappointment involved the failure of the power supply on one (early) sample.

The Triangle's formula involves using lightweight materials throughout the suspension and platter – to the extent that the subchassis only levels itself properly when a disc is on the platter. The subchassis itself is an ovoid piece of Aerolam honeycomb, giving high stiffness with low mass, and this is suspended from three narrow springs, giving an inherently stable configuration adjustable from nuts set in the plinth sides. The tight, high quality main bearing is similarly unusual, being an inverted self-stabilising single point design, with ruby bearing surface.

LAB REPORT

When properly levelled, the *PT TOO* gave a

very good rumble figure and an encouraging spectrum, the only significant mechanical contribution being a -43dB spike at 100Hz . The more powerful, better coupled motor ensures that the original *Pink's* 'slowing under load' bogey is now entirely a thing of the past. Torque is fine, and indeed the speed characteristics throughout are very good indeed: negligible absolute error and drift, and fine wow and flutter performance, with quick start up.

The breakthrough characteristics are also generally very good, albeit with some vibration coupling around 60Hz and very mild acoustic and vibration at 390Hz . The fine mechanical disc impulse test result showed the effectiveness of the mat-less acrylic platter in damping disc vinyl.

SOUND QUALITY

The *PT TOO* was particularly well received on the listening tests, and was immediately recognised as a major point of reference, giving a uniquely attractive combination of midrange transparency and exciting, lively dynamics. The sound was a little 'light' in character, lacking the 'weight' and 'slam' of some alternatives perhaps, but the lack of coloration plus fine midrange depth, focus, detail and air, was more than compensation for listeners in the context of the system used. In the bass it was notably even and articulate.

CONCLUSIONS

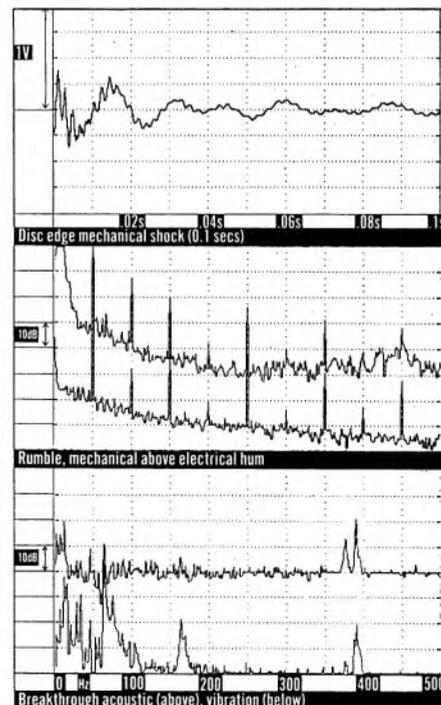
The *Pink* offers a smart and attractive package with some exceptional strengths and very few weaknesses. The light suspended mass does not suit it to parallel tracking arms, but even quite heavy pivoted arms (eg SME *V*) are accommodated without difficulty. The lab performance confirms that earlier weaknesses are no more and overall performance is very good

indeed. The *PT TOO* is the best we have heard in many areas, and a good match for the competition in other respects, and so merits firm recommendation.

TEST RESULTS

Motor section	
Type	electronic, belt-drive, subchassis
Platter mass/damping	1.7kg/very good
Finish and engineering	very good
Type of mains connecting leads	3 core remote
Speed options	33 $\frac{1}{3}$ /45rpm
Wow and flutter (DIN peak wtd sigma 2)	0.04%
Wow and flutter (lin peak wtd 0.2-6Hz/6.300Hz)	0.13%/0.05%
Absolute speed error	+0.08%
Speed drift, 1 hour/load variation	-0.13%/ -0.15%
Start-up time to audible stabilisation	3 secs
Rumble, DIN B wtd, L/R average (see spectrum)	-77/-78dB
System as a whole	
Size (w x d x h)/clearance for lid rear	45 x 39 x 15.5cm/7cm
Ease of use	good
Typical acoustic breakthrough and resonances	excellent
Subjective sound quality of complete system	very good
Hum level/acoustic feedback	very good/excellent
Vibration sensitivity/shock resistance	very good/fair
Estimated typical purchase price	£500

Reviewed by Martin Colloms.
Reprinted from issue 48.



REGA RB300

REGA RESEARCH LTD, 119 PARK STREET, WESTCLIFFE-ON-SEA SSO 7PD. TEL: (0702) 333071.

BEST BUY



This Rega-made product uses a very rigid one-piece arm beam/headshell, which unusually is constructed from a hollow aluminium casting. No joins are present between cartridge platform and pivot. The bearings themselves are highly pre-loaded and yet mounted to such a high tolerance that friction is negligible while play is physically undetectable.

Rega's traditional magnetic frictionless bias compensator is employed, with a novel touch present in the design of the downforce mechanism. When set to zero, the carefully designed coil spring mechanism exerts a minus force of 3g, so reducing the counterbalance requirements.

The bearing gimbal is itself a substantial casting and the usual adjustable vertical pillar design has been omitted, being regarded as a structural weakness. The alternative is a threaded stem and large locknut; vertical height adjustment is only possible using various washers.

LAB REPORT

Tests showed the *RB300* has some of the finest bearings in the business; furthermore it was very competent in the important area of beam/headshell rigidity. Friction was very low in both planes, without a trace of play, and while biasing worked well, the calibrated figures were a little on the high side (by about 25%). Downforce calibration was accurate and cue operation fine. Geometric accuracy was to a high standard, while the effective mass was a moderate 10.5g. A wide range of cartridges are judged suitable in the 8-22cu range.

The structural resonance picture suggested good control and excellent rigidity. The mild 400Hz mode was probably the counterweight, while the first bending or torsional mode was deferred until a remarkably high 1.5kHz. The treble was also remarkable for its absence of resonances after 4kHz.

SOUND QUALITY

It was clear after only a few minutes audition, that the *RB300* was a top flight performer. Depending on the chosen player, it proved quite comfortable in the company of other reference tonearms in the \$250-£400 range.

The sound was notably dry and neutral with excellent control throughout the range. Trans-

ients were judged excellent, while it offered a very well-focused sound stage with very good depth. Its only significant failing was a slight muddling of detail on complex musical passages.

CONCLUSIONS

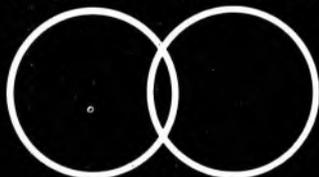
The *RB300* is an excellent product of which Rega can be justly proud. Despite its modest price it sets new standards in performance, and a Best Buy rating is obviously appropriate.

TEST RESULTS

Approximate effective mass, inc screws, excl cartridge	10-11g	non-detachable
Type/mass of headshell		
Geometric accuracy		very good
Adjustments provided		overhang/offset
Finish and engineering		very good/excellent
Ease of assembly/set-up/use		very good/excellent/very good
Friction, typical lateral vertical	150mg/15mg	
Bias compensation method		magnetic
Bias force, rim/centre (set to 1.5g elliptical)	340mg/330mg	
Downforce calibration error, 1g/2g	+0.05g/+0.03g	
Cue drift, 8mm ascent/descent	negligible, 0.5 secs/3.0 secs	
Arm resonances		see graph
Subjective sound quality		very good
Arm damping		none
Estimated typical purchase price		£90

Reviewed by Martin Colloms
For graph references see issue No. 43.

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REGA PLANAR 2 and 3

REGA RESEARCH LTD, 119 PARK STREET, WESTCLIFFE-ON-SEA SSO 7PD. TEL: (0702) 333071.



Since 1984 the *RB300* arm has been a standard fitting on the *Planar 3* deck. The *Planar 2* now comes with a simplified version of the new *RB300* arm, called the *RB250*.

This simple turntable design comprises a solid chipboard plinth covered in tough matt black laminate. Three fairly stiff stepped rubber feet provide a stable tripod foundation while the high quality lid is directly hinged to the chassis plinth with neither springs nor isolation. A plain main bearing with thrust ball showed close tolerances, with no detectable play. Belt-driven *via* a rubber cord, the inner platter hub is a reinforced plastic moulding, the uppermost projection forming the tapered centre spindle and the outer platter boss. The platter is made of heavy plate glass (less thick in the *Planar 2*), surmounted by a thick felt mat. In a simple and ingenious gravity suspension, a second drive belt is looped to support the slow speed synchronous drive motor and suppress vibration coupling to the platter.

The *Planar 2 RB250* arm has the same excellent bearings and one-piece cast arm tube as the *RB300* but has been simplified by using a conventional rotating counterweight which is partly decoupled. The leadout cable is fixed and the chassis earth combined with one of the signal grounds; phono plugs are fitted. Effective mass is around 11.5g including the supplied stainless steel mounting hardware, suitable for moderate compliance cartridges or even modest moving coils.

Rega recommend that the deck should be placed on a light wall mounted shelf, rather than 'coffee table' or floor cabinet; this we found to be good advice.

LAB REPORT

The platter was clearly well founded as the minimal low frequency ringing on the disc

impulse response showed. The initial transient was poorly damped, however, a characteristic of thick felt mats.

Almost no metalwork was present in the unit and this meant very little humfield screening was provided. Consequently hum levels were poorer than average and the choice of cartridge will need a little care. Weighted wow and flutter was satisfactory but linear wow was on the high side at 0.21%, this measured without the mat as the felt is of slightly variable thickness. Speed was fairly accurate, but slowed a significant 0.4 per cent under load, with some overshoot after recovery due to motor suspension tension rocking. Start-up was average for a belt-drive at 4.5 seconds.

Rumble levels were just satisfactory for the price averaging -71dB with the motor off. Acoustic breakthrough was about average and the lid was found to be influential here; results were better when it was entirely removed. Vibration isolation was also poorer than average.

The arm was well finished with very good geometry. It was easy to set up and use, and demonstrated low bearing friction. Bias compensation was set to sensible levels and the cue worked well. Downforce calibration proved satisfactory.

SOUND QUALITY

Belying traditional assumed relationships between a number of technical parameters and sound quality, the Rega proves that a well-developed, subjectively-assessed balance of performance counts for more than technical excellence with regards to any one parameter. On the debit side the Rega did suffer from a modicum of programme wow, particularly on rock programme, but this was not considered serious at this price level; a mild loss of stereo depth was also noted, together with an accom-

panying impairment of low bass definition and evenness. Conversely it sounded 'musical' in a balanced and coherent manner.

With the latest arm the *Planar 2* sounded more confident. In the upper bass it was surprisingly articulate while mid and treble were notably smooth and sweet with better detail than before. Presentation of detail was considered well above average and little inferior to 'super-fi' models.

CONCLUSIONS

The *Planar 2* offers a fine subjective performance and is both very well made and finished, which places it firmly in the Best Buy category. The *Planar 3* is also good, but does not offer quite the same value, though a Best Buy rating is also appropriate here, noting the excellent *RB300* arm.

TEST RESULTS

Motor section	Integrated turntable
Type	manual, belt-drive
Platter mass/damping	2.2kg/good
Finish and engineering	very good/very good
Type of mains connecting leads	2 core phones
Speed options	33/45rpm
Wow and flutter (DIN peak wtd sigma 2)	0.09%
Wow and flutter (lin peak wtd 0.2-6Hz/6.300Hz) *0.21%/0.45%	
Absolute speed error	+0.4%
Speed drift, 1 hour/load variation	synchronous/-0.4%
Start-up time to audible stabilisation	4.5 secs
Rumble, DIN B wtd, L/R average (see spectrum)	-72/-70dB
Arm section	
Approximate effective mass, inc screws, excl cartridge	11.5g
Type/mass of headshell	universal detachable/8.0g
Geometric accuracy	very good
Adjustments provided	overhang/lateral angle
Finish and engineering	excellent/very good
Ease of assembly/set-up/use	very good/very good/very good
Friction, typical lateral vertical	less than 25mg/15mg
Bias compensation method	internal magnet
Bias force, rim/centre (set to 1.5g elliptical)	300mg/310mg
Downforce calibration error, 1g/2g	-0.1g/-0.07g
Cue drift, 8mm ascent/descent	negligible 0.5 secs/1.5 secs
Arm resonances	very good
Subjective sound quality	very good
Lead capacit/damping method	70pf/counterweight decoupling
System as a whole	
Size (w x d x h)/clearance for lid rear	45 x 36 x 12.3cm/7cm
Typical acoustic breakthrough and resonances	average
Subjective sound quality of complete system	above average
Hum level/acoustic feedback	average-/fairly good
Vibration sensitivity/shock resistance	average-/good
Estimated typical purchase price	Rega 2 £125, Rega 3 £188
*worsened by unevenness of thick felt mat	

Reviewed by Martin Colloms.

For graph references see issue No. 43.

REVOX B291

FWO BAUCH LTD., 49 THEOBALD STREET, BOREHAMWOOD, HERTS WD6 4RZ. TEL: (01) 953 0091.



This is the turntable for those who want the foolproof handling of a compact disc player. The B291 is not totally goof-proof, since there is no built-in record sensing and it is possible to lower the cartridge onto a bare rotating mat.

The Revox is supplied set up with a cartridge, a choice of the Shure V15LT chosen for this review or a (cheaper) Elac 150.

The arm is contained in what is best described as a brick-like object on a swivelling pillar at the right hand side of the platter, which is swung out of the way to change records. Swing it back through 90 degrees, press 'down' and the servos take over, noisily shuffling the cartridge to its cueing point and lowering away from there. At any time, you can press 'left' and 'right' keys to search for specific places, at which point the cartridge area is flooded with light to help with the otherwise rather difficult task of cueing.

The platter is a relatively lightweight casting and is driven by a direct drive motor. A rudimentary (and rather creaky) suspension decouples the player from the outside world.

LAB REPORT

There may be no arm in the usual sense but the resonant behaviour expected of an arm is certainly present in the vestigial Revox design. The area enclosed by the resonance plot – a rough but useful measure of the energy storage potential of the arm – is enormous, the first break-up modes appearing as a massive peak around 250Hz, with a sharp effect around 2.5kHz too. The direct drive motor system does ensure essentially state of the art speed stability figures however.

There were problems measuring the Revox in the usual manner (the cartridge is never allowed to be in the play position with the platter stopped for example, even if power is cut), but by subterfuge most of the measurements

were run with the exception of rumble. (It was impossible to attach the rumble coupler because it blocked the arm.) Shocks applied to the platter resulted in some ringing, whilst the breakthrough and acoustic feedback plots were rather 'dirty'. The arm is not readily amenable to the usual kind of analysis either, but it is interesting that it takes a substantial 100mg of force acting at the stylus before the cartridge carriage moves.

SOUND QUALITY

Sonically the Revox disappoints, with the cartridge partly but not wholly responsible for a rather lifeless, insipid sound. There was little bass, and what there was lacked energy and focus. Dynamics and resolution were limited, and stereo imagery was imprecise and small in scale. The treble too lacked precision, whilst surface noise seemed magnified.

For all this, the Revox did sound steady and never gave cause for worry about pitch precision, which is more than can be said about some of the most exotic hardware tested this time, and which is a prerequisite for good musical reproduction in anyone's language. Similarly, tonal balance is pretty neutral and the bass end is at least kept under good control. The cosmetics of good sound reproduction are there: all that's wanted is the substance.

CONCLUSIONS

It's easy to criticise turntables of this kind. Inevitably, any record player that goes out of its way to offer compact disc style convenience is bound to suffer quite serious audible consequences.

TEST RESULTS

Motor section
Type
Platter mass/damping

automatic integrated player
2.8kg approx

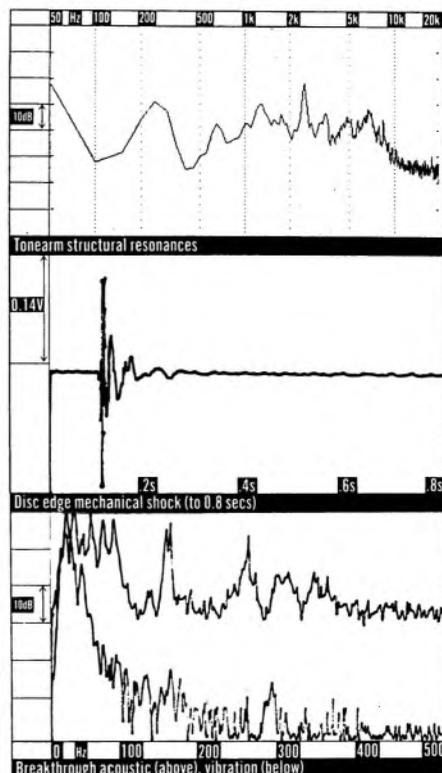
Finish and engineering good
Type of mains connection leads 2 core
Speed options 33, 45rpm
Wow & flutter (DIN peak Wtd/Uwtd) 0.065%/0.11%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz) 0.11%/0.025%
Absolute speed error +0.32%
Speed drift 1 hour/load variation none/-0.95%
Start up time to audible stabilisation 4 secs
Rumble DIN B Wtd L/R n/a (see text)

Arm section

Approximate effective mass inc screws, exc cartridge n/a
Type/mass of headshell parallel tracker/n/a
Geometric accuracy excellent
Adjustments provided none
Finish & engineering good/average
Ease of assembly/set-up/use very good/very good/very good
Friction (typical) lateral/vertical 100mg/c/a
Bias compensation method none (not needed)
Bias force, rim/centre (set to 1.5gm elliptical) n/a/n/a
Downforce calibration error, 1gm/2gm n/a
Cue drift negligible
Cue rate ascent/descent 0.5 secs/0.5 secs
Arm resonances very poor
Arm damping method none
Load capacitance n/a

System as a whole

Size (h x w x d)/clearance for lid rear 15 x 45 x 39/7cm
Ease of use excellent
Typical acoustic breakthrough and resonances below average
Subjective sound quality of complete system poor
Hum level/acoustic feedback good/below average
Vibration sensitivity/
shock resistance below average/below average
Estimated typical purchase price £629





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ROKSAN ENGINEERING LTD., THE TURNMILL, 63 CLERKENWELL ROAD, LONDON EC1R 5BH. TEL: (01) 251 1021.

RECOMMENDED



The Roksan *Xerxes* is a 'clean sheet' design which throws many of the clichés of turntable design overboard. Development has been rapid in the last couple of years, and not only is recent production substantially better turned out than before, there have been important engineering changes, notably to the spindly main bearing which is now a meticulously engineered three-piece design. All such mods are retrofittable – at a price. The Roksan is available in many arm fittings (forget armboards – the entire top plate must be changed), and various high quality veneers.

A normal spring suspension is eschewed in favour of a stiffly floating top surface, sawn part through to control panel modes. The felt-topped platter is a complex and superbly engineered medium weight structure with high inertia, and the synchronous motor is allowed to rotate about the pulley axis against a spring, but is restrained in other planes. The key idea, which also finds expression elsewhere in the design, is to live with resonances by placing them where they don't matter, rather than attempting to sink them by adding mass (the brute force solution).

The deck is driven from an external quartz referenced power supply, finished in keeping with the turntable. This drives each phase of the motor using its own Class A amplifiers, and runs hot as a result. Uniquely, the centre spindle is detachable to ensure records only contact the mat, not the main bearing directly.

The Roksan is physically large and its aesthetics are plain, but the finish is A1, especially the now diamond turned metalwork. Only the lid is rather flakey; it would benefit from rubber stops and counterspringing to replace the friction hinges. Setting up, simple in principle, is fiddly in practice and best left to the dealer (and his stethoscope!).

LAB REPORT

Wow and flutter is excellent, the Roksan achieving significantly lower wow than a number of the super-decks with ultra-heavy platters. The *Xerxes* also responded as well as almost any to the impulse and acoustic feedback tests, with a notably smooth energy trend, but some increased 'noise' at the lowest frequencies and to a lesser extent near 500Hz too. The former demonstrates the need for a good, firm isolating platform. Platter damping is relatively poor but resistive, in line with expectations for a non-clamped felt covered platter, and the initial transient was quickly damped in the impulse test. Rumble levels were excellent and the spectrum clean.

SOUND QUALITY

Sound quality is top class. To start with, the basics are right: the deck runs at the right speed, with no audible dynamic wow, superb pitch resolution, speed and bass integration, and operates with a range of arms. When a note stops, *Xerxes* stops too – it has less overhang than almost any upmarket turntable. Aside from these prerequisites, stereo resolution is particularly fine, with stable soundstaging and explicit depth information in a suitable system. The sense of control is apparent at all volume levels, but never impedes the liveliness of the music. Early samples seemed to compress the dynamic range somewhat, but this criticism no longer applies with the latest production.

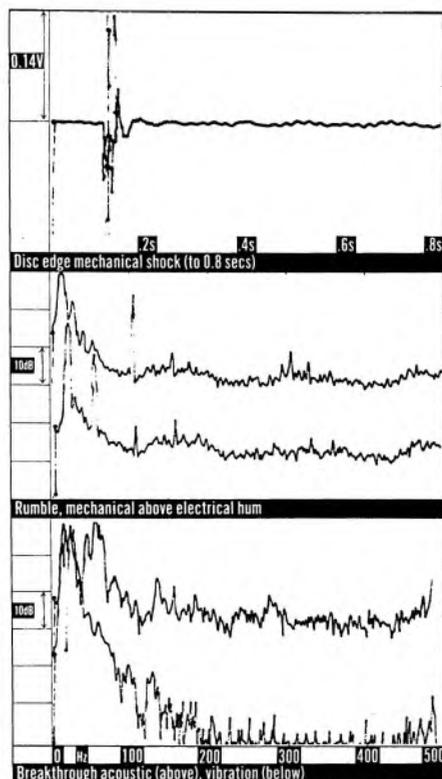
Xerxes works well with a range of arms, including the Mission *Mechanic*, but can sound a little lightweight in some situations. However, the Linn *Ittok* is less happily accommodated than on the *LP12*. Conversely the Rega *RB300*, which doesn't sound too happy on a Linn, could have been made for *Xerxes*.

CONCLUSIONS

One version of the state of the art, and an unequivocal recommendation. Great value with the Rega *RB300* too, but be careful about siting.

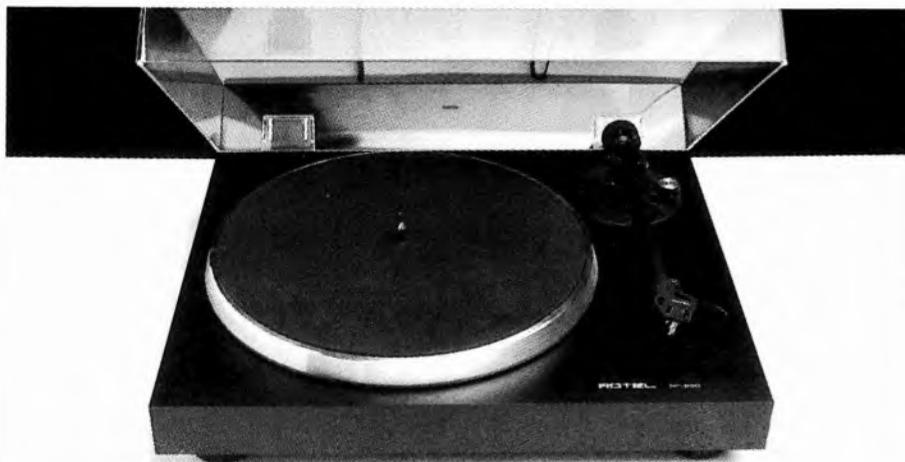
TEST RESULTS

Motor Unit	
Type	manual motor unit
Platter mass/damping	2.1kg/good
Finish and engineering	excellent
Type of mains connection leads	3 core
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.07%/0.12%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.13%/0.02%
Absolute speed error	+0.13%
Speed drift 1 hour/load variation	-0.06%/ -0.03%
Start up time to audible stabilisation	5 secs
Rumble DIN B Wtd L/R	-78/-80dB
Size (h x w x d)/clearance for lid rear	15 x 48 x 39/7cm
Ease of use	average
Typical acoustic breakthrough and resonances	excellent
Subjective sound quality of complete system	excellent
Hum level/acoustic feedback	excellent/excellent
Vibration sensitivity/shock resistance	good/good
Estimated typical purchase price	£595



ROTEL RP-830

ROTEL HI-FI, 25 HEATHFIELD, STACEY BUSHES, MILTON KEYNES MK12 6HR. TEL: (0908) 317707.



Such has been Japan Inc's headlong flight away from black vinyl that this Rotel is now one of the few serious (non-system-oriented) 'Japanese' turntables left. Even so, since its introduction it has been very much in the shadow of the visually similar but much more competently designed *RP-850*.

The *RP-830* is a solid design that sits on four stiffly sprung feet. Drive to the platter is by a relatively high speed, four pole motor through a flat belt to the inner hub of a one piece platter, which in turn is a friction fit on the captive main bearing/spindle assembly. The chassis is relatively heavy and quite well made, with an excellent matt black vinyl finish and very Europeanised styling – restrained in the extreme. The platter weighs about 1.5kg with good peripheral weight distribution, but it rings like a bell without its heavy rubber mat, and structural properties aren't particularly helped by the two large slots cut into the top surface to allow finger access to change the belt from one pulley diameter to the other (for 33 and 45rpm operation).

The arm, like a number of the other components, appears to be a standard Japanese OEM component, probably bought off the shelf. The one concession to purist ideals is a rigid and stable diecast headshell, which is solidly clamped in position. Unclamped, it can be rotated to facilitate cartridge fitting and azimuth adjustment.

LAB REPORT

Although absolute running speed was set slightly high, drift and slowing under load were modest, and wow and flutter were both highly presentable. Rumble levels were very low, the spectrum analysis being very clean and well behaved. Electrical breakthrough was essentially insignificant.

Analysis of the behaviour of the chassis shows some discrete effects, presumably due to platter rock. Elsewhere the deck behaved well. Ditto with the arm, apart from friction levels which are only just the right side of acceptable.

The first arm breakup mode is around 600Hz, and thereafter there are numerous resonances right up the frequency band to the 20kHz measuring cutoff point. But they are well spread out, and there are no dominant effects of any kind, so the arm can be presumed to be treating incoming energy in a fairly evenhanded way – a fair result for such a low cost design.

SOUND QUALITY

The bass sounded rather detached and occasionally muddled with this player, detracting from solidity and pace. Overall, the Rotel is rather four-square and undistinguished, and is clearly no *RP-850*. But it's not all bad: midband focus and stereo imagery were pretty good; and the high frequency end, which is affected more by the arm than other factors, comes over as crisp and detailed.

CONCLUSIONS

Workmanlike but lacking a certain visceral edge, the Rotel is soundly conceived and well built, with a clean, detailed cartridge.

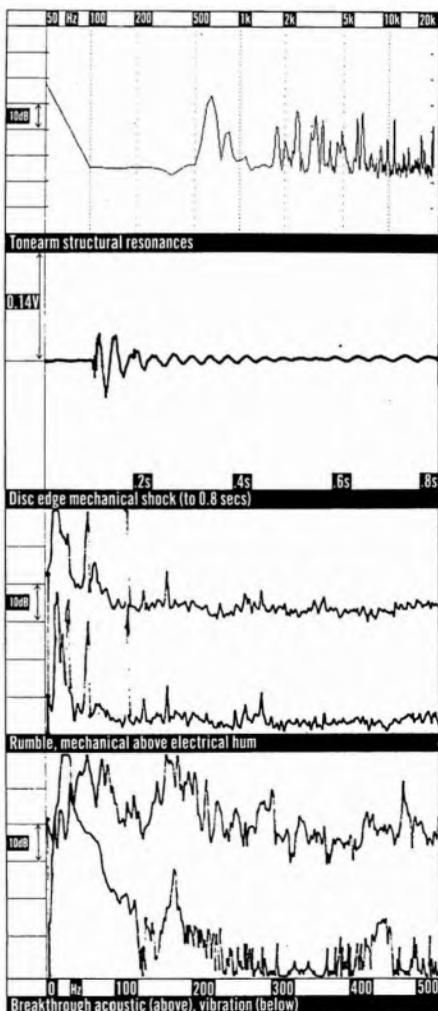
TEST RESULTS

Motor section	
Type	manual belt drive integrated player
Platter mass/damping	1.5kg/poor
Finish and engineering	fair
Type of mains connection leads	2 core
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.06%/0.11%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.12%/0.035%
Absolute speed error	+0.64%
Speed drift 1 hour/load variation	+0.032%/-0.16%

Start up time to audible stabilisation	1 sec
Rumble DIN B Wtd L/R	-76.5/-79dB

Arm section	
Approximate effective mass inc screws, exc cartridge	14gm
Type/mass of headshell	non-detachable
Geometric accuracy	moderate
Adjustments provided	azimuth & overhang
Finish & engineering	good/average
Ease of assembly/set-up/use	very good/very good
Friction (typical) lateral/vertical	60mg/60mg
Bias compensation method	spring & dial
Bias force, rim/centre (set to 1.5gm elliptical)	250mg/260mg
Downforce calibration error, 1gm/2gm	0gm/+0.05gm
Cue rate	negligible
Cue drift ascent/descent	1 sec/2.5 secs
Arm resonances	good
Arm damping method	none
Load capacitance	140pF

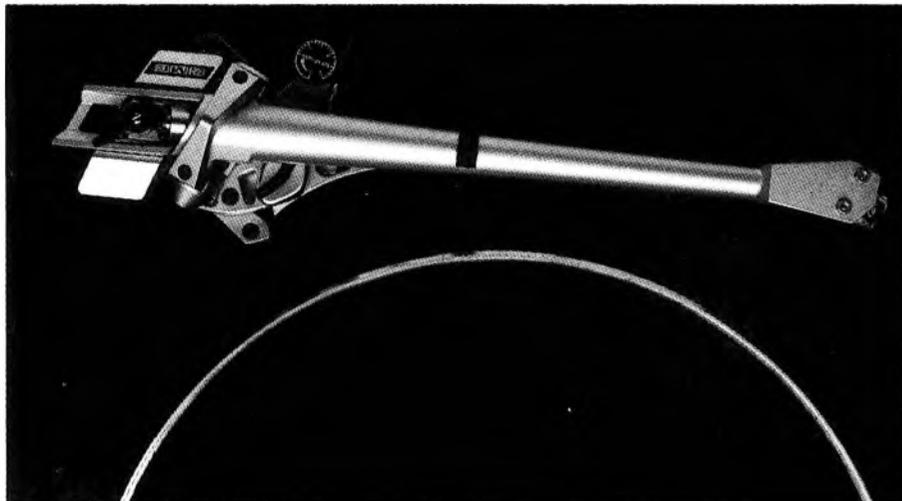
System as a whole	
Size (h x w x d)/clearance for lid rear	14 x 44 x 34/7cm
Ease of use	good
Typical acoustic breakthrough and resonances	fair
Subjective sound quality of complete system	average
Hum level/acoustic feedback	good
Vibration sensitivity/shock resistance	average
Estimated typical purchase price	£159.90



SME SERIES IV

SME LTD., STEYNING, SUSSEX BN4 3GY. TEL: (0903) 814321.

RECOMMENDED



Editorially it was deemed essential to include this important new SME tonearm, but for legal reasons it was not possible for Alvin Gold to carry out the review, so the editor has stepped (rather reluctantly) into the breach. One consequence is that this cannot be a comparative subjective review in the normal *Choice* tradition, though fortunately the tonearm measurements, carried out in Martin Colloms' lab, pose no such problems.

Furthermore, physical incompatibility with both the editorial turntable (a heavily modified Linn) and cartridge (the three-legged *Troika*) that are in everyday *Ittok* use provided a further handicap, preventing straightforward substitution. That said, the *Series IV* (like all SME arms) is as nearly universal as anything on the market, and for the purposes of the review it was fitted to a Roksan *Xerxes*, with Audio Technica *ATF5* and Linn *Karma* cartridges.

Series IV is the 'budget', simplified version of *Series V*, selling at little more than half the price of its black brother (but still a daunting £875). For which you get a silver version of the best looking and best finished tonearm in the world – a veritable Magnum 45 amongst Berettas.

SME's fixed cartridge screw holes plus sliding base system is a longstanding tradition, ensuring accurate alignment. The base, now operating like a vice, is impressively rigid when locked, and requires an oval armboard cutout. Also traditional is the camera – nay Hasselblad – standards of fit and finish down to the minutest details, plus an exemplary instruction manual (written in real English!).

The crucial feature carried down from *Series V* is the highly complex 'single piece' magnesium casting which encompasses headshell, tapered, wide diameter main beam, bearing housing and counterweight shafts, providing an exceptional rigidity/mass ratio. Retain-

ing the precisely calibrated underslung counterweight, damped and swivelling side entry leadout socket and sprung bias compensation, the simplification process involves omitting the fluid damping option and the user-friendly height adjustment, plus less costly wiring and the substitution of 3-ball for 7-ball ABEC bearing races.

LAB REPORT

The medium effective mass should accommodate all but the highest compliance cartridges without difficulty. Bearing friction was very low and impressively smooth, while downforce calibration was precise, though bias compensation, surprisingly, was a little high at the outside grooves. The midband and treble evenness and control shown in the arm resonance plot is little short of spectacular, carefully damped minor perturbations around 1-2kHz being the only notable feature.

SOUND QUALITY

Amongst the least characterful of tonearms, the main drawback with *Series IV* lies in its tendency to expose the shortcomings of partner components. However good the *ATF5* is for the price, it is still a £100 cartridge and was clearly out of its depth in this company. *Karma* substitution brought the necessary bandwidth, integration and weight to confirm this as one of the finest tonearms around, somehow combining the 'welly' of the best pivoted designs with much of the delicacy and precision of air-bearing parallel trackers.

The lack of midband and treble coloration, plus precise, coherent and wideband stereo focusing are notable strengths, though perhaps the bass is slightly less 'agile' than some alternatives, and the emphasis would seem to lean a little more towards control than 'speed'. However, these are impressions gained in isolation,

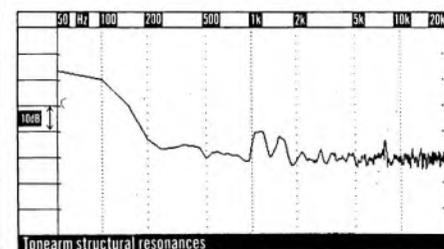
with no opportunity for substitution comparison. And without a doubt the *IV* (and presumably even more so the *V*) has an uncanny ability to 'read' the characteristics of the turntable and cartridge, so isolating its own character is very difficult.

CONCLUSIONS

It is hard to find fault in this exceptional tonearm, which provides all but the 'nth' degree of *Series V* refinement at a (comparatively) attractive price. No one should contemplate such a purchase without first satisfying themselves that the sound quality is right in the context of the other system ancillaries – particularly turntable and cartridge. But of all the exotic tonearms around, the SME excels in exuding exceptional engineering professionalism, and generates considerable confidence in its value as a long term investment.

TEST RESULTS

Arm	
Approximate effective mass inc screws, exc cartridge	11g
Type/mass of headshell	fixed, integral
Geometric accuracy	very good
Adjustments provided	overhang/height
Finish & engineering	excellent
Ease of assembly/set-up/use	very good
Friction (typical) lateral/vertical	<10mg/<10mg
Bias compensation method	calibrated spring
Bias force, rim/centre (set to 1.5gm elliptical)	240mg/210mg
Downforce calibration error, 1gm/2gm	nil
Cue drift	negligible
Cue rate ascent/descent	instant/2 secs
Arm resonances	excellent
Arm damping method	none
Load capacitance	100pF
Estimated typical purchase price	£675



Tonearm structural resonances

THE SOURCE/ODYSSEY RP1

SOURCE/ODYSSEY LTD, 157 CURLE ST., GLASGOW G14 0TS. TEL: (041954) 5585.



This Source and Odyssey are both visual stunners – the deck for its magnificent sculpted solid wood plinth and the arm for the gold and matt aluminium finish on an amazing structural design which features odd bullet shaped constructions, offsets, weird angles and corners wherever corners have no right to be.

The essential components of the Source consist of a two-piece 7.5kg phosphor-bronze platter, topped with a felt mat, and a massive cone-in-tip bearing spindle which bears on a precision ball in the bronze bearing well. Drive is by flat belt from the crown pulley of a DC motor. The subchassis is steel, and so too is the top plate, which is coated in Nextel. If excited laterally the suspension tends to go into complex rocking modes, which may be related to the use of five suspension springs. Three are used in the usual way, a fourth stabilises the subchassis against horizontal excitation and the fifth 'locks the tonearm and cartridge in the groove' (it doesn't).

Power is provided by a 24V Hall-effect Papst DC motor, and the smoothed supply comes from a massive external power unit, but a cheap 'starter' supply is also available. The lid is the only rather flakey item.

The £690 Odyssey tonearm was first introduced in 1981. The arm tube and some of the other components are made of rather coarsely finished brushed aluminium, the rest is gold

plated brass, thus giving 'lossy' interfaces *via* differing mechanical impedance. Some of the various offsets appear to have been calculated to reduce or eliminate turning moments due to dynamic tracking conditions, to improve geometry, and to 'harmlessly' dissipate unwanted energy by staggering the various planes of movement. The cartridge mates to a vestigial block headshell which incorporates the required offset, and an optional fingerlift – unfortunately (because it's been poorly designed) best removed in use. One thing the Odyssey is not, however, is a rigid arm.

LAB REPORT

The arm has moderately high effective mass (15gm) and a full range of adjustments. Bearing friction levels are almost vanishingly small, but lead capacitance is surprisingly high. Arm resonant behaviour is excellent: the first, well-damped break appears around 800Hz; other effects are distributed mostly above 5kHz and are at a very low level. But it's possible that this apparently good behaviour results from the 'lossy' nature of the arm.

The various dynamic tests failed to show up any important problems with the turntable. Shocks applied to the record are damped quickly and evenly by the platter and felt mat, whilst rumble is low and electrical noise adequately suppressed. Flutter is quite low too,

but linear wow in the 0.2-6Hz range is distinctly (and audibly) high. I suspect that belt compliance is excessive with respect to the enormous inertia of the platter. Slowing under load was a surprisingly high 0.95 per cent.

SOUND QUALITY

The measured wow was detected in listening tests before the measurements were made; notes made at the time describe pitch as 'not overly stable'. The basic character of the sound, however, was very impressive (leaving the arm to one side for a moment). The Source doesn't quite have the vitality and urge of, say, a Roksan or a Linn, but it has enormous reserves of weight and energy. The soundstage is large in scale and very explicit, while the midband has an 'open mouth' quality: it projects properly, and what is projected sounds articulate and believable. Transients are crisply painted, and the whole effect is very full bodied, with a lot of drive and 'wellie'.

The arm seemed rather disappointing, though I admit it's not easy to distinguish with absolute certainty between arm and turntable when the two are used together. Nevertheless, although the Odyssey has something of the explicit quality of the Source, and a trace of its authority too, it also sounds rather brash and forward and clearly compresses dynamics (it sounds 'loud') and loses information. Tracking very well on transient material, and handling surface noise with aplomb, there's a 'flatness' in the way it reproduces high frequencies which was noticed with a range of cartridges (including a Koetsu *Rosewood Signature* whose normal home is a *RB300*) that is not properly reconcilable with a truly high grade arm.

CONCLUSIONS

The turntable is clearly a fine and imposing performer, with a rich, powerful but slightly 'slow' sound, and a wow problem which should be cured. What it does well, no turntable in my experience does better, so the potential is clearly worth exploiting. The arm, unfortunately, is not recommended on its current showing.

TEST RESULTS

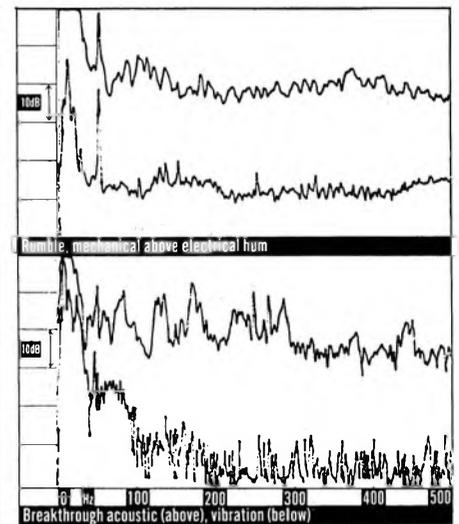
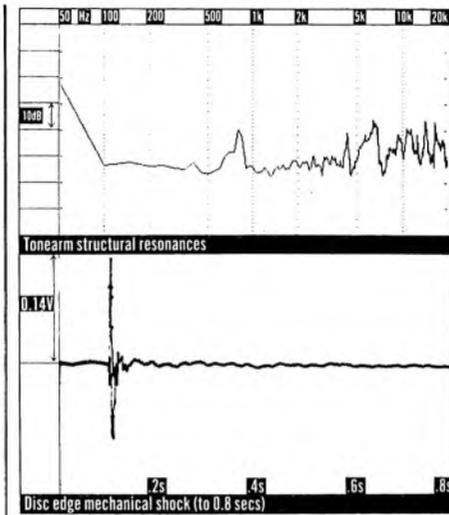
Motor section	
Type	belt drive, suspended subchassis motor unit
Platter mass/damping	7.5g/good
Finish and engineering	excellent
Type of mains connection leads	2 core + earth
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Uwtd)	0.20%/0.21%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.20%/0.08%
Absolute speed error	none
Speed drift 1 hour/load variation	+0.32%/–0.95%
Start up time to audible stabilisation	5 secs
Rumble DIN B Wtd L/R	–68.5/–77.5dB

Arm section

Approximate effective mass inc screws, exc cartridge 15gm
 Type/mass of headshell integral, fixed
 Geometric accuracy excellent
 Adjustments provided overhang/height/lateral
 Finish & engineering below average/good
 Ease of assembly/set-up/use poor
 Friction (typical) lateral/vertical 10mg/10mg
 Bias compensation method thread & lever, uncalibrated
 Bias force, rim/centre (set to 1.5gm elliptical) 180mg/180mg
 Downforce calibration error, 1gm/2gm uncalibrated
 Cue drift negligible
 Cue rate ascent/descent instant/2 secs
 Arm resonances excellent
 Arm damping method none
 Load capacitance 280pf

System as a whole

Size (h x w x d)/clearance for lid rear 16 x 50 x 40/8cm
 Ease of use good
 Typical acoustic breakthrough and resonances very good
 Subjective sound quality of complete system good
 Hum level/acoustic feedback good
 Vibration sensitivity/shock resistance good
 Estimated typical purchase price from £1,884



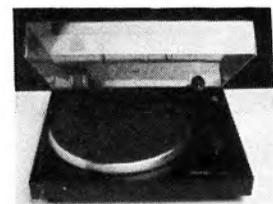
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DUAL 503



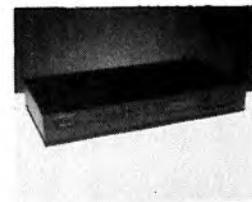
ARCAM DELTA



ROTEL RP830



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BEST BUY

SYSTEMDEK/II/IIX

SYSTEMDEK LTD, UNIT 34, KYLE ROAD, IRVINE INDUSTRIAL ESTATE, IRVINE, SCOTLAND. TEL: (0294) 71251.



Seeking to lower the entry price for serious turntables, Systemdek introduced the *II* a few years ago. But its 'kitchenware' styling was not an overwhelming success, so along came the slightly more expensive *IIX*, with conventional plinth and cover and an improved 'hanging' suspension. Whether it was the changed appearance or the improved subchassis performance that did the trick is impossible to say, but the *IIX* performed comfortably better, in the marketplace and the listening room. So now they've transferred the *X* suspension onto the relaunched *II*. An electronic power supply is an optional extra, and you can now have a Systemdek arm to round out the package. We have fully auditioned and partly retested a new *II*, grafting the results into the original *IIX* review.

This player has a plate glass turntable with felt mat, and uses a steel subchassis suspended from longish, foam-damped, top-adjustable springs, driven from a synchronous motor via an O-ring, with manual (or electronic) speed change. The Japan-sourced arm is typical of a number offered by various manufacturers, usually at under £100, with fixed headshell, open gimbal bearing and quite substantial main beam. Effective mass is quite high, so low compliance cartridges should be used.

LAB REPORT

The new subchassis was not quite as stable as the *IIX*, so wow and flutter is up a bit, but is still not serious. A similar impression is gained from the disc impulse spectrogram, where the initial transient is damped in a typical felt mat manner, but some LF rocking follows. The other speed characteristics and rumble are fine, while acoustic breakthrough was good, vibration pretty good, with some below 100Hz and a few higher spring modes. The arm was a good

example of the type, with tight bearings and low friction, good calibration and reasonable resonance behaviour – fairly lively but well balanced with a mildly 'brash' upper range, with the first main break around 800Hz-1.3kHz.

SOUND QUALITY

Rating a solid above average, the 1987 *II* set a very decent standard for its price. The sound was quite open and clear with some life, but bass and focus were both a little softened, and the system seemed to become a little congested when dealing with very complex material.

CONCLUSIONS

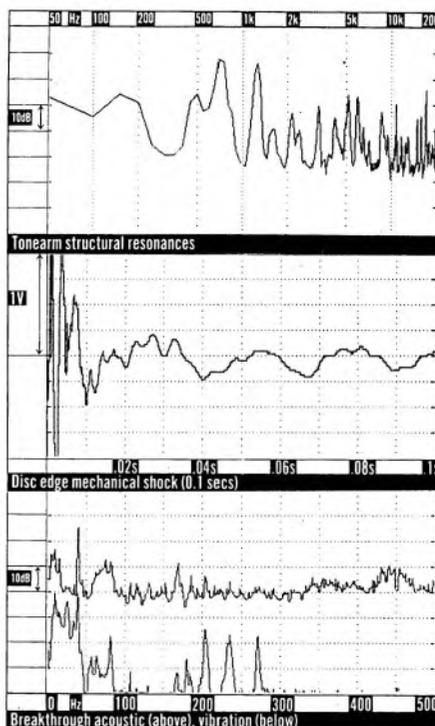
The *IIX* continues to improve in detail and so has managed to remain fully competitive in this fast changing market. The new arm is good value for low compliance cartridges, and the basic synchronous motor unit is particularly good value, if a rather spartan appearance.

TEST RESULTS

Motor section (IIX figures bracketed)	
Type	manual or elec., belt, subchassis
Platter mass/damping	1.8kg/1 good
Finish and engineering	very good
Type of mains connecting leads	3 core/phonos and earth
Speed options	33 $\frac{1}{3}$ /45rpm
Wow and flutter (DIN peak wtd)	0.14% (0.08)%
Wow and flutter (lin peak wtd)	0.16 (0.14)/0.17 (0.05)%
Absolute speed error	-0.25% (+0.05)%
Speed drift/load variation	-0.08%/+0.1 (-0.16)%
Start-up to stability	4 (4.3) secs
Rumble L/R (DIN B wtd)	(-76dB/ -78dB)
Tonearm	
Effective mass (approx)	15g
Type/mass headshell	fixed
Geometric accuracy	very good
Adjustments provided	height, overhang, lateral, tilt
Finish/engineering	very good
Ease of set-up/use	very good
Friction, (typical lat/vert)	20mg/40mg

Bias method	dial spring
Bias force (rim/centre, 1.5gE)	130mg/170mg
Downforce error 1g/2g	0g/0g
Cue drift, 8mm up/down	slight, 1 secs/2 secs
Arm resonances	1 good
Sound quality	above average
Arm damping	slight c/wt decoupled
Whole system	
Size (w x d x h)/lid at rear (IIX)	41 x 34 x 16.5cm/16.5cm*
Ease of use	very good
Acoustic breakthrough, resonances	very good
Sound quality	above average
Hum/acoustic feedback	very good/excellent
Vibration, shock sensitivity	good (excellent)/1 good
Typical price	£215/£199
*11s skeletal	

Reviewed by Martin Colloms.
Reprinted from issue 48.



TECHNICS SLBD-22

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

RECOMMENDED



Technics is the hi-fi division of Matsushita, who probably make more turntables than the rest of the world put together. The *SL-BD22* is a straightforward budget (£90) semi-automatic player, traditionally finished in Technics' grey/brown, of traditional size and with a traditional pivoted arm – albeit with a P-mount fitment incorporating an *EPS-24CS* cartridge. Finish and appearance are to the expected high standards, and the simple controls are placed on a front ledge, giving speed selection and pitch adjustment, cueing and stop; start is initiated by removing the arm from its rest, automatics handling stop and return.

Having a P-mount cartridge, downforce and bias compensation are factory set. The arm is a fairly low mass affair, but showed quite good bearing integrity considering the low cost of the unit. The cast aluminium platter has a beautifully cut rim strobe to confirm speed, but is inclined to ring and the mat is very thin. The main bearing mounting showed some rocking tendency too, though the bearing itself was good. The main plastics moulded plinth and tinny resonant cover are coupled direct to the platter and arm, the whole sitting on four vestigial sprung feet. Set-up was nice and simple, straight from the box.

LAB REPORT

The arm bearings were impressively free of play and also gave low friction, but the light-weight construction – giving an estimated effective mass of 6g, suited to highish compliance T4P cartridges – certainly contributed towards the fairly poor resonance performance, which showed plenty of discontinuities and suppressed treble.

The basic rumble figures are respectable, but the spectrogram shows numerous motor harmonics and 100Hz interference, probably

from the mains transformer. Wow and flutter was average, with significant slowing under load. Neither breakthrough test gave good results, the structure being unusually 'live' acoustically in the midband, and very susceptible to vibration at low frequencies; sometimes you just can't win. The disc impulse test was similarly traumatic, with substantial complex rocking.

SOUND QUALITY

Notwithstanding the indifferent results on our more complex lab tests, the sound of the *SL-BD22* was not badly received. It did not quite attain the standards of the two '33 models, but left the *L20* for dead. Though rated well below average, this is still not a bad result for a £90 player, and is probably better than most or all at a similar price. It received the criticisms expected at this level, a degree of coarseness, coloration and constricted depth, with high frequency untidiness, but did at least convey a little atmosphere and 'air', and only started to become unpleasant with heavy rock sources.

CONCLUSIONS

Though this player did not perform well enough to qualify for Best Buy rating, it still did a decent enough job for the price to merit Recommendation, bearing in mind the high standards of finish and build, despite the sonic weaknesses.

TEST RESULTS

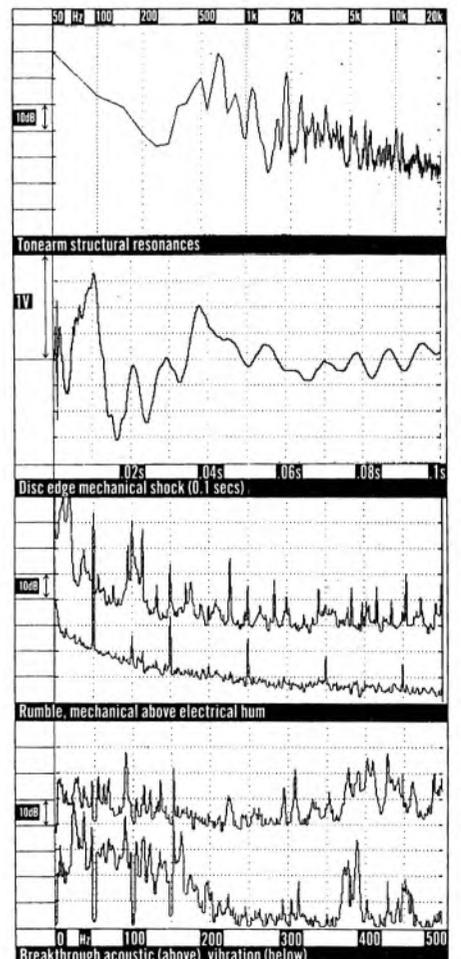
Motor section	
Type	semi auto, electronic, belt-drive, solid
Platter mass/damping	0.52kg/poor
Finish and engineering	very good
Type of mains connection leads sockets:	2 core/phonos and earth
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.07%
Wow & flutter (Linpeak Wtd 0.2-6Hz/6-300Hz)	0.2%/0.15%

Absolute speed error	+0.01%
Speed drift 1 hour/load variation	-0.17%/-0.4%
Start up time to audible stabilisation	1.5 secs
Rumble DIN B Wtd L/R	-72/-73dB

Arm section	
Approximate effective mass inc screws, exc cartridge	approx 6g
Type/mass of headshell	P-mount
Geometric accuracy	excellent
Adjustments provided	none
Finish & engineering	very good
Ease of assembly/set-up/use	excellent
Friction (typical) lateral/vertical	20mg/30mg
Bias compensation method	spring
Bias force, rim/centre (set to 1.5gm elliptical)	100mg/170mg
Downforce calibration error, 1gm/2gm	fixed at 1.25g
Cue drift, 8mm ascent/descent	negligible, 1 sec/3 secs
Arm resonances	below average
Subjective sound quality	well below average
Arm damping	some c/wt decoupling

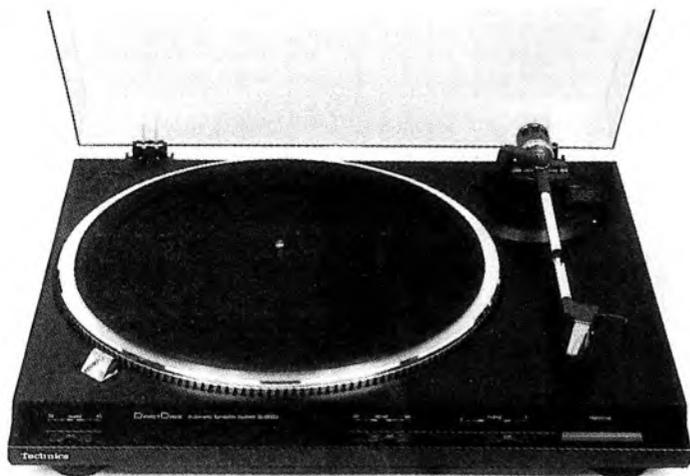
System as a whole	
Size (w x d x h)/clearance for lid rear	43 x 38 x 9.5/4cm
Ease of use	very good
Typical acoustic breakthrough and resonances	poor
Subjective sound quality of complete system	well below average
Hum level/acoustic feedback	good/below average
Vibration sensitivity/shock resistance	poor/fairly good
Estimated typical purchase price	£90

Reviewed by Martin Collins. Reprinted from issue No. 48



TECHNICS SL-DD33/SL-QD33

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



These two low-cost integrated players are virtually identical apart from the motor systems used. The *DD* model costs £100 and has a conventional direct drive motor, whereas the £130 *QD* has quartz crystal speed reference. Compared with specialist hi-fi products they simply bristle with features. Automatics include start, stop and return, with plinth front selection of cueing, auto-repeat, and two (fixed) speeds. The platter rim has beautifully machined strobe markings – of no apparent value as the speeds are fixed. The platter also has disc size sensing to assist the automation and make sure that nasty mistakes (cueing the mat) cannot happen.

This player comes complete with a Technics *P30S* cartridge, and has a *P*-mount type arm which is not suitable for traditional half-inch screw-mount cartridges. An advantage is that the tracking weight is standardised at 1.25g, so both downforce and bias can be factory set. The low mass arm has good gimbal bearings with no evidence of play, and plinth phono sockets replace the arm lead.

Finished to a high standard in Technics' traditional dark brown/grey, high production volume encourages the extensive use of plastics mouldings, so the plinth and base are determinedly lightweight. The platter is a lightweight aluminium casting, covered in a ribbed mat, but the main bearing is a quality item, with no sign of play. The whole unit stands on fixed, spring/rubber feet, and the lid is a resonant affair.

LAB REPORT

Tight arm bearings plus good geometry and calibration suggest a quality arm but it was very difficult to check the lateral friction because of the fixed bias compensation, and there seemed to be some suggestion of sticking

here. The tough resonance sweep test is slightly scrappy, with unwanted activity at 500Hz but the overall result is quite well-damped and balanced.

Rumble is pretty good, and both units showed fine speed stability and control – ironically the *DD* model (bracketed in data) giving the superior wow and flutter. Acoustic breakthrough was only fair, vibration isolation quite poor at low frequencies, while the disc mechanical impulse showed good initial damping, followed by severe platter rocking.

SOUND QUALITY

While the Technics 33s fall short of the standards achieved by models whose main emphasis is on sound quality, they at least make a reasonable attempt. The sound is generally quite well controlled, with fair focus and a little depth, but some 'hollow' and 'nasal' midrange coloration. Bass is below average, slightly soft and 'thick', while the treble is rather untidy, if balanced, emphasising surface noise.

CONCLUSIONS

Though these players stress appearance, build quality and features at the expense of sound quality there is good sound engineering in many places, good lab performance, and a sound that is respectable enough, if rather uninviting. The *DD* version clearly offers the better value for money, but both merit recommendation.

TEST RESULTS

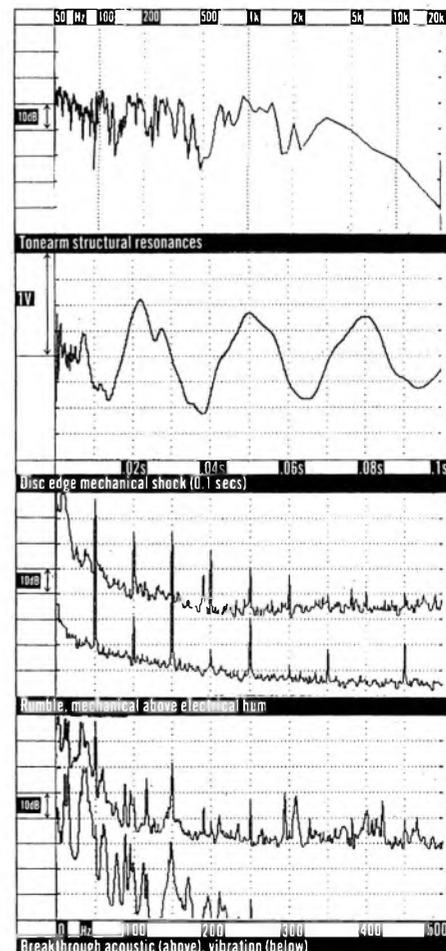
Motor section	(DD33 in brackets)
Type	automatic, electronic, direct drive, solid
Platter mass/damping	1kg/below average
Finish and engineering	very good
Type of mains connecting leads	2 core/phonos and earth (sockets)
Speed options	33 $\frac{1}{3}$ /45rpm
Wow and flutter (DIN peak wtd sigma 2)	0.15% (0.04%)

Wow and flutter (lin peak wtd)	0.13% (0.08%)/0.12% (0.08%)
Absolute speed error	-0.2% (-0.17%)
Speed drift, 1 hour/load variation	0% (0%)/0% (0%)
Start-up time to audible stabilisation	2 (1.5) secs
Rumble, DIN B wtd, L/R average (see spectrum)	-75/-79dB

Arm section	
Approximate effective mass, inc screws, excl cartridge	7.5g
Type/mass of headshell	fixed, P-mount
Geometric accuracy	very good
Adjustments provided	none
Finish and engineering	very good
Ease of assembly/set-up/use	excellent
Friction, typical lateral vertical	see text/20mg
Bias compensation method	fixed spring
Bias force, rim/centre	130mg/190mg
Downforce	0.1g/0.03g
Cue drift, 8mm ascent/descent	very slight, 1 secs/1 secs
Arm resonances	above average
Subjective sound quality	below average
Arm damping	slight counterweight decoupling

System as a whole	
Size (w x d x h)/clearance for lid rear	43 x 38 x 10cm/3cm
Ease of use	excellent
Typical acoustic breakthrough and resonances	average
Subjective sound quality of complete system	below average
Hum level/acoustic feedback	good/average
Vibration sensitivity/shock resistance	below average/good
Estimated typical purchase price	£100, £140

Reviewed by Martin Colloms. Reprinted from issue 48.



THORENS TD166III

PORTFOLIO MARKETING, RIVER WALK, TONBRIDGE, KENT TN9 1DT. TEL: (0732) 365071.

BEST BUY



TEST RESULTS

Motor section

Type	auto-lift, belt-drive, subchassis
Platter mass/damping	2.5kg/below average
Finish and engineering	good
Type of mains connecting leads	2 core/phonos and earth
Speed options	33 $\frac{1}{3}$ /45rpm
Wow and flutter (DIN peak wtd sigma 2)	0.08%
Wow and flutter (lin peak wtd 0.2-6Hz/6.300Hz)	0.15%/0.06%
Absolute speed error	+1.4%
Speed drift, 1 hour/load variation	%/-0.18%
Start-up time to audible stabilisation	3.5 secs
Rumble, DIN B wtd, L/R average (see spectrum)	-72dB

Arm section

Approximate effective mass, inc screws, excl cartridge	7g
Type/mass of headshell	fixed
Geometric accuracy	very good
Adjustments provided	overhang, lateral, tilt
Finish and engineering	good
Ease of assembly/set-up/use	very good/good/good
Friction, typical lateral vertical	20mg/20mg
Bias compensation method	thread & weight
Bias force, rim/centre (set to 1.5g elliptical)	120mg/170mg
Downforce calibration error, 1g/2g	-0.2g/-0.4g
Cue drift, 8mm ascent/descent	negligible, 1 secs/1 secs
Arm resonances	above average
Subjective sound quality	average
Arm damping	some c/wt decoupling

System as a whole

Size (w x d x h)/clearance for lid rear	43 x 35 x 15cm/8.5cm
Ease of use	very good
Typical acoustic breakthrough and resonances	good
Subjective sound quality of complete system	above average
Hum level/acoustic feedback	very good/good
Vibration sensitivity/shock resistance	good/fairly good
Estimated typical purchase price	£179

Reviewed by Martin Colloms.
Reprinted from issue 48.

Thorens are always trying to kill off the '166, but the market won't let them. It was revived again for 1986, as a £169 integrated player, based on a low cost version of the classic TD150/160 subchassis motor unit plus Thorens' own arm. It provides auto stop/lift and has cue and speed control along the front of the top plate. The arm is a low mass affair, better suited to more compliant cartridges, and is a cross between fixed and detachable heads – the wires remain continuous and in situ, but a strong collar releases the head for cartridge mounting. The complex gimbal bearings were set slightly loose, and armheight can only be adjusted using shims.

The motor is essentially the same as that produced over many years, albeit now using a low voltage motor fed *via* a transformer. The metal platter sits on a plastic hub, driven by a compliant belt from a plastic clutch pulley, while the rubber mat surface is now flat (the ribs are found on the underside!). The subchassis springing has foam damping, the lid is cheaper polystyrene, and finish is spartan but clean.

LAB REPORT

The arm bearings were a bit sloppy, but showed good friction levels and geometry. Downforce calibration was 20 per cent light, but bias was

about right. Resonances included the main, quite severe, torsional mode at around 600Hz, plus an isolated high Q peak at 3kHz, while high frequencies were suppressed.

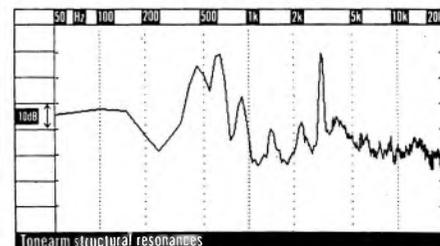
Based on earlier findings, the motor section has a generally decent lab performance in all departments, including breakthrough, rumble and speed stability.

SOUND QUALITY

Though the competition is now much tougher, this latest TD166 reincarnation still delivers the sonic goods, rating firmly above average with the new arm. This has clearly raised the standard a little, though it is still probably the weakspot, and contributed to a degree of treble 'roughness' and 'splash' that might be ameliorated with a kinder moving magnet cartridge. Depth, focus, ambience, resolution and dynamics were all liked, bass was pretty good, though some mid coloration was criticised.

CONCLUSIONS

Old turntables never die, and fortunately Thorens are persuaded of the fact. This revived '166 yet again takes its place near the top of its class, as a practical, sensibly engineered, and well balanced player.



THORENS TD316

PORTFOLIO MARKETING, RIVER WALK, TONBRIDGE, KENT TN9 1DT. TEL: (0732) 365071.



The TD316 turntable is a higher-quality replacement for the old TD166, a deck which offered excellent value and has since been resurrected. The 316 carries forward the established 166 arm, now fitted to the latest subchassis and drive system of the 320 series. One cost concession is seen in the change to black ash vinyl for the plinth exterior, a substitute for the real veneer of the 320; while the inner platter hub is now made from reinforced plastic, the outer ring is still Mazak.

Features include an electronic motor control with convenient two-speed switching on the plinth, plus the comparative luxury of a plinth-mounted cue control which allows jiggle-free operation despite the suspended subchassis. The arm has been improved by replacing the old headshell with a new cast metal design, offering sensible cartridge fitting and a firm locking collar. Bias compensation is by thread and weight, with downforce set by a calibrated dial and rotating counterweight.

SOUND QUALITY

Good points included a strong stable sound with good pitch and speed stability. The bass was weighty and extended with the mid moderate in coloration and good on detail. The treble was a touch exuberant but quite well focused. Stereo images were well presented in the width dimension but lacked some measure

of depth transparency; overall it sounded a little less dynamic than top rated alternatives.

CONCLUSIONS

Undoubtedly competitive, the lower cost 316 integrated player offers traditionally good Thorens engineering. Arm mass is on the low side, suited to some of the more delicate moving magnet cartridges, and is also well calibrated and convenient. In contrast to some of the competition, this player also offers a good lab performance and two-speed electronic motor drive.

TEST RESULTS

Motor unit/integrated player

Type	belt-drive, subchassis, manual
Platter mass/damping	3.0kg/good
Finish and engineering	excellent/very good
Type of mains connecting leads	remote transformer/plus earth
Speed options	33/45rpm
Wow and flutter (DIN peak wtd sigma 2)	0.06%
Wow and flutter (lin peak wtd 0.2-6Hz/6.300Hz)	0.14%/0.14%
Absolute speed error	-0.5%
Speed drift, 1 hour/load variation	<0.1%/-0.34%
Start-up time to audible stabilisation	7.0 secs
Rumble, DIN B wtd, L/R average (see spectrum)	-74/-76dB

Arm section

Approximate effective mass, inc screws, excl cartridge	4.5g
Type/mass of headshell	fixed
Geometric accuracy	very good
Adjustments provided	height/overhang/lateral
Finish and engineering	good/good
Ease of assembly/set-up/use	very good/very good/very good

Friction, typical lateral vertical	45mg/<15mg
Bias compensation method	thread and weight
Bias force, rim/centre (set to 1.5g elliptical)	200mg/160mg
Downforce calibration error, 1g/2g	-0.075g/-0.15g
Cue drift, 8mm ascent/descent	good, 1.5 secs/3.5 secs
Arm resonances	good
Subjective sound quality	good
Arm damping	some counterweight decoupling

System as a whole

Size (w x d x h)/clearance for lid rear	44 x 37 x 16cm/6.5cm
Ease of use	good+
Typical acoustic breakthrough and resonances	very good
Subjective sound quality of complete system	good+
Hum level/acoustic feedback	very good/very good
Vibration sensitivity/shock resistance	very good/average+
Estimated typical purchase price	£219

Reviewed by Martin Colloms

Reprinted from issue 43.

THORENS TD 160S IV

PORTFOLIO MARKETING, RIVER WALK, TONBRIDGE, KENT TN9 1DT. TEL: (0732) 365071.

RECOMMENDED



Believe it or not, the *TD160* was discontinued by the manufacturer back in 1983. Happily, however, the new distributor recognised the error...

Reintroduced (not for the first time) for 1987, the *160* is based on Thorens' classic sprung floating subchassis principle. A 16-pole synchronous motor drives an inner platter by flat belt, the motor pulley incorporating a slipping clutch to ensure smooth starting and long belt life. The suspension settings are preset for normal arms (don't think of using anything super-heavy or exotic). The platter and main bearing have been upgraded, and the base, lid and metalwork are all of good quality. The only real criticism is the (unnecessary) keyhole slots in sub and main platters and the consequently necessary thick rubber mat which spoils the sound to a degree.

LAB REPORT

Wow and flutter is exceptionally low, whilst rumble is just satisfactory, though the schedules didn't allow for a lot of running in this case, which might have helped. Acoustic

never excites. Speed accuracy is beyond reproach, and combined with good inherent definition, the deck sounded strong and articulate. But there is a mild softening of impact, and the bass has a mildly 'plummy' quality, perhaps caused by overhang (energy storage), and partly curable by changing the mat to something lighter and harder.

SOUND QUALITY

This is one of those straight down the middle products that always sounds competent yet feedback levels were a little high, and shock transmission *via* the feet (footfall *etc*) increased rapidly at LF. The rumble and electrical spectra were clean, but the disc edge shock test caused a rapid oscillation which spectrum analysis showed was a complex pattern of interacting effects.

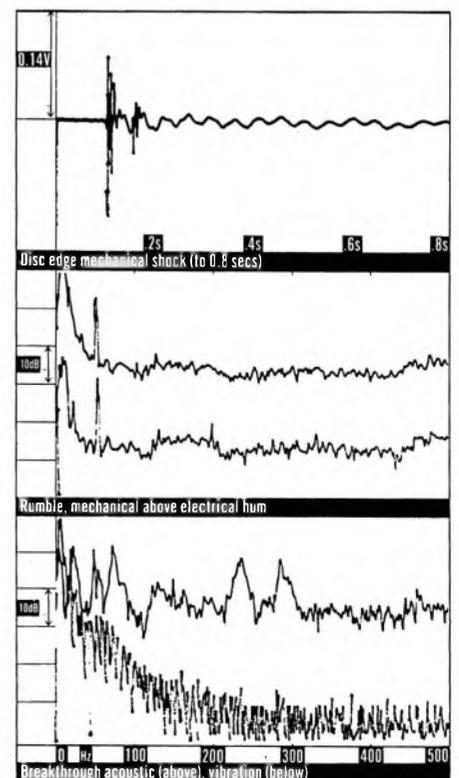
CONCLUSIONS

This is a quality product, and from experience a consistent one that needs no specialist skills to set up, yet which gives much of the benefits of those that do. The excellent backup is

another plus, so it may be Recommended, obviously.

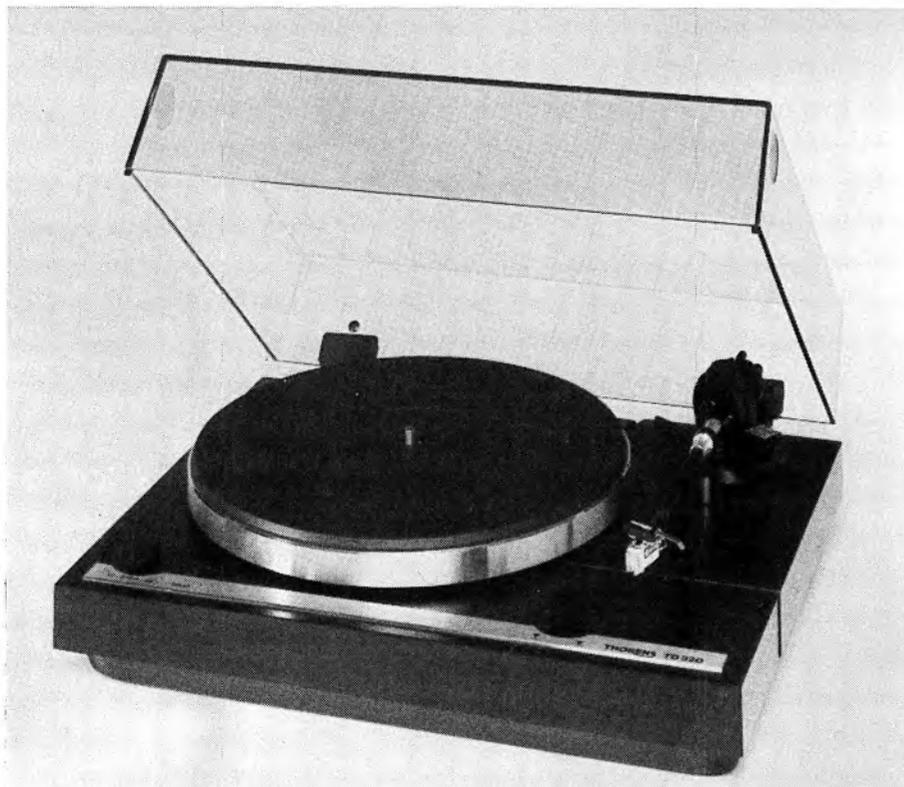
TEST RESULTS

Motor Unit	
Type	manual motor unit
Platter mass/damping	3.1kg/good
Finish and engineering	good
Type of mains connection leads	2 core
Speed options	33, 45rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.05%/0.10%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.13%/0.02%
Absolute speed error	-0.19%
Speed drift 1 hour/load variation	+0.01%/-0.51%
Start up time to audible stabilisation	4 secs
Rumble DIN B Wtd L/R	-71.5/-72.5dB
Size (h x w x d)/clearance for lid rear	16 x 44 x 35/9cm
Ease of use	very good
Typical acoustic breakthrough and resonances	average
Subjective sound quality of complete system	average+
Hum level/acoustic feedback	good/below average
Vibration sensitivity/shock resistance	average/below average
Estimated typical purchase price	£229



THORENS TD320

PORTFOLIO MARKETING, RIVER WALK, TONBRIDGE, KENT TN9 1DT. TEL: (0732) 365071.



The TD320 is the top model in Thorens' new series, and is also available without arm (321). Following in the footsteps of B&O and Philips, Thorens have chosen to replace their usual coil spring suspension with one using flat leaf springs, these hung or cantilevered from the chassis allowing free movement. Centration and consistency are thus improved and the springs are easy to adjust from above.

The massive plinth is of solid MDF, 40mm thick. The section of material cut out for the arm mounting is used to construct a wood-based high-mass subchassis of low resonance properties. Arm mounting boards are interchangeable. Thorens' existing two-part Mazak platter and belt-drive has been retained, but a new low voltage synchronous motor has been fitted, fed by an electronically synthesised two phase power supply with the two speeds directly switched.

The 320 is engineered to a high standard with excellently toleranced main bearing and particularly good finish. The lid now sports spring loaded hinges. It proved easy to set up except for the restricted clearance available for dressing the arm cable inside the deck.

LAB REPORT

The clutch provided a judder-free start up at a

slow 8.7 seconds. Rumble was a very low -76dB with no supply harmonics visible on the spectrogram. The new flat mat offered quite good platter damping with good termination of disc impulse energy. The suspension offered very good levels of vibration isolation while acoustic energy was also well rejected. No particular emphases were detected in the frequency range.

Wow and flutter was a very low 0.06%. The separate figures for wow and flutter were well balanced, while speed accuracy was good, and slowing under load a mild 0.25%. This player also provided quite good resistance to shock though the chassis proved to be a trifle 'whippy' in the rotational mode.

SOUND QUALITY

Performing very well in the listening tests, the 320 provided a stable, focused sound, with a feeling of substantial weight and solidity. Stereo images revealed fine depth and space while the pitch and rhythm were well maintained. Acoustic feedback was very low, while the player was also not too critical of siting, a good sign.

CONCLUSIONS

The 320 series improves on the traditional

strengths of the TD160 and offers a welcome advance in engineering, performance and finish. Competitive in their price category, this range of models is recommended.

TEST RESULTS

Motor unit/integrated player*	
Type	electronic, belt-drive, subchassis
Platter mass/damping	3.7kg/good
Finish and engineering	excellent/very good
Type of mains connecting leads	2 core
Speed options	33/45rpm
Wow and flutter (DIN peak wtd sigma 2)	0.06%
Wow and flutter (lin peak wtd 0.2-6Hz/6.300Hz)	0.1%/0.1%
Absolute speed error	-0.16%
Speed drift, 1 hour/load variation	<0.1%/-0.25%
Start-up time to audible stabilisation	8.7 secs
Rumble, DIN B wtd, L/R average	-76dB
Size (w x d x h)/clearance for lid rear	44 x 37 x 16cm/6.5cm
Ease of use	good
Typical acoustic breakthrough and resonances	very good
Subjective sound quality of complete system	very good
Hum level/acoustic feedback	very good/very good
Vibration sensitivity/shock resistance	very good/fairly good
Typical price	£320

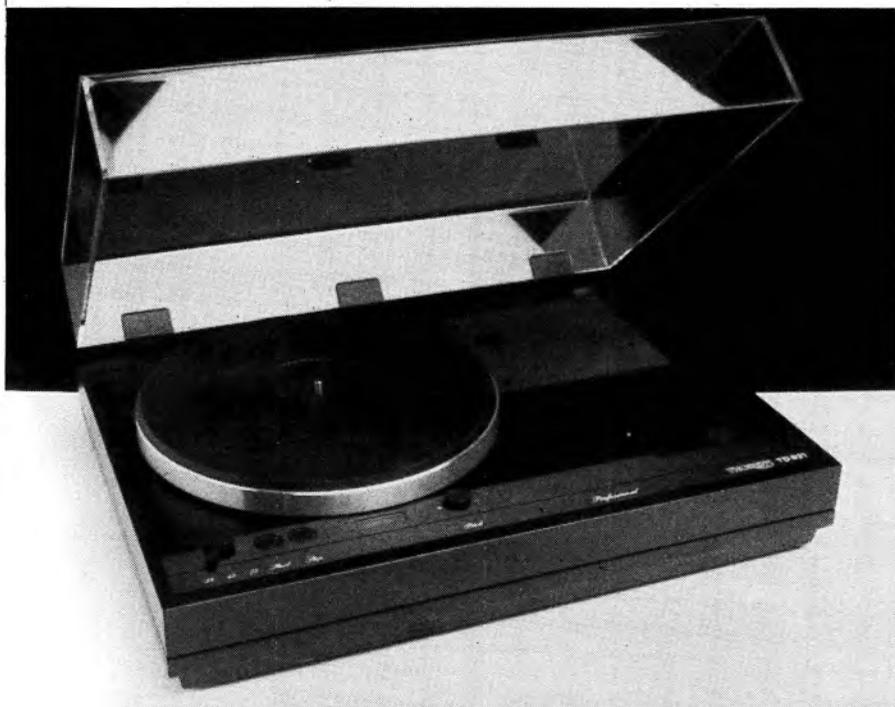
*supplied without arm (TD321BC)

Reviewed by Martin Colloms.

For graph references see issue No. 40.

THORENS TD 521

PORTFOLIO MARKETING, RIVER WALK, TONBRIDGE, KENT TN9 1DT. TEL: (0732) 365071.



Advertised as compatible with 'any disc ever recorded', the *TD521* has a switch speed change between 33, 45 and 78rpm, with an internally illuminated stroboscope and pitch control for fine tuning. The generous 55cm width enables outsize arms to be fitted – the 12 inch SME for example, and certainly most of the exotic parallel trackers too.

Armless as standard, the *521* is belt driven and suspended *via* leaf springs, the suspension being tuned to a relatively high frequency. The deck is equipped with the usual Thorens inner and outer platters, both with keyhole access slots and topped by a heavy rubber mat. The power supply is a small transformer combined with a two-pin (non-UK standard) plug.

LAB REPORT

Speed stability is exemplary. Rumble is low, the frequency analysis being clean apart from some minor discrete low frequency artefacts. Suspension isolation is quite good, though decoupling deteriorates rather quickly at LF. Acoustic feedback is held down well apart from a 250Hz peak. Disc damping is excellent – gain had to be increased substantially for the plot as displayed.

SOUND QUALITY

Sound quality is compromised by the mat and probably by the platter construction too. It clearly sounded soft and compressed by the

standards of the price. Pitch is as accurate as promised, and music has real stability with considerable midband clarity and focus. But the bass didn't do much, and low level listening was made difficult due to a lack of presence and clarity and the wayward LF.

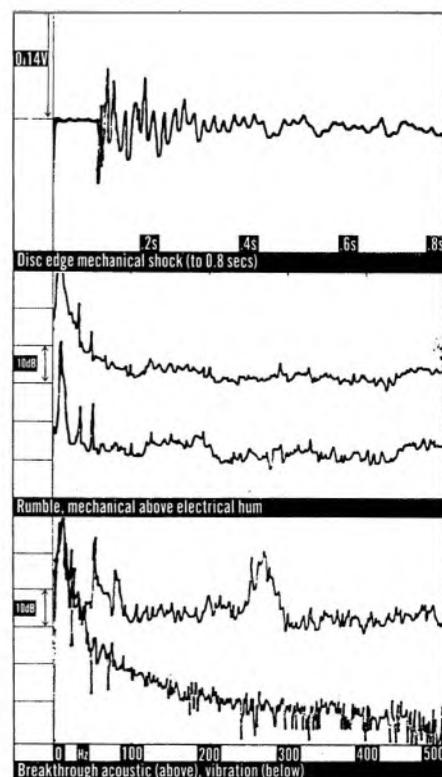
CONCLUSIONS

Not competitive with other up-market turntables on sound quality, the Thorens *TD521* could yet prove attractive for those who want to use long arms, value the 78rpm facility or who have outsize records to play.

TEST RESULTS

Motor Unit

Type	manual motor unit
Platter mass/damping	3.1kg/good
Finish and engineering	good/good
Type of mains connection leads	transformer in plug (2 pin)
Speed options	33, 45, 78rpm
Wow & flutter (DIN peak Wtd/Unwtd)	0.07%/0.13%
Wow & flutter (Lin peak Wtd 0.2-6Hz/6-300Hz)	0.03%/0.13%
Absolute speed error	+0.13% (strobe markings stationary)
Speed drift 1 hour/load variation	0.09%/0.63%
Start up time to audible stabilisation	7 secs
Rumble DIN B Wtd L/R	-76/-77dB
Size (h x w x d)/clearance for lid rear	18 x 55 x 40/8cm
Ease of use	good
Typical acoustic breakthrough and resonances	good
Subjective sound quality of complete system	average
Hum level/acoustic feedback	average/poor
Vibration sensitivity/shock resistance	poor/average
Estimated typical purchase price	£625





TURNTABLES AND TONEARMS CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

The best of the turntables and tonearms from current and past reviews.

Four arms attained a standard suitable for recommendation. Best of the lot in relation to price is the cheapest – the *Moth* arm (\$65), or Rega *RB250* by another name. At the present time this is certainly the outstanding budget arm, being both better made, more consistent and better sounding than its peers, as well as offering more sophisticated construction, notably in the one-piece armtube and headshell. One obvious snag is that it's not height adjustable, though spacers are available optionally. More important, it has its own base fitting which is not compatible with the most widely used of all – the one popularised by Linn Products.

Going up in price, the Alphason *Xenon* (\$210) – which is Linn compatible – impressed for its explicit clarity that verges on over-sharpness but happily never quite crosses the line. Like all Alphasons, it has moderate mass and there should be no problems interfacing it with a wide range of turntables and cartridges. The same applies equally to the flagship Alphason *HR-100S* (\$359) tested here with the optional linear crystal silver cable which is also available for the *Xenon*. Again, the most obvious characteristic is good mid and top resolution, but the *HR-100S* does it better, giving a cleaner all round performance – better top end control (still occasionally in danger of sounding metallic), a more lucid and progressive mid, and a tighter, more integrated bass.

The other arms are already well known. The Linn *Ittok* (\$399) was assessed primarily in its role as a partner for Linn's own *LP12* (\$471) turntable.

Experience suggests that the *LP12* and *Ittok* do enjoy something of a special relationship – supercompatibility if you like – yet with other turntables, the net should be cast a little wider. Of all Linn's record playing components, the *Ittok* is certainly the one that wears its age least well. It sounds almost rough at times next to some newer designs, the Alphason and the Rega amongst them, and its stereo qualities are shown a

clean pair of heels by a number of others, not least some of the exotic US parallel tracking models. What saves the *Ittok* is its superb quality of build, its genuine consistency (a rare quality with arms generally), its practicality – and perhaps most important, the still unexcelled overall balance.

In terms of build, consistency, neutrality and general confidence building, its only peers are the SME designs. Specifically the *Series IV* (\$675) tested on this occasion must come nearer to offering all things to all men, albeit at a price, than any rival.

Of the turntables tested this time round, there are a few spectacular hits – and one or two spectacular misses too. The *Rock* (\$350) was reassessed, this time stripped down form, which is by far the most cost effective way to get this turntable running since the losses, compared to the top of the line version, are not modest exactly, but not traumatic either. The *Rock* sounds, as always, lean and dynamic with an excellent (if highly individual) stereo presentation and superb bass. Some might find the top rather dry, yet all indications are that, like it or not, the *Rock* is surprisingly accurate. The Heybrook *TT2* with arm (\$528) is another mid-price player to make a hit this time. Its new Alphason built arm makes an excellent case for itself and brings some zest to the partnership, though how it would have stood up against the Manticore *Mantra*, the Linn *Axix* or the AR *EB1012* is open to conjecture this time around.

Other midprice turntables did well, helping to pin the lie about the dearth of talent in this area of the market. The Thorens *TD160* (\$229) makes a welcome return, thanks to the efforts of their new UK distributor. I only wish Thorens would make some of the improvements that are now long overdue. Warmly recommended anyway, as is the Michell *Synchro* (\$235) which really looks too pretty to be any good, but which in fact performs both tricks well. The Michell is a particularly good match to the Regas.

At the bottom end of the

market. But the established revolution has taken place since Ariston unveiled their very promising new low cost integrated *Q-Deck* (\$140), and market leader Dual changed horses from the *505* to the *503-1* (\$125). Of the two, the Ariston is easily the better sounding, but the Dual is still a fine budget buy and will be much more widely available. Also recommended is the Rotel *RP-830* (\$160), which is competent if undistinguished – and ironically is now one of the finest turntables now made in the Far East. By default of course...

Switching finally to the cream, the Alphason *Sonata* (\$695) joins established leaders like the Linn *LP12* and the Roksan *Xerxes* (\$595) at the top end of the market. But the established models haven't stood still either. The Linn has been improved in minor respects, and has also acquired a new cartridge, the *Troika* (\$546), which is easily their most convincing MC yet, and by today's standards tolerably sensibly priced. The whole Linn record playing system sounds better balanced, more poised and more articulate than ever before. But the Roksan *Xerxes* has also improved drastically in a number of key areas (including finish, which is now little short of amazing), and at the end of 1987 is arguably better at resolving midband information off disc than any other. It's also happy working with arms the Linn doesn't like (some parallel trackers, the Regas and SMEs...). In the author's opinion though the Roksan/*Ittok* combination is not a happy one.

The Alphason *Sonata* is new and yet to prove its long term worth, but the *HR-100S* tonearm has properties roughly complementary to the others, the motor unit countering a slight dryness in arm balance that combines a truly solid, articulate bottom end with excellent dynamics and resolution. Not as subtle as the Roksan, or as polished as the Linn maybe, but definitely one to watch.

The following Best Buy and Recommended turntables and tonearms combine findings from

the latest reviews (Alvin Gold plus PM on SME) with those from previous editions (Martin Colloms). Further details may be found in *The Directory*.

TURNTABLES BEST BUYS

NAD 5120	\$90
Technics SLDD33	\$110
Rega Planar 2	\$135
Ariston Q Deck	\$140
Thorens TD166 III	\$179
Rega Planar 3	\$188
Systemdek IIII.r	\$199
Ariston RD60	\$219
Acoustic Research EB101	\$220
Logic Tempo/Datum II	from \$240
Manticore Mantra	\$300/\$330
Linn Axix	\$313

RECOMMENDED

Technics SLBD22	\$90
Dual CS 503-1	\$125
Technics SLQD33	\$140
Rotel RP830	\$160
Thorens TD316	\$219
Thorens TD160S Mk IV	\$225
Michell Synchro	\$235
Thorens TD320	\$319
Elite Rock	\$350
Systemdek IV	\$448
Heybrook TT2 with arm	\$528
Pink Triangle PT TOO	\$539
Roksan Xerxes	\$595
Alphason Sonata/HR-100S MCS	\$1,054
Linn Sondeck LP12/Ittok/Troika	\$1,416
Zarathustra Soliloquy	\$1,995
Audio Labor Konstant	\$2,560

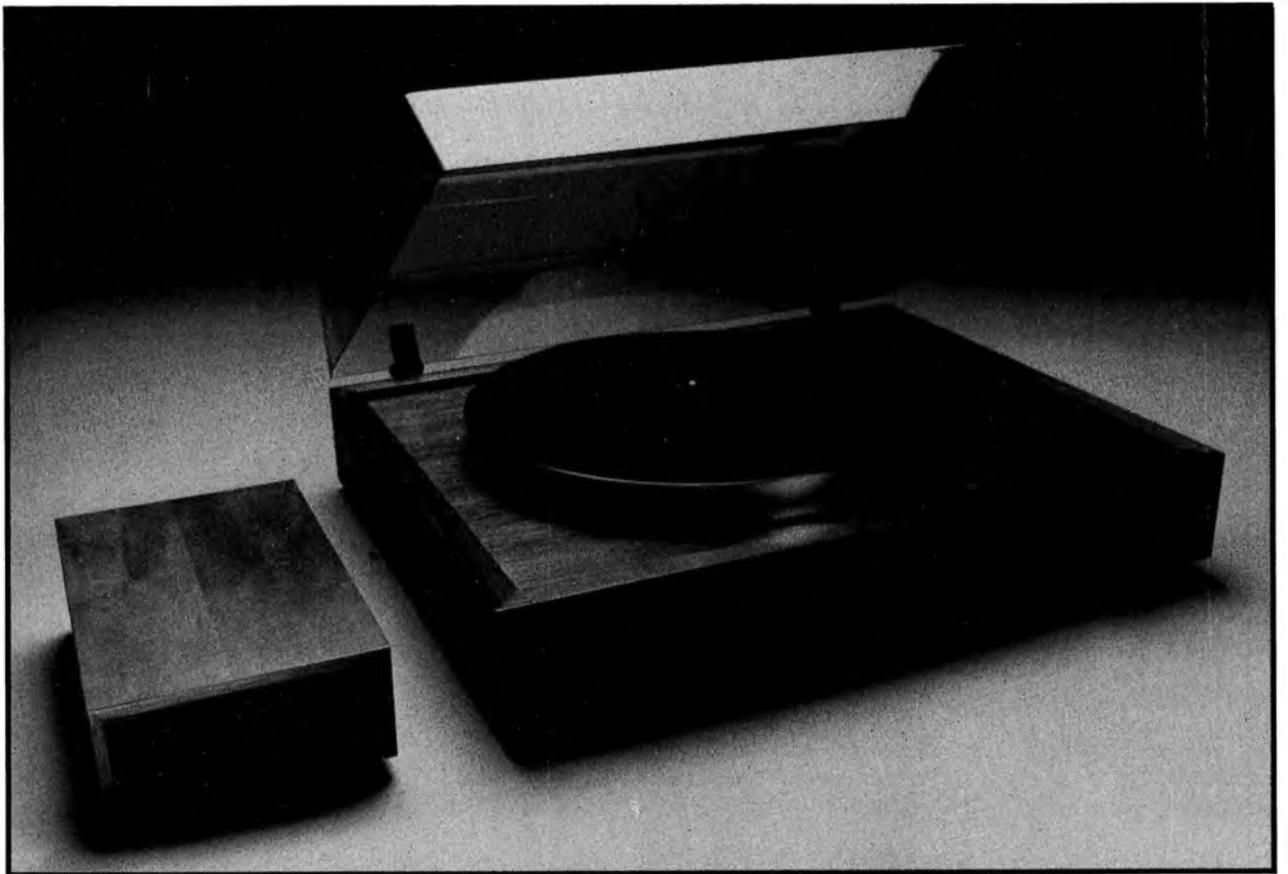
TONEARMS BEST BUYS

Moth	\$65
Rega RB300	\$90
Linn LV Plus	\$129

RECOMMENDED

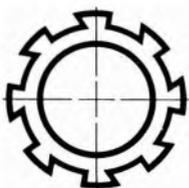
Logic Datum II	\$119
Alphason Delta	\$165
Alphason Xenon	\$210
Logic Datum S	\$230
Kusma	\$349
Alphason HR100S	\$359
Linn Ittok LVII	\$399
Helius Orion 2	\$490
Well Tempered Arm	\$545
SME Series IV	\$675
Eminent Technology	\$960
SME Series V	\$1,138
Airtangent	\$1,698
Goldmund T3F Arm	\$3,850

The World's Reference Record Player



the Xerxes

By Roksan



Xerxes is the most creative and interesting turntable to emerge for some years.

Martin Colloms
HiFi Choice Collection 1987

With three of the finest turntables in the world to compete against (the Oracle fitted with an SME Series V, the Linn fitted with an Ittok, and the SOTA fitted with an old Alphason . . .), the Xerxes appeared to have its work cut out. In the event, its superiority was clear from the outset. It wasn't that it did any individual thing better than the others; no, it did everything better.

Stereophile Vol. 9 No. 3

. . . so you can finish an evening's listening wondering why anybody would want to invent Compact Disc. The second big thing in its favour is that it boogies.

HiFi Answers

. . . Roksan's demonstration. I have simply never heard a more exciting, natural, convincing portrayal of favoured recordings in my life. Period.

Kent Bansford
HiFi Heretic USA

Xerxes is an information retriever of the highest order and its musical coherence is exemplary. It has first class pitch and timing stability and delivers music with a 'master tape' like feel of security . . . IT REALLY IS THAT GOOD.

Malcolm Steward
HiFi Review

. . . quite sincerely, the extent to which the Roksan Xerxes outperformed my reference on this number was staggering . . . You don't have to be one of the world's five or ten top thinkers to realise that 'the reference' record player I refer to above is the Linn Sondek.

Art Dudley
HiFi Heretic USA

. . . (our reference turntables – Elite Rock and Micro SX 555 FVW) are now replaced. Their job is immediately taken over by the fascinating and realistic Xerxes.

Martin Doll
Stereoplay

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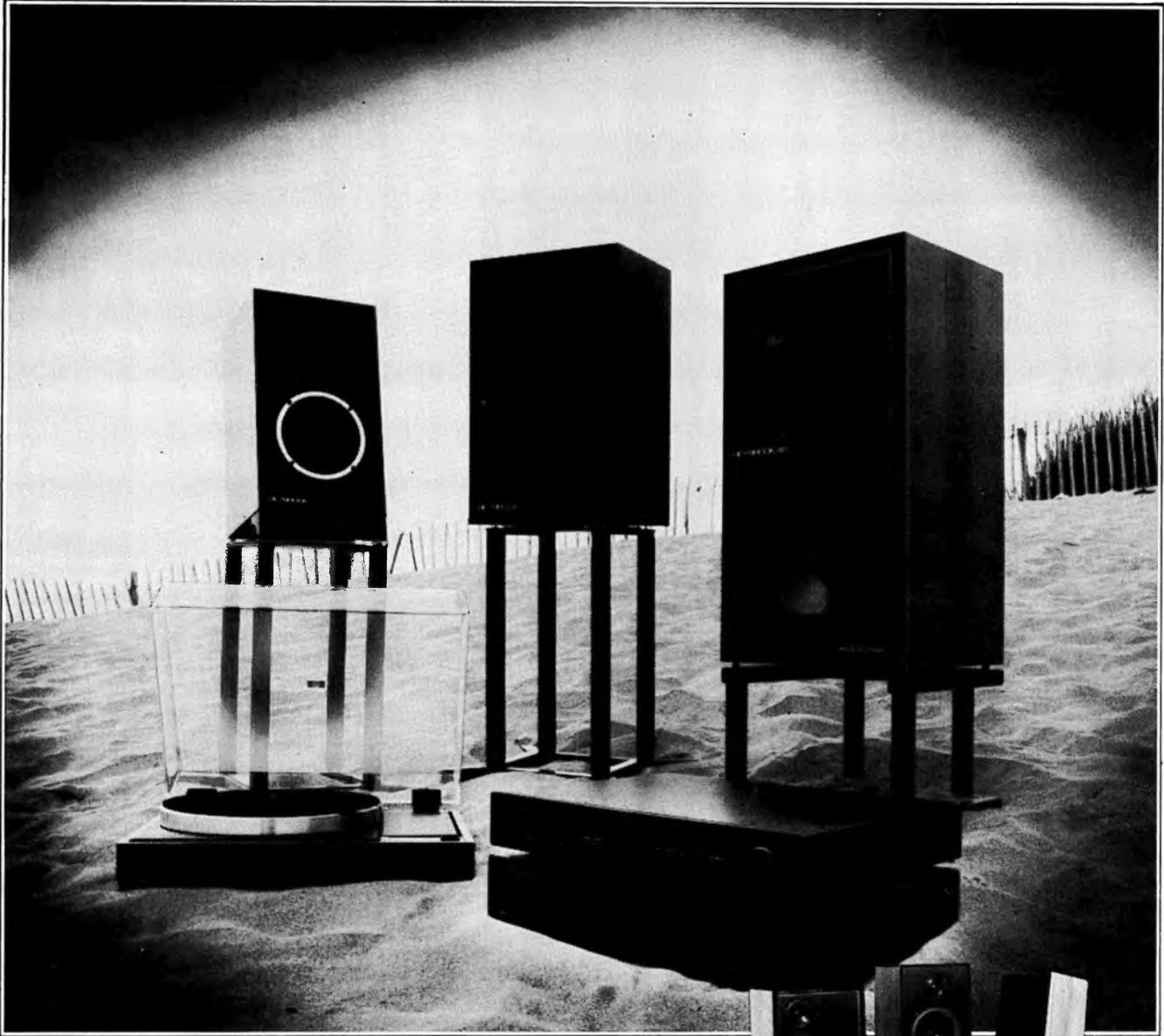
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99



CHOOSING AND USING . . . TUNERS

Radio broadcasts come for free, so it makes sense to take advantage of them. Choosing the right tuner and using it properly is the first step. . .

Not the most glamorous of the hi-fi components, tuners are usually bought on cosmetic grounds, by the 40 per cent or so who choose to partner a previously selected amplifier. Years ago, people bought receivers instead, but these have fallen from favour and fashion.

And at least the separates option allows the tuner to be added later as a system upgrade, and may also allow the customer to choose a level of performance to suit his pocket and interest in the radio medium.

The motivation to buy a tuner must surely relate closely to the characteristics of radio programming in whatever country. And in this respect the UK is very weird indeed – a bizarre combination of Government over-regulation and indecision at the local level alongside a national network widely regarded as the envy of the world. The result is certainly some of the best programming in the world, but biased in such a way that could only exist in a non-commercial operation, and leaving substantial gaps in the balance and depth of popularly-orientated programming.

But for those with broad or specifically classical music tastes, the BBC is one of the few services which continue to transmit substantial amounts of live performance, and this is a powerful reason for contemplating a significant investment in a decent tuner. Given a reasonably decent hi-fi system, radio transmissions of pre-recorded material rarely equal the quality obtainable by reproducing that same source directly in the home; broadcast treatment of LP discs is a particular travesty. Yet the live transmission from studio or concert hall, if sensitively miked and mixed, can produce a spine-chilling realism that transcends other sources in certain respects. It is a treat that should not be overlooked.

BASIC REQUIREMENTS

From the hi-fi perspective, FM (VHF) is the only form of radio which is worth considering, and

the only source of stereo broadcasts in the UK. But many programmes are only available on AM (Medium and Long wave) transmissions, so an FM-only tuner may need the backup of a common or garden transistor radio to cope with the BBC's infuriating habit of trying to squeeze five channels into three FM networks by switching and swapping frequency allocations. There is clearly a powerful argument for looking closely at the FM/AM combination tuner. But do not look too closely, because the quality of the AM sections fitted to most hi-fi tuners is embarrassingly bad. The typical medium priced portable will probably comfortably outclass the hi-fi tuner's AM section, presumably because its portability requires that it works under a wider range of reception conditions.

But frankly – and rather sadly – AM is a dead loss for quality reception in Europe these days, simply because the airwaves are grossly overcrowded with powerful transmitters. To get them all in without even worse interference problems, the stations restrict the bandwidth of the signals they transmit, by rolling off most of the treble range well below the natural range of human hearing, an expediency which deals fidelity a fatal blow. Moreover, AM in the UK remains resolutely monophonic, without even that curiously random and intermittent luxury of FM in stereo provided by the BBC.

THE VITAL ELEMENT

Nostalgia aside, we must accept that FM is it, and then see what is needed to get decent results. In pole position, not too surprisingly, comes the quality of the aerial or antenna. It is a common misconception that you only need a rooftop aerial if you're trying to pull in distant signals over difficult terrain. In fact you may need an even better aerial to get good results in the urban jungle than you do amongst the rolling hillsides, because of the need to get well above traffic and other electrical interference and to avoid the multiple reflection

effects of nearby large buildings.

To get a decent aerial system needs a budget of perhaps 25 per cent of the cost of the tuner, and the attentions of a skilled installation engineer. A knowledge of local terrain and transmission conditions is very important in choosing and siting the aerial, and it makes some sense to look for a radio enthusiast rather than someone who spends 90 per cent of his time pointing TV aerials at the local repeater. But programming preferences can also influence the selection of an aerial, so make sure the contractor is properly briefed.

The ideal aerial for tuning to local stations is not the ideal for long distance reception. The final choice will depend upon the range you wish to receive and the direction of the relevant transmitters. It may be possible to get adequate local signals from a single fixed antenna of two to four elements, though the disposition of transmitters may sometimes require the addition of an aerial rotator. Long distance reception needs a higher gain multi-element antenna, which has a commensurately 'tighter' reception beam, and a rotator will be that much more useful.

It is also worth pointing out that aerial signal has to be many times stronger for the tuner to produce a stereo rather than a mono output. If you want stereo radio, you do need a real aerial, and preferably not something inadequate that needs a booster along the cable in order to make the stereo beacon light up.

THE TUNER ITSELF

Tuners may be very simple or highly complex. The bare necessity is an aerial connection and a couple of sockets for passing the stereo signal on to the amplifier, plus some sort of device for tuning in the stations, but the ingenuity of manufacturers has come up with all manner of additional facilities to enhance the performance or haffle the uninitiated. The opposite extremes are admirably illustrated by comparing two well-respected models which cost the best part of

£1,000, one from the UK and the other from the Continent. The former has no apparent frills at all, carrying out functions like muting entirely automatically; the other gives an almost infinite number of options under manual or automatic control, with a front panel to rival the complexity of a personal computer. Both have their loyal adherents, yet the philosophical rift is so great it is hard to see how the purchaser of one would have even considered the other.

Tuners consist of two distinct sections. The 'front end' receives most of the attention, and is the part which is responsible for capturing the wanted signal from the aerial – and more important, is responsible for rejecting all the other signals coming down the aerial, either interference or from stations on other frequencies which are often many times more powerful than the wanted signal. The *Choice* tests analyse the front end RF performance in some considerable detail.

Because specialist tuners have traditionally been designed by specialist radio engineers, most of the attention has been lavished on the receiving 'front end' circuitry. Yet the broadcast system in the UK is such that most locations receive a reasonably strong transmission signal for a limited number of stations. UK hi-fi manufacturers have been busily getting back into the tuner market after years of Japanese domination by emphasising the superior sound of simple, carefully designed audio circuitry – in much the same way as they have creamed off some of the top end of CD player sales. The paradoxical result is that some of the better sounding tuners often have comparatively weak RF performance, but this will only prove a liability under abnormally difficult reception conditions. The sheer complexity of the tuner with exceptional RF capabilities can prove a handicap on basic sound quality. The customer has the option of going in either direction, according to his needs, preferences, and local signal conditions.

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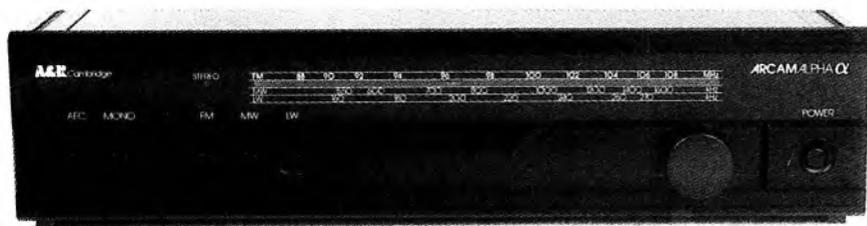
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A&R ARCAM ALPHA

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BEST BUY



transistor radio – and plays it through the main hi-fi system.

LAB REPORT

Sensitive and with good signal-to-noise ratios, the *Alpha* measured pretty respectably throughout. Stereo separation and harmonic distortion were a bit below par, and pilot tone rejection dropped to -31 dB with modulation.

CONCLUSIONS

This tuner has successfully established a distinctly 'British' identity, with attractively classic ergonomics. A modest price plus sound quality comfortably better than most are further reasons for a Best Buy.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/Stereo	3 μ V/30 μ V
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	-68dB/-62dB
Muting threshold, R.F. level	2.5 μ V
Alternate channel selectivity	63dB
Pilot tone rejection, 19kHz/38kHz	66dB/55dB
AM rejection	-60dB
Capture ratio	1.3dB
Total harmonic distortion at 100% mod,	
1kHz, mono/stereo	-43dB/-43dB
Stereo separation, 1kHz/5kHz/10kHz	30dB/28dB/24.5dB
Output level, 100% modulation	840mV
Dimension (width, height, depth)	40 x 9.7 x 22.5cm
Typical price inc VAT	£149
<i>Reprinted from issue 50.</i>	

Matching the Arcam *Alpha* and *Delta*, this is an analogue tuner, covering FM and AM bands. The 'scale and pointer' presentation has distinct advantages over a digital readout as does a conventional watchface over the digital equivalent.

Tuning is facilitated by a neat LED indicator in the indicator pointer. This emulates the traffic light by changing from red *via* orange to green when a station is correctly tuned, and the frequency may then be held by selecting AFC (automatic frequency control). Radio specialists could argue that the resolution and accuracy of the pointer/scale is a little imprecise, but this will not worry the user who should in any case 'fine-tune' by ear. The tuning knob itself lacks any real flywheel action, but then one hardly has the right to expect this at a near 'budget' £140. The remaining buttons select FM and long and medium wave AM, plus mono/stereo.

SOUND QUALITY

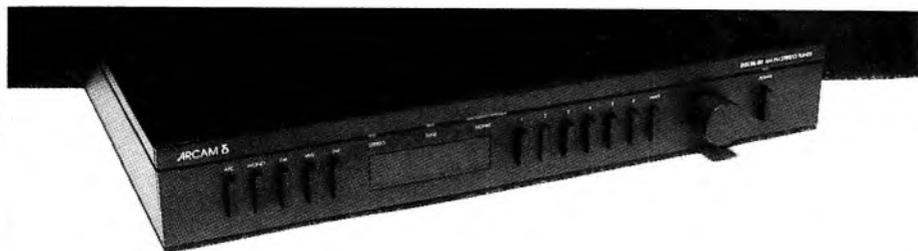
FM sensitivity seemed fine, with decent stereo from around 500 μ V aerial input, albeit with a slight whistle, and fine quality stereo from 1mV upwards. The sound quality itself was comfortably in the good class – less than the best but a fine result for the price nonetheless. It was described as inherently pleasant and musically relaxing, if a trifle bland and lacking 'air' and 'drama'.

AM was rather insensitive with noticeable background noise which restricts dynamic range, but had the significant aural advantage of being able to 'fine-tune' the tuning envelope away from the station centre transmission frequency for the best trade off between balance and dynamics: as such results were amongst the most acceptable from a far from inspring range of alternatives. At least this hi-fi tuner gives an AM performance to match a good

A&R ARCAM DELTA

A&R CAMBRIDGE LTD, DENNY INDUSTRIAL CENTRE, WATERBEACH, CAMBRIDGE CB5 9PB. TEL: (0223) 861550.

BEST BUY



Unlike the all-analogue *Alpha* tested in the last issue the more expensive *Delta* has a digital display and features presets alongside the traditional analogue tuning circuitry. It is housed in an attractive full width low profile case with a well designed and easy to use front panel. Manual tuning uses a large flywheel-assisted knob.

Twelve presets are provided – 6 for FM and 6 for AM (covering both MW and LW). Other front panel controls are restricted to band selection, AFC on/off and mono/stereo switching. The tuning indicator follows traffic light protocol.

LAB REPORT

As one might expect, the *Delta* measures rather better than the *Alpha* in most respects. Especially in stereo, sensitivity was very good, and signal-to-noise ratio was fine. There was little cause for complaint with any of the other

measurements, although alternate channel selectivity was below average and the adequate stereo separation could have been better. The muting threshold was set a little too low in our opinion, and a mild rolloff was present in the treble, just 1dB down at 13kHz.

SOUND QUALITY

With a near silent background, free from spurious whistles and the like, *Delta* delivered a lively sound which was considered a most competent copy of the original source, allowing for transmission losses. A slight loss of treble 'sparkle' was evident, but the mid range showed pleasing ambience and depth, and the sound was considered robust and clear throughout the frequency range. The soundstage was wide and well-focused, and the sound as a whole was imbued with musical drive and pace.

AM reception was outstanding compared with usual standards, and the sound quality

ranking was high. The front end showed good dynamic range, and the sound was clearer, better balanced and less coloured than usual. The combination of good results for both AM and FM put the Arcam *Delta* in a strong position.

CONCLUSIONS

Whereas the cheaper *Alpha* sounded good, the *Delta* certainly provides worthwhile improvements. Quiet backgrounds from 500 μ V input and upwards and better than average noise at 100 μ V mean it is a sensitive model. The AM sound was quite outstanding considering the limitations of the medium. In all this is a high performance design that deserves strong recommendation.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/Stereo	2.6 μ V/18 μ V
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	75dB/68dB
Muting threshold, R.F. level	1.5 μ V
Alternate channel selectivity	50dB
Pilot tone rejection, 19kHz/38kHz	65dB/57dB
AM rejection	64dB
Capture ratio	1.5dB
Total harmonic distortion at 100% mod,	
1kHz, mono/stereo	-54dB/-53dB
Stereo separation, 1kHz/5kHz/10kHz	35dB/35dB/32dB
Output level, 100% modulation	510mV
Channel balance, stereo	0.1dB
Dimension (width, height, depth)	43 x 6.0 x 29.5cm
Typical price inc VAT	£260

CREEK CAS 3140

CREEK AUDIO SYSTEMS, 2 BELLEVUE ROAD, FRIERN BARNET, LONDON N11 3ES. TEL: (01) 368 4425.



Matching the 4040 in presentation, the £140 FM-only 3140 has some nice touches in the black wooden sleeve made up into a quality case with rounded front edges. The tuned frequency is displayed on a large green digital frequency readout, alongside a decent sized flywheel-assisted tuning knob.

A row of four pushbuttons provide useful functions, some rarely found on such a low cost model, including 'narrow/wide' and 'local/DX' to optimise reception for short or long range reception, plus mono/stereo and AFC on/off. The fact that the stereo beacon glows green over a switch labelled mono is a touch idiosyncratic, but a useful centre-tune indicator is also fitted.

SOUND QUALITY

Sensitivity was very good, with very low noise stereo available from a modest 500µV aerial input, and with added flexibility through the

narrow/wide feature. The sound quality was very well received, rating very good and showing many of the favourable characteristics of state of the art models at far higher prices. There was little to criticise apart from a slight 'thickening' of textures and slight rolloff detectable at high frequencies, but much praise was awarded for the clear, firm sound with good bass 'weight' and fine focus.

LAB REPORT

Giving fine results for sensitivity, signal-to-noise, pilot tone and AM rejection, selectivity and capture ratio, the RF side of this fine tuner is beyond reproach. On the audio side the response was flat enough, with a gentle low frequency rolloff, but distortion was only average and stereo separation rather below par. The DX/local selector had only a marginal effect. The output level is lower than most, so a check on amplifier compatibility will be worthwhile.

CONCLUSIONS

The Creek 3140 emerges as a true front rank performer with excellent ergonomics and audiophile sound quality, all at a near budget price – clearly a strong Best Buy amongst separate tuners, albeit with the minor handicap of covering FM only.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	3µV/35µV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	74dB/-65dB
Muting threshold, R.F. level	4µV
Alternate channel selectivity	100dB
Pilot tone rejection, 19kHz/38kHz	66dB/100dB
AM rejection	66.5dB
Capture ratio	1.3dB
Total harmonic distortion at 100% mod.	
1kHz, mono/stereo	-52dB/-52dB
Stereo separation, 1kHz/5kHz/10kHz	24dB/26dB/27dB
Output level, 100% modulation	233mV
Dimension (width, height, depth)	42 x 17.5 x 6.2cm
Typical price inc VAT	£150

Reprinted from issue No. 50.

HARMAN KARDON TU920

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



The TU920 is a smartly styled, digitally synthesised quartz-locked tuner. Sixteen presets for AM or FM stations are provided via 9 keys grouped together on the left of the central frequency display, the signal strength LEDs and tune indicator.

Tuning can be either automatic, or manual via the large rotary switch at the right end of the panel, which springs back to the centre position when released. Also of interest is an 'active tracking' function whose circuitry is designed to reduce interference from adjacent stations; this should only be used if interference is experienced.

LAB REPORT

Sensitivity and signal-to-noise ratio were both considered good, but the muting threshold was set too low at 13µV. Active tracking had little effect on the alternate channel selectivity, which measured exceptionally well in any case,

but it worsened the measured capture ratio from a moderate 3dB to 8.5dB.

AM rejection was good, but pilot tone rejection was only average. Distortion measurements were fine but stereo separation deteriorated with increasing frequency to a mediocre 22dB at 10kHz. Frequency response was flat up to 10kHz and then exhibited a 1dB bump, trailing off again above 20kHz.

SOUND QUALITY

This upmarket model did not perform to the anticipated standard. Sound quality rated only 'average'. Pleasant in overall character, it was also considered a bit 'flat' and lacking in 'life', clarity and ambience. Violin tone seemed on the thin side, while the bass lacked punch and dynamic drive. Improved stereo depth would also have helped matters.

AM was rated poorer than average due to 'birdies' and whistles. However, through this

noise the bass was clearly quite good, and the response was obviously more 'open' than usual.

CONCLUSIONS

High quality sound is prerequisite for a design at this price level but the HK did not really make the grade on either AM or FM bands, even though the lab performance was fine.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	3.0µV/33µV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	72dB/66dB
Muting threshold, R.F. level	13µV
Alternate channel selectivity	80dB
Pilot tone rejection, 19kHz/38kHz	33dB/52dB
AM rejection	66dB
Capture ratio	3dB (8.5dB active)
Total harmonic distortion at 100% mod.	
1kHz, mono/stereo	-48dB/-48dB
Stereo separation, 1kHz/5kHz/10kHz	41dB/26dB/22dB
Output level, 100% modulation	828mV
Channel balance, stereo	0.29dB
Dimension (width, height, depth)	44.3 x 6.8 x 36cm
Typical price inc VAT	£299

HITACHI FT-MD5500

HITACHI SALES (UK) LTD, HITACHI HOUSE, STATION RD., HAYES, MIDDX UB3 4DR. TEL: (01) 848 8787.

BEST BUY



This is a midi sized version of the established, full-width Hitachi advanced AM/FM digital tuner design tested a year ago; complete with real wood side panels, it looks and feels more substantial than the majority. An impressive range of features includes choice of bandwidth for both the RF (single/double) and the IF stages (narrow/wide) to optimise signal capture, and auto-quieting to improve S/N. These can either be set manually or *via* the new FCCS (field condition computer system), and may be programmed into the 16 AM or FM memory presets. The display has 'flags' for everything, and can be switched between frequency and signal level (displayed in 1dB steps). Tuning is automatic or manual and stereo/mono may be switched manually.

LAB REPORT

The Hitachi produced a good set of results, complicated somewhat by the wide range of

alternative modes available. The tuner was sensitive and displayed good signal-to-noise ratios throughout. Muting thresholds and pilot tone rejection were fine, but AM rejection could be improved. Alternate channel selectivity and capture ratio are dependent on the settings and measured as expected. Frequency response exhibited a very slight treble rolloff above 8kHz.

SOUND QUALITY

This powerful tuner achieved very quiet stereo backgrounds at decent signal strengths, with really clean audio above 500 μ V and good 'birdie' rejection. The FM sound quality was close to the best in the report, providing very good treble clarity and purity, well detailed and with a strong bass, plus a well-focused midrange. Some slight 'boxy' midrange congestion was noticeable on complex passages. Stereo images were wide and stable.

This model was above average on the AM band. Noise levels were lower than usual and the sound was fairly open and clean, with noticeable freedom from the usual awful whistles. The AM front end had a good dynamic range and handled a wide range of signal levels.

CONCLUSIONS

This fairly expensive upmarket tuner proved to be a sophisticated performer, with a sound quality to match its 'computer intelligent' automatic reception controls. Highly versatile with a station strength indicator of DX quality, this model would appeal to a station-seeking radio enthusiast yet also delivers genuine hi-fi quality.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	1.9 μ V/22 μ V
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	75dB/63dB
Muting threshold, R.F. level	single 8.5, double 12 μ V
Alternate channel selectivity	wide 27, narrow 74dB
Pilot tone rejection, 19kHz/38kHz	-55dB/-100dB
AM rejection	50dB
Capture ratio	1.5dB
Total harmonic distortion at 100% mod,	
1kHz, mono/stereo	typically -69dB/-67dB
Stereo separation, 1kHz/5kHz/10kHz	67dB/64dB/50dB
Output level, 100% modulation	1225mV
Channel balance, stereo	0.1dB
Dimension (width, height, depth)	37 x 8.5 x 28cm
Typical price inc VAT	£230

JVC FK-1100

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



We had some problems with our first *FK-1100* sample which was considered poor on audition and returned weak stereo separation on the test bench. The second sample proved much better and is hopefully more representative.

This fully featured digital AM/FM tuner offers many microprocessor-aided functions, including preset tuning for 40(!) stations each of which can be named (up to 6 characters), as well as the more conventional manual tune and auto seek. When preset stations are selected, the chosen name appears on a display which can also be switched to indicate signal strength up to a max of 100dB. There is a choice of RF sensitivity, IF bandwidth, and two aerial inputs. A QSC (quiet slope control) circuit reduces noise on low strength signals, automatically switching off if signal strength rises. Another feature is the compu-link control system which provides central remote control when connected in compatible JVC systems.

LAB REPORT

Good performance is available in all respects, many of our measurements depending on the optional manual settings. The *1100* was fairly sensitive on the DX setting, while 'local' provided sensible attenuation. Rejection of pilot tones and AM signals was reasonably good, and the signal-to-noise, alternate channel selectivity and capture ratio figures are respectable. Distortion and stereo separation show no cause for complaint, and the frequency response was flat up to -1dB at 15kHz.

SOUND QUALITY

Just making the 'good' class, this sophisticated model needed extensive auditioning due to the variety of alternative settings, several of which subtly altered the sound quality. The audibility of low level 'birdies' at signal strengths below 1mV is one weakness which could have been

better for the money. The *1100* provided distinctly good bass - tighter and deeper than usual - while the overall character was good, though the stereo soundstage showed a mild loss of width and depth. Transients were mildly dulled, and the midrange could have been a little more transparent.

The AM performance was rated below average, with a 'slurred' treble, a muffled effect, and some audible high pitched heterodyne whistles in the background.

CONCLUSIONS

Although this tuner has some interesting luxury features, it did not deliver sufficient lab or listening room performance to qualify for recommendation.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	(DX) 2.9 μ V/40 μ V (local) 20 μ V/200 μ V
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	75dB/66dB
Muting threshold, R.F. level	15/19 μ V local; 2.5 μ V DX
Alternate channel selectivity	68dB
Pilot tone rejection, 19kHz/38kHz	50dB/70dB
AM rejection	60dB
Capture ratio	1.5dB wide; 5.5dB narrow
Total harmonic distortion at 100% mod,	
1kHz, mono/stereo	-65dB/-58dB
Stereo separation, 1kHz/5kHz/10kHz	47dB/40dB/28dB
Output level, 100% modulation	1131mV
Channel balance, stereo	0.04dB
Dimension (width, height, depth)	43.5 x 10 x 28.5cm
Typical price inc VAT	£355

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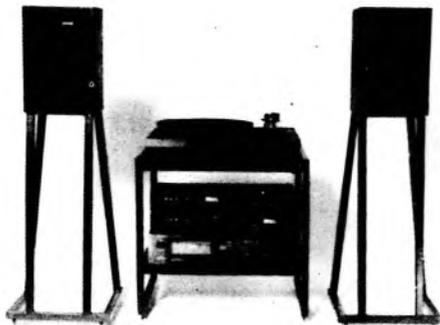
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THE SPECIALISTS

MUSICAL FIDELITY T1

MUSICAL FIDELITY LTD, UNIT 16, OLYMPIC TRADING ESTATE, FULTON RD., WEMBLEY HA9 0ND. TEL: (01) 900 2999.

RECOMMENDED



The T1 is an analogue, manual FM-only tuner styled to match the A1 amp and other family members. The tuning dial set low on the front panel is recessed and cannot be viewed clearly from above. That aside, the dial was reasonably attractive and well calibrated. The unit is easy to operate with only a tuning knob and on/off switch visible. The 4 x 3 LED matrix tuning/signal strength meter is set alongside the dial with the stereo indicator light. The centre (green) LEDs indicate signal strength and the outer (red) LEDs direct towards centre tune.

The back panel has the aerial socket plus two sets of phono outputs, one fixed and the other variable by an adjacent volume control.

LAB REPORT

The T1 mutes early at an RF level of 140µV on stereo signals, precluding measurement of stereo sensitivity for a lower 50dB signal-to-noise ratio; mono sensitivity was good.

Ultimate signal-to-noise ratios were respectable and most of the other measured results were rated as good. The only weakness on our sample was alternate channel selectivity, but this was deemed satisfactory even so. The frequency response exhibited a treble lift above 5kHz peaking 1dB up to 12kHz before falling rapidly beyond 15kHz.

SOUND QUALITY

The T1 scored highly on sound quality, rating the best in the new test group by a short head. Providing a close copy of the original sound source, it sounded more like a good pre-amplifier than a tuner, with a high level of clarity and transparency, and a lively, open midrange with no perceptible loss of dynamic drive. (Tuners often tend to sound slower and more confused than the original source.) Marginally bass 'light', and with a hint of excess treble, this tuner delivered large stereo sound-

stages, with considerable width, depth and fine focus.

Aside from some reception interference problems with a nearby CB transmitter, the T1 delivered quiet backgrounds, especially at higher signal strengths above 5mV.

CONCLUSIONS

This tuner requires a healthy input signal from a good aerial for the best performance, whereupon it can deliver a top class sound with very low distortion, good separation and low noise levels and so justify its highish price. If you do not mind the ergonomics and the need for an eye level site to see the tuning indicator clearly, it may be strongly recommended.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	5µV/see text
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo (1mV)	73dB/63dB
Muting threshold, R.F. level	140µV
Alternate channel selectivity	53dB
Pilot tone rejection, 19kHz/38kHz	59dB/63dB
AM rejection	56dB
Capture ratio	1.75dB
Total harmonic distortion at 100% mod,	
1kHz, mono/stereo	-67dB/-68dB
Stereo separation, 1kHz/5kHz/10kHz	43dB/42dB/41dB
Output level, 100% modulation	571mV
Channel balance, stereo	0.04dB
Dimension (width, height, depth)	41 x 6.1 x 25cm
Typical price inc VAT	£299

MERIDIAN 204

BOOTHROYD STUART, 13 CLIFTON RD., HUNTINGDON, CAMBS PE18 7EJ. TEL: (0480) 57339.



This FM-only tuner, designed and styled to complement the rest of the Meridian range fits in perfectly with their modular 207 system. Each unit has a small frontal area, being only 16cm wide but making up for this in depth. The black glass front panels have yellow lettering and glowing function buttons - well executed and stylish but possibly not to everyone's taste.

A clock and timer are part of the package, so the digital display has several functions which are selected as required. Flags are also provided for stereo and tune. Tuning is manual or automatic, and there are six station presets. The only other front panel control is a mono/stereo button. The back panel has the normal aerial and audio sockets together with DIN sockets to take the Meridian control bus. The latter will eventually allow this tuner/timer to participate in a 'round the house' remote control system alongside the CD player and active loudspeakers.

LAB REPORT

Frequency response was perfectly flat up to 15kHz, with a droop of less than 0.5dB at 20kHz. Pilot tone and AM rejection were both good, distortion was low and stereo separation reasonable. Alternate channel selectivity and capture ratio were satisfactory and the muting threshold was set to a sensible 30µV. The unit demonstrated adequate sensitivity, but the signal-to-noise ratio can only be considered below par. Output was quite healthy at 780mV and channel balance measured an accurate 0.09dB.

SOUND QUALITY

This tuner's RF performance was a little below par in requiring signal levels above 1mV to clear minor 'birdie' tones from the audio output, and even then it did not provide a particularly quiet background, which was borne out by the lab tests.

Rated a little above average for overall sound quality, this is rather unexceptional considering the high price. The midrange seemed a little dominant with some congestion on more complex program, while the treble could have done with more 'air' and 'sparkle'. Bass impact was 'softened' while the upper bass was considered a little 'boxy'. Stereo images were well focused with good width, but depth was impaired.

CONCLUSIONS

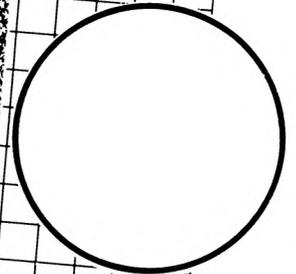
This interesting 'system' tuner did not offer quiet enough backgrounds or a high enough standard of sound quality to be recommended as a standalone player at its highish price.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	7.5µV/30µV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	63dB/57dB
Muting threshold, R.F. level	30µV
Alternate channel selectivity	56dB
Pilot tone rejection, 19kHz/38kHz	53dB/>70dB
AM rejection	65dB
Capture ratio	2.75dB
Total harmonic distortion at 100% mod,	
1kHz, mono/stereo	-60dB/-59dB
Stereo separation, 1kHz/5kHz/10kHz	40dB/31dB/25dB
Output level, 100% modulation	780mV
Channel balance, stereo	0.09dB
Dimension (width, height, depth)	16 x 9.5 x 32cm
Typical price inc VAT	£405

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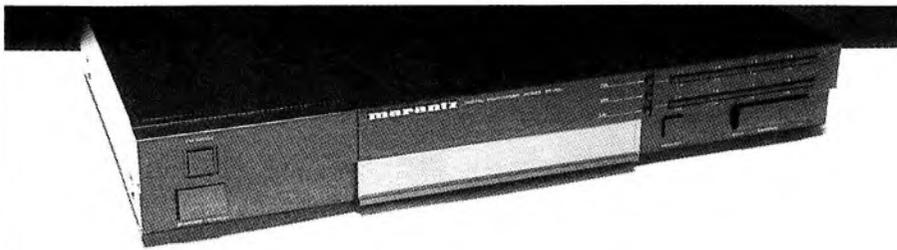
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MARANTZ ST-35L

MARANTZ AUDIO (UK) LTD, 15-16 SAXON WAY IND. EST., MOOR LANE, HARMONDSWORTH, MIDDX UB7 0LW. TEL: (01) 897 6633.



The mid-priced *ST-35L* is a full size MW/LW/FM digital synthesis model with only the basic functions expected from a tuner of this type. These include auto/manual search, 16 presets for FM stations and 8 for AM, plus signal strength and stereo indicator lights. The styling is a little different from normal, the display centrally sited on the lower half of the front panel, the indicator lights on either side and the majority of controls on the right.

An AM loop aerial is provided, plus sockets and connectors for normal external aerials.

LAB REPORT

Frequency response is ruler flat up to 15kHz and both stereo and mono sensitivity was good. Signal-to-noise ratio was fine, alternate channel selectivity was excellent, but the 3.5dB capture ratio is a little below par. The muting threshold was set too low, pilot tone rejection was adequate, and AM rejection was consi-

dered very good. Total harmonic distortion and stereo separation were just satisfactory, output levels were usefully on the high side, while channel balance was good.

SOUND QUALITY

The sound quality of a mid-priced unit should be better than budget models, but this was not the case. Our FM rating was rather below average, while the AM sound was really poor. The '35 delivered nice quiet FM stereo backgrounds from 1mV upwards, but the treble was 'spitchy' and sibilant on vocals, the upper mid could show some 'brittleness' on occasion, and some congestion of fine detail was apparent at lower mid frequencies. The bass betrayed a hint of 'boom', and although the stereo staging was quite good, there could have been more depth.

AM reception was not particularly sensitive and showed a below average ability to deal with

a wide range of signal strengths. Too many heterodyne whistles were present, together with a hissy background and a thick 'ringing' tonal quality – distinctly unpleasant.

CONCLUSIONS

Although the measured performance of this tuner was pretty good, the sound quality was just satisfactory on FM and degraded to 'poor' on AM, so recommendation is hardly appropriate.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	4µV/35µV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	74dB/67dB
Muting threshold, R.F. level	6.7µV
Alternate channel selectivity	80dB
Pilot tone rejection, 19kHz/38kHz	-42dB/-47dB
AM rejection	68dB
Capture ratio	3.5dB
Total harmonic distortion at 100% mod.	
1kHz, mono/stereo	-46dB/-42dB
Stereo separation, 1kHz/5kHz/10kHz	30dB/27dB/25dB
Output level, 100% modulation	1230mV
Channel balance, stereo	0.17dB
Dimension (width, height, depth)	42 x 6.9 x 29cm
Typical price inc VAT	£160

NAIM NAT 01

NAIM AUDIO LTD., SOUTHAMPTON ROAD, SALISBURY SP1 2LN. TEL: (0722) 332266.



The £1,098 two-box *NAT01* follows the usual Naim tradition of simplicity first and foremost, and a minimum of user adjustment. The power supply contains only a switch in preparation for any additional tuning modules, and so may be sited out of the way for the time being. The tuner itself just has a single large knob and a digital frequency display, backed up by two indicator lights, though the tuning itself uses analogue varicaps, unusually with a tuning head made by Naim Audio themselves. Though lacking presets, the tuning knob has a fine traditional flywheel action.

Most of the necessary functions like stereo/mono switching are performed automatically. The lower indicator arrow comes on to indicate signal, while the upper is added when the tuner switches to stereo, while the frequency display itself brightens perceptibly when the station is precisely tuned.

LAB REPORT

The *NAT01* performed most satisfactorily on the lab tests. The frequency response was flat up to around 10kHz, then beginning an initially gradual roll-off (-2dB at 15kHz).

The various RF measurements indicated a high quality carefully aligned 'front end', entirely effective at capturing wanted and rejecting unwanted aerial input and showing evidence of careful quality control. The automatic muting threshold is set a little higher than most, so this is clearly not a tuner for those who wish to explore the airwaves and pull in weak, distant stations.

SOUND QUALITY

There may be better sounding tuners around somewhere in the world, but we have yet to hear one. The sound is recognisably 'Naim-like', but *NAT01* provides an unusually transparent

window onto the broadcasting studio. This can be something of a two-edged sword: one is sometimes 'discomforted' by the generally mediocre quality of much recorded music output, but when a real live broadcast comes along the difference is immediately, spine-tinglingly obvious – even if the music isn't to taste, it is difficult not to stay tuned. And radio drama takes on a dynamic realism quite devoid of the artificiality that most tuners seem to introduce.

CONCLUSIONS

Clearly meriting recommendation, the crucial question will then be whether or not radio programming rates an expenditure of £1,098.

TEST RESULTS

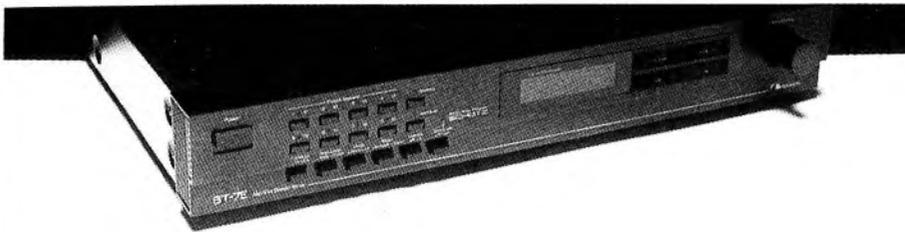
Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	7µV/70µV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	72dB/66dB
Muting threshold, R.F. level	55µV
Alternate channel selectivity	-66dB
Pilot tone rejection, 19kHz/38kHz	-54dB/-76dB
AM rejection	-73dB
Capture ratio	2.3dB
Total harmonic distortion at 100% mod.	
1kHz, mono/stereo	-50dB/-60dB
Stereo separation, 1kHz/5kHz/10kHz	35dB/37dB/35dB
Output level, 100% modulation	200mV
Channel balance, stereo	-0.02dB
Dimensions (w x d x h)	(21 x 36 x 8.5) x 2cm
Typical price inc VAT	£1,098

First reviewed: The Collection 1987.

RECOMMENDED

NAKAMICHI ST-7E

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



Individualistically styled, with a tuning knob (almost extinct on Japanese digital tuners) to the right and the presets to the left of a central display, this is an upmarket digital tuner with all the normal functions (16 AM/FM presets etc.) plus some more unusual and useful ones. Most interesting is probably the Schotz noise reduction system which provides an effective increase in tuner sensitivity for stereo reception. It is possible to switch between two FM aerials, and the signal strength threshold to which the auto tune facility responds can also be selected. The meter can be set to 'signal' (signal strength) or 'multipath' (level of multipath interference), and the audio output level can be controlled individually for each channel.

LAB REPORT

This tuner measured very well on the whole. Sensitivity was very good especially when the Schotz circuit was in operation. Signal-to-noise

ratio, alternate channel selectivity, pilot tone rejection and AM rejection were all very good. Capture ratio was less inspiring and the muting threshold was set to an extremely low $0.25\mu\text{V}$. Harmonic distortion was rather higher than expected, and channel separation only adequate.

SOUND QUALITY

The Schotz circuitry complicates the issue here, since it provides a remarkable improvement in fidelity with low signal strengths, effectively extending the range and sensitivity of the model by a considerable degree. However, this is achieved with some loss in quality at normal signal strengths.

Rated good for FM sound quality, and exceptional on low level signals (*eg* $25\text{-}200\mu\text{V}$), the Nakamichi showed nicely quiet backgrounds with a generally neutral and dynamic copy of the original source. Louder more complex mus-

ical sections could, however, have been clearer in the upper midband. Stereo images were good on the whole, but depth, rated just 'good', could have been better with a model at this high price level.

AM rated rather above average, with a more open character than usual and with a clean sounding passband. Backgrounds were relatively hiss- and whistle-free, while RF signal handling was also above average.

CONCLUSIONS

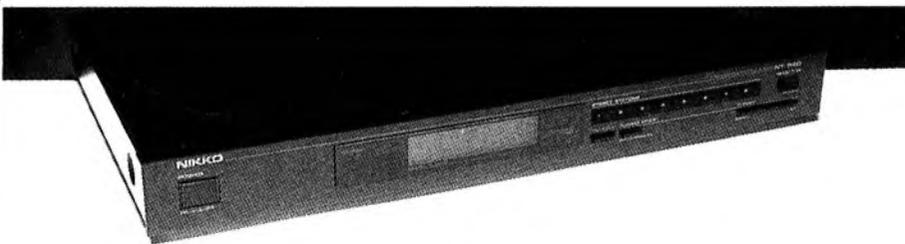
In measurement terms the Nakamichi was not exceptional, though the Schotz did provide a powerful improvement on weak signals. As such, this tuner is something of a special case.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	1.2 μV /12 μV (35 μV without Schotz)
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	78dB/70dB
Muting threshold, R.F. level	0.25 μV
Alternate channel selectivity	75dB
Pilot tone rejection, 19kHz/38kHz	87dB/89dB
AM rejection	72dB
Capture ratio	2.7dB
Total harmonic distortion at 100% mod.	
1kHz, mono/stereo	-44dB/-42dB
Stereo separation, 1kHz/5kHz/10kHz	40dB/32dB/27dB
Output level, 100% modulation	2230mV (max)
Channel balance, stereo	0.16dB
Dimension (width, height, depth)	43.5 x 7.3 x 33.5cm
Typical price inc VAT	£750

NIKKO NT-540

NIKKO UK, 150 REGENT STREET, LONDON W1R 5FA. TEL: (01) 439 6288.



Nikko may be a new name to some, but they are a long established Japanese brand that used to be available in the UK until a few years ago, and have now decided to have another go. This black, slimline AM/FM (no LW) digital tuner is unobtrusively styled to match their amplifiers, but will not look out of place in other systems.

All the usual functions are provided: 8 FM and 8 AM presets, manual or auto scan tuning, plus auto stereo reception. The centrally located display provides the necessary frequency information and the number of the preset selected, and there are also flags for tuning mode, stereo, waveband, and memory. The back panel carries screw terminals for 300ohm and 75ohm FM plus AM aerial inputs, along with phono audio outputs.

LAB REPORT

Though this one was not of the more sensitive designs, it should prove adequate enough in

the domestic environment, and the signal-to-noise ratio was quite good given a reasonable signal level. The muting level was set too low and alternate channel selectivity was just adequate. The frequency response curve was flat above 200Hz but showed some bass rolloff, being 1dB down at 50Hz and 3dB down at 20Hz. All the other measured results were very good.

SOUND QUALITY

This modestly priced tuner gave a reasonably quiet background at higher aerial strengths, but some 'birdies' were audible below 4mV input, and these had become chronic by 100 μV in stereo mode. FM audio quality was moderately 'muffled', with some lack of treble definition and precision. This tuner was not very good at conveying the atmosphere and drama of a performance, and stereo depth was impaired. Some coloration was evident as a degree of midrange 'congestion' and a 'wiry'

string tone. Stereo focus lacked stability, particularly in the treble.

The AM band was considered fairly pleasant, albeit rather 'thick' and dull sounding. The RF dynamic range and sensitivity were quite good, while whistle suppression was good, contrasting with the FM result.

CONCLUSIONS

Modestly priced, this Nikko performed respectably on measurement. However, the sound quality was rather unexceptional – indeed below average on FM – and the suppression of odd whistles should have been better at lower aerial signal strengths.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	4.5 μV /80 μV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	78dB/66dB
Muting threshold, R.F. level	12 μV
Alternate channel selectivity	55dB
Pilot tone rejection, 19kHz/38kHz	61dB/70dB
AM rejection	69dB
Capture ratio	1.6dB
Total harmonic distortion at 100% mod.	
1kHz, mono/stereo	-60dB/-60dB
Stereo separation, 1kHz/5kHz/10kHz	51dB/47dB/44dB
Output level, 100% modulation	570mV
Channel balance, stereo	0.04dB
Dimension (width, height, depth)	44 x 5.0 x 28.0cm
Typical price inc VAT	£154

ONIX BWD1

ONIX AUDIO, 18 SYDNEY ST., BRIGHTON BN1 4EN. TEL: (0273) 674555.



This tuner comes from a small British amplifier company which has been established for a few years now, though this is the first of their products to be reviewed in *Hi-Fi Choice*. The unit is both attractive and different from most, being narrow but higher and much deeper than the run of the mill – clear influence of Cyrus and Naim. FM only, and ergonomically simple, tuning is performed manually by a large knob on the right, while the one on the left has three switch positions – 'auto muting, wide bandwidth', 'wide bandwidth no muting', and 'narrow bandwidth' to optimise selectivity for strong and weaker stations. AFC strength on the narrow setting can also be adjusted by means of an internal control.

The aerial socket is on the back panel, alongside a switch which attenuates input front end by 10dB for high aerial signal strengths.

LAB REPORT

This is a sensitive tuner when switched to high gain mode. Stereo automatically mutes before a 50dB signal-to-noise ratio is reached so no equivalent sensitivity results for stereo could be taken. Signal-to-noise ratio was fine in both stereo and mono, and pilot tone rejection was good. On 'auto' and 'DX' settings the alternate channel selectivity was poor, improving on the narrow setting.

SOUND QUALITY

The original on-board power supply expired, so the \$160 SOAP accessory power unit was brought into service. In its best fidelity reception mode the ONIX tuner rated just a little above average. Some 'birdies' were evident below 1mV RF input which offsets the value of its good sensitivity.

The general sound quality was more than

satisfactory, but the full stereo depth potential was not achieved. The tonal balance had a 'lighter' texture than the original, with some 'fierceness' or 'glare' in the upper midrange. It also seemed a touch bass light and mildly dulled.

CONCLUSIONS

The ONIX delivered a good lab performance and offered worthwhile reception versatility, but its considerable cost did not appear to be reflected in corresponding fidelity advantages.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	2.5µV/see text
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	72dB/66dB
Muting threshold, R.F. level	8µV
Alternate channel selectivity	48dB
Pilot tone rejection, 19kHz/38kHz	63dB/70dB
AM rejection	56.0dB
Capture ratio	(not measureable) < 1dB
Total harmonic distortion at 100% mod.	
1kHz, mono/stereo	-60dB/-50dB
Stereo separation, 1kHz/5kHz/10kHz	40dB/38dB/35dB
Output level, 100% modulation	230mV
Channel balance, stereo	0.06dB
Dimension (width, height, depth)	230 x 7.3 x 42.0cm
Typical price inc VAT	£360; SOAP power supply £159

PIONEER F-551L

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



This is the cheapest of Pioneer's current stand-alone tuners, but this does not mean it has an inadequate specification. The L denotes the British version of this tuner, equipped with long as well as medium wave AM alongside FM.

Well styled and convenient to use, the 551 has no fewer than 24 preset memories for FM and AM stations. As well as the normal facilities, a switchable CCTS (computer controlled tuning system) causes an internal microprocessor to provide optimum tuning automatically for the received station. The frequency display can also be changed to show signal strength.

LAB REPORT

This unit returned a fine set of test figures. RF performance was very good, and signal-to-noise ratio was especially good with a stereo signal. The muting threshold was set a little low to be useful, and both pilot tones and 38kHz

sidebands could have been better suppressed. Frequency response exhibited a slight treble lift above 2kHz, rising gradually to +0.5dB at 15kHz, but no complaints can be made when price is taken into account.

SOUND QUALITY

Despite some minor criticisms, the general view was that this budget tuner delivered fine FM sound, making a good match for the original source. The minor weaknesses included a 'softened' bass, very mild sibilant exaggeration in the treble, and a little 'thinning' and 'lightening' in the midband. The stereo soundstage was nicely placed in terms of width and focus, albeit with a small loss of depth. Stereo backgrounds were quiet and noticeably free from 'birdies' or stray whistles, even at lower signal strengths. In fact, solid, quiet stereo was available from 500µV upwards.

AM sounded muffled but was less 'heavy' than average, and fairly well balanced tonally. Coloration and distortion were moderate, and the overall result was about average for this waveband.

CONCLUSIONS

The lab performance was fine, with the modest pilot tone rejection offset by excellent sensitivity and freedom from 'whistles'. The sound was average on AM, which is still good for the price, and the FM sound quality was way above average. Fine value for money indicates a 'best buy' rating.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	2µV/20µV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	70dB/69dB
Muting threshold, R.F. level	8µV
Alternate channel selectivity	60dB
Pilot tone rejection, 19kHz/38kHz	29dB/44dB
AM rejection	66dB
Capture ratio	2.5dB
Total harmonic distortion at 100% mod.	
1kHz, mono/stereo	-50dB/-50dB
Stereo separation, 1kHz/5kHz/10kHz	48dB/38dB/32dB
Output level, 100% modulation	690mV
Channel balance, stereo	0.02dB
Dimension (width, height, depth)	42 x 6.5 x 22cm
Typical price inc VAT	£100

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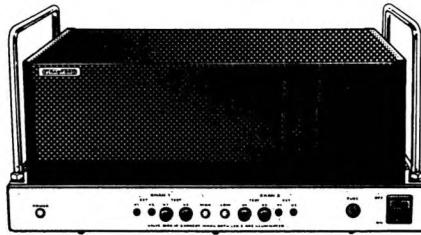


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Stereophile, U.S.A. September 87.



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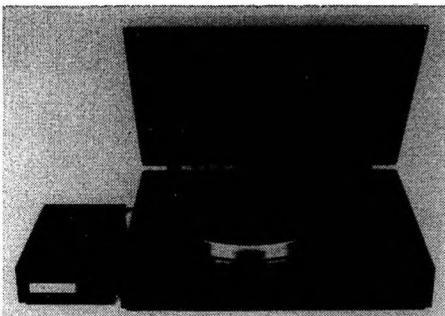
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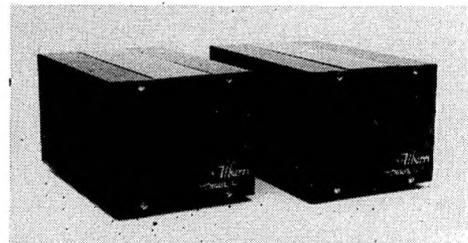


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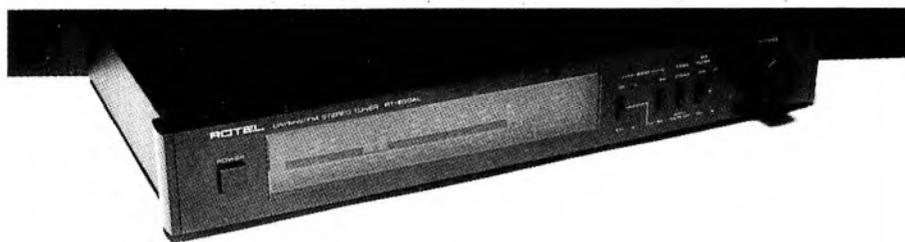
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ROTEL RT830AL

ROTEL HI-FI, 25 HEATHFIELD, STACEY BUSHES, MILTON KEYNES MK12 6HR. TEL: (0908) 317707.

BEST BUY



This the simpler of two Rotel tuners currently available is a straightforward 3-waveband analogue unit. Cleanly styled, tuning is only manual, but none the worse for that. Facilities are not numerous, but the normal band switching and mono/stereo button is accompanied by an AM high frequency filter which cuts down background noise. At the right end of the tuning dial a stereo LED sits above a row of signal strength LEDs. A loop AM aerial fits neatly on the back of the tuner, alongside a 75ohm aerial socket and the normal phono audio output.

LAB REPORT

The tuner is difficult to criticise because the measured performance was very good for a budget unit. Minor niggles include a muting threshold which is set to low, just adequate AM rejection figures, a pilot tone only 40dB down, and less than ideal stereo separation. The other results are all very good, with some close to the

state of the art. For example, frequency response is ruler flat from 20Hz to above 15kHz – one of the best in this group. Harmonic distortion is quite low too.

SOUND QUALITY

Despite its modest price, this Rotel scored well above average on sound quality and proved pretty sensitive to weak stations into the bargain. Quieting was complete at above 250µV and both mono and stereo background noise levels were low. Compared with the norm, the Rotel had a neutral, sweet midrange, punchy dynamic bass and clean clear treble. Large stereo images showed good depth, width and focus, though the clarity on more complex higher modulation passages in the mid register was mildly compromised – loud transients lost some 'attack' and 'speed'.

On AM it returned an above average result, clearer and more open than most, and pleas-

antly balanced from the frequency response or tonal viewpoint. Backgrounds were reasonably quiet, but the handling of higher RF signal levels could have been improved.

CONCLUSIONS

This tuner returned a substantially good all round performance, especially in terms of sensitivity and distortion. The sound quality was very good for the price on both AM and FM bands, so it clearly deserves a Best Buy rating; who would be without FM stereo at this kind of price?

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	4.5µV/45µV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	74dB/65dB
Muting threshold, R.F. level	2µV
Alternate channel selectivity	74dB
Pilot tone rejection, 19kHz/38kHz	40.5dB/50dB
AM rejection	46dB
Capture ratio	1.75dB
Total harmonic distortion at 100% mod,	
1kHz, mono/stereo	–65dB/–63dB
Stereo separation, 1kHz/5kHz/10kHz	36dB/33dB/30dB
Output level, 100% modulation	725mV
Channel balance, stereo	0.12dB
Dimension (width, height, depth)	44.5 x 6.6 x 30.2cm
Typical price inc VAT	£110

SONY 500ES

SONY UK LTD, SONY HOUSE, SOUTH STREET, STAINES, MIDDX. TEL: (0784) 67000.



In our last tuner tests, the 500ES' more expensive 700 stablemate was very well liked. The 500 is also a digital synthesiser design, has very similar styling and equally good finish and substantial build, but lacks some of the 700's facilities.

Ten presets are provided for AM and FM, along with three modes of tuning – manual, automatic, and sweep. (The latter scans the FM band pausing at each receivable station for a few seconds in turn.) A calibration tone for setting tape record levels ref 100% modulation, plus the normal muting on/off button.

LAB REPORT

This unit provided a fine set of test results, some of which were even better than its more expensive relative. There is very little to criticise, but I suppose the capture ratio could have been better and the 38kHz sidebands better suppressed. However, although the frequency

response was flat through the midband, it rolls off early, measuring –1dB at 10kHz and a full –5dB at 15kHz. The stereo mute level might also have been set at a higher level than 6µV.

SOUND QUALITY

This tuner rated a disappointing below average on both AM and FM bands. FM colorations included a noticeably dulled upper treble, which removed the air and delicacy in that range. The upper mid was considered a touch 'brittle' and 'wiry' sounding, with a hardened 'cuppy' effect on vocals. The bass, however, was firm and extended. Stereo images seemed rather flat, with a noticeable loss of depth. Minor 'birdies' were evident at aerial inputs below 1mV.

The AM sound was moderately aggressive and lacking in bass, though quite good on mid clarity and detail. AM also proved quite sensitive, and better than usual on low level signals.

CONCLUSIONS

Both the AM and FM sound quality were suspect, while the lab results were not perfect either – for example, the treble rolloff was rather surprising. Despite the good results achieved by the Best Buy ST700ES, the cheaper 500 shows distinct room for improvement.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	2.5µV/25µV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	74dB/68dB
Muting threshold, R.F. level	6µV
Alternate channel selectivity	74dB
Pilot tone rejection, 19kHz/38kHz	68dB/82dB
AM rejection	69dB
Capture ratio	2.5dB
Total harmonic distortion at 100% mod,	
1kHz, mono/stereo	–63dB/–65dB
Stereo separation, 1kHz/5kHz/10kHz	56dB/46dB/42dB
Output level, 100% modulation	540mV
Channel balance, stereo	0.02dB
Dimension (width, height, depth)	43 x 8.7 x 34cm
Typical price inc VAT	£200

SONY ST-S 700ES

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



This £300 upmarket 'ES' tuner is the top current Sony model available in the UK. Described as 'direct comparator', it is larger than most, solidly built and finely finished. This quartz digital synthesiser design covers FM and medium and long wave AM, with 10 preset switches plus 'manual' and computer controlled electronic tuning.

A feature is the wide/narrow IF option which helps get the best performance from local/distant stations respectively. Pushbuttons and knobs select auto muting/mode plus a variety of tuning and programming functions such as 'scan'. However, the signal strength meter is rather more decorative than functional, using 10 segments to display five levels, with full saturation at a low $100\mu\text{V}$.

SOUND QUALITY

FM sensitivity seemed subjectively very good, adequate for good stereo by $200\mu\text{V}$ and solid

above $500\mu\text{V}$ aerial signal, with noticeably quiet backgrounds compared with the norm. The sound quality too is very good indeed, with excellent stereo focus and width, fine resolution at low and high frequencies, and an even, smooth overall balance, perhaps a touch on the bright side compared with other leading references. Coloration was negligible, but a slight softening of impact was queried by one listener.

The AM reception was competent and the tuning indicator worked well. Backgrounds were again unusually quiet, and the sound quality was pretty decent, particularly in the bass, though the 'corner' of the HF rolloff seemed audible as a slightly 'quacky' coloration.

LAB REPORT

An outstanding set of performance measurements serve as a worthwhile benchmark

against which lesser models may be compared, with signal-to-noise ratios particularly excellent. The normal/narrow tuning 'window' proved effective in operation, with appropriate advantages and disadvantages showing up in the figures.

CONCLUSIONS

This is a first class tuner in every respect including FM sound quality, with above average AM reception. Though it is more expensive than average it shows what a basic Japanese IC package can achieve by intelligent engineering and a little relaxation of tight budgetary constraints, and fully merits recommendation.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	2.6/36 μV (3/39 μV narrow)
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	-82dB/-75dB
Muting threshold, R.F. level	4 μV
Alternate channel selectivity	71dB (83dB narrow)
Pilot tone rejection, 19kHz/38kHz	-73dB/-93dB
AM rejection	71dB
Capture ratio	1.8dB (2.6dB narrow)
Total harmonic distortion at 100% mod.	
1kHz, mono/stereo	-70dB/-65dB
Stereo separation, 1kHz/5kHz/10kHz	54dB/42dB/37dB
Output level, 100% modulation	570mV
Channel balance, stereo	-0.02dB
Typical price inc VAT	£300
<i>Reprinted from issue No. 50.</i>	

TANDBERG 3001A

ORTOFON UK, DENMARK HOUSE, HAVISTOCK IND. EST., RUSCOMBE, TWYFORD, BERKS. TEL: (0734) 343621.



This is an expensive and beautifully made FM tuner with a host of useful facilities conventionally styled to complement Tandberg's established amplifiers. Analogue tuning dial it may have, but Tandberg have also provided 8 presets and a digital programme display. A superb wide-range analogue signal strength meter sits alongside a useful and accurately centred needle type tuning meter on the left of the front panel. Other facilities include a switchable noise cancelling circuit, automatic frequency control, variable muting level, and selectable bandwidth. On the back panel, along with the 75ohm aerial socket, are detector output, FM multipath outputs, fixed audio out, a variable audio output - and even switchable de-emphasis.

LAB REPORT

In general the figures speak for themselves - all very good. The tuner is very sensitive and

extremely quiet in all modes, with excellent pilot tone and AM rejection. Compared with the very best, alternate channel selectivity and capture ratio could have been improved on the optimum fidelity setting, but even so these are still good and user selectable. As expected, distortion declined from very good to satisfactory as the IF bandwidth was reduced. Stereo separation was also good, and the output level was very healthy. Frequency response was perfect.

SOUND QUALITY

Covering the FM band only, this tuner rated 'good' for sound quality on its optimum fidelity setting (wide IF). It was slightly worse on 'medium' and clearly worse on 'narrow', though this setting did provide a pretty spectacular station capture ability on distant weak signals.

Quieting was superb above $100\mu\text{V}$ input, bettering our modulation system with near silence in the absence of music. From a critical

standpoint there was some loss of 'flow' and 'drive' in the bass, while the slightly 'shut-in', mildly 'congested' midrange also sounded slightly 'electronic'. In other respects it was fine, demonstrating big stereo soundstages and quite decent depth and ambience.

CONCLUSIONS

Rivaling the world's finest for build quality, finish and design, this state of the art Tandberg approached but didn't quite make the front line for sound quality. Nevertheless, as a station seeker it gives top notch performance, and is recommended for the enthusiast suffering from poor reception conditions.

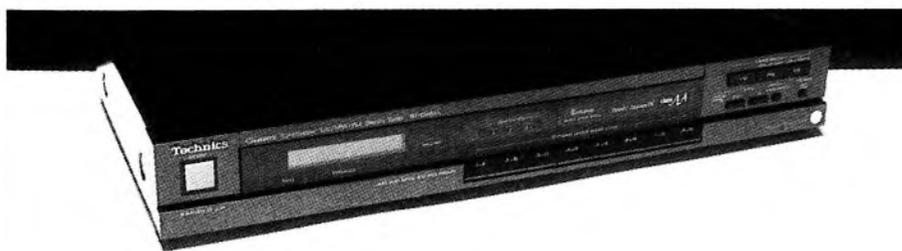
TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	1.2 μV /14 μV narrow (1.5 μV /17 μV wide)
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	>80dB/>80dB
Muting threshold, R.F. level	6 μV (variable)
Alternate channel selectivity	wide 22dB, normal 69dB, narrow 80dB
Pilot tone rejection, 19kHz/38kHz	>-70dB/>-70dB
AM rejection	>-70dB
Capture ratio	1.0, 2.5, 9dB (wide, normal, narrow)
Total harmonic distortion at 100% mod.	
1kHz, mono/stereo	wide -72dB/-69dB
Stereo separation, 1kHz/5kHz/10kHz	wide 43dB/42dB/41dB
Output level, 100% modulation	fixed 2310mV
Channel balance, stereo	0.07dB
Dimension (width, height, depth)	43.5 x 8.3 x 35cm
Typical price inc VAT	£1,295

TECHNICS ST-G45AL

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

RECOMMENDED



This full-width slimline digital tuner differs slightly from others in having a backlit LCD display. Both manual and automatic tuning facilities are provided, and a quartz-lock indicator lights when tuned precisely to an FM or AM station.

Sixteen presets can be tuned either automatically or manually; on automatic, presets 1 to 16 are programmable for FM, or 9 to 16 for AM and 13 to 16 for LW. On switch-on the tuner automatically selects the station last received. The back panel has the normal AM and FM aerial facilities, provision for the loop AM antenna provided, and connections to allow an external timer to be used.

LAB REPORT

Generally competent, this unit neither excelled nor was particularly deficient in any area. Sensitivity and signal-to-noise ratio were quite good, but muting threshold could have been set

higher and neither alternate channel selectivity nor pilot tone rejection will win any prizes. However, AM rejection was very good, distortion figures were fine, and the stereo separation was more than satisfactory. Frequency response measurements showed a slight high frequency rise above 5kHz, peaking 1dB at 15kHz.

SOUND QUALITY

Slight 'birdies' were present below 500µV, clearing to a decently quiet background by 1mV of aerial input. Judged to be pleasant sounding and rating above average, the audio was clear and open, with an essentially neutral character. Stereo images were sharply focused, with good width but only average depth and ambience, the sound lacking that final 'see-through' quality. The treble was pure and free from sibilant emphasis, while the bass was considered deep and firm.

The AM band sounded pretty awful, rating 'poor'. The sound was unduly thick and coloured, and despite the narrow filtered bandwidth it was plagued by heterodyne whistles.

CONCLUSIONS

Not particularly cheap for its modest specification, nevertheless the lab performance was quite good and the visual display was liked. FM sound quality is about right for the price, but the AM is clearly an afterthought. A decision to purchase may well depend on the importance or otherwise of the AM band.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	3µV/36µV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	68dB/65dB
Muting threshold, R.F. level	2.2µV
Alternate channel selectivity	55dB
Pilot tone rejection, 19kHz/38kHz	-39dB/45dB
AM rejection	78dB
Capture ratio	2.5dB
Total harmonic distortion at 100% mod,	
1kHz, mono/stereo	-64dB/-67dB
Stereo separation, 1kHz/5kHz/10kHz	47dB/44dB/37dB
Output level, 100% modulation	595mV
Channel balance, stereo	0.42dB
Dimension (width, height, depth)	43 x 6.4 x 23.5cm
Typical price inc VAT	£156

YAMAHA TX-L400

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



This attractive, well finished, satin-black tuner complements the Yamaha amplifiers in both style and build quality. Like most Japanese models it uses digital synthesis, with 16 presets on 9 buttons covering the 3 bands. Auto or manual tuning modes are available. The red display on the left contains the signal strength meter, stereo flag, preset number selected, and the band and frequency in use.

The back panel has spring clip connections for both AM and FM aerials instead of the normal co-ax socket, but audio output is conventional, via phono sockets.

LAB REPORT

This unit was sensitive, reaching 50dB signal-to-noise from a 22µV stereo signal; good ultimate signal-to-noise ratios in excess of 67dB were available at higher signal levels. Parameters such as stereo separation, distortion, AM rejection and alternate channel selectivity all

met or exceeded the expected standard. Capture ratio and pilot tone rejection could have been better, but in practice are still reasonable. Frequency response was within 0.5dB throughout the audio band to 15kHz.

SOUND QUALITY

Another fine budget tuner, the L400 achieved a 'good' rating for FM sound quality. Full quieting was obtained by 500µV, by which time the 'birdies' had flown away and a decently quiet stereo background was achieved. Described as firm, 'open' and lively, this tuner showed pleasing clarity throughout the range, particularly in the treble. The midrange sounded uncoloured, and the bass was clean if very slightly lacking in weight. Stereo images were fairly wide, well focused, and showed quite good depth.

However, AM did sound pretty awful. Rated well below average, and really only usable for information rather than entertainments, it

sounded 'thick' and 'honky', with no bass or treble, and noisy, 'whistly' backgrounds; furthermore, it wasn't very sensitive.

CONCLUSIONS

Providing attractive ergonomics with solid FM lab and listening test performance, this budget model was let down by poor AM results, though some may consider this inconsequential.

TEST RESULTS

Sensitivity for 50dB signal-to-noise ratio	
Mono/stereo	2.2µV/22µV
Ultimate signal-to-noise (CCIR/ARM/1kHz ref)	
Mono/Stereo	72dB/68dB
Muting threshold, R.F. level	14µV
Alternate channel selectivity	66dB
Pilot tone rejection, 19kHz/38kHz	-31dB/50dB
AM rejection	62dB
Capture ratio	2.8dB
Total harmonic distortion at 100% mod,	
1kHz, mono/stereo	-60dB/-56dB
Stereo separation, 1kHz/5kHz/10kHz	50dB/46dB/41.5dB
Output level, 100% modulation	525mV
Channel balance, stereo	0.03dB
Dimension (width, height, depth)	43.5 x 7.2 x 23.5cm
Typical price inc VAT	£130

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TUNERS: BEST BUYS AND RECOMMENDATIONS

BEST BUYS

These offer exceptional value and a good all round performance, especially on FM stereo.

Pioneer 551L (£100)

This well equipped digitally controlled model is a fine all rounder at a competitive price.

Rotel RT-830L (£110)

This tuner did well on all tests and its analogue dial may well be preferred by some.

Yamaha TX-L400 (£130)

A good digital FM tuner, though AM sound was weak.

Arcam Alpha (£150)

A good FM sound with above average AM too, the dial is analogue, tuning is manual, and RF front end is good.

Creek CAS 3140 (£150)

This unpretentious but versatile high performance FM only model offered a top notch sound, with manual tuning.

Rotel RT 850 (A) L (£160)

Recently revised, this digital tuner gave fine FM sound and good lab measurements at the price.

Arcam Delta (£250)

Building on the strengths of the *Alpha*, the *Delta* performed well in all departments, combining preset analogue tuning with a digital display.

Hitachi FT-MD 5500 (£250)

This new 'midi' version of an established Hitachi achieved worthwhile ratings for sound quality, and offered very good sensitivity and complex but versatile automated digital facilities.

Sony STS-700ES (£300)

A front line digital model, this well designed tuner returned fine lab performance with very good FM sound and above average AM results.

RECOMMENDATIONS

The following models are recommended on the basis of good value with the accent on improved performance in the case of the more costly models.

Denon TU-717 (£100)

With good measured performance for the price the *TU-717* also rated as satisfactory on sound quality.

Hitachi FT-5500 II (£230)

In its *Mk II* form, this classic design scored on excellent radio performance, designed to cope with a range of reception conditions, coupled with a basically good audio quality.

Marantz ST151L (£105)

This nicely styled and very well finished digital tuner gave acceptable technical results, and while best suited only to normal reception areas, did give decent sound on all bands.

Mission Cyrus (£180)

Rating highly on sound quality, this tuner was not so impressive on radio performance, making its potential abilities in poorer reception areas less than outstanding.

Musical Fidelity T1 (£300)

A very good sounding FM only analogue design, suited to higher signal strengths.

Naim NAT01 (£1098)

This expensive analogue/varicap model provided reference standard sound quality on FM bands, requiring a reasonably strong aerial signal.

Pioneer F-55L (£110)

This all-band digital synthesis model delivered a fine RF performance with acceptable sound quality, but was poor on AM.

Pioneer FX-99X (£240)

This digital tuner offered exceptional radio performance suiting almost any reception conditions, along with basically good sound quality.

Quad FM4 (£279)

An ergonomic delight, this FM-only model has a very competent all round performance and a pleasing sound.

Revox B261 (£890)

A flagship tuner, this versatile model has a wealth of facilities including auto aerial rotation. For the serious FM radio enthusiast the RF performance was excellent. **Sansui TUD99X (£250)** Something of a reference in 1986, the '99X delivers excellent RF performance and good sound quality on the FM band, but was rather mediocre on AM.

Technics ST-500L (£100)

With a thoroughly respectable RF and lab performance, the sound quality was considered acceptable for recommendation as a basic FM tuner, though AM was poor.

Technics STG 45 AL (£140)

A digital tuner with respectable FM stereo and a good performance all round.

Technics ST-G7 (£400)

Comprehensive facilities and a generally impressive level of technical performance justify a high price so this well-furnished model can again be recommended.



TUNERS TECH TALK

Extracting radio signals from an overcrowded ether is a technology in its own right.

We have assembled 16 new tuners for this review, spanning a wide price range from budget to luxury level. Auditioned on broadcast bands at high and low signal strengths, a more searching analysis involved simulating a transmitter by using a high performance stereo encoder/radio frequency generator. High quality disc sources were 'broadcast' directly, so the tuner's reproduction could be compared with the original, allowing for modulation losses. We also tried a range of signal strengths to investigate those annoying birdies or whistles which can plague a number of tuner designs.

LABORATORY TESTING

The lab testing equipment included double RE RF generators, a modern RE encoder, and a pile of computer controlled Hewlett Packard analysers. Despite abbreviating the test programme to provide more product reviews, we aim to cover all the major aspects of tuner testing.

Many tests were run at full modulation in both mono and stereo to exercise the tuner at the broadcast deviation limits. Variations in *muting* performance were assessed and tuners with silly, excessively noisy mute thresholds were identified.

Several measurements serve to define just how well a unit tunes into a station, how strongly it locks on, and how well it rejects interference and neighbouring stations. These include *AM rejection*, which relates to multipath and amplitude types of interference – car ignition noise and the like – where results of better than 50dB are required, and up to 80dB is theoretically possible. *Capture ratio* indicates how well the tuner can reject a weaker, close or on-channel station (foreign interference perhaps), and here very small numbers of the order of 2dB or better are desirable, with 0.8dB at the state of the art. Tuners can generate unwanted signals in or near the audio band – stereo *multiplex tones* at 19kHz and

38kHz for example – and these should be suppressed by 50dB or more to avoid interference when making tape recordings.

The background noise performance of the FM system is not exceptional by today's standards and now expect a tuner to offer little of its own noise. Stereo signal-to-noise ratios of better than 65dB (CCIR ARM weighted 1kHz) are a sensible target, and many tuners now beat this handsomely. We also checked *stereo separation* in the range 100Hz to 10kHz, favouring values of 45dB or more at mid frequencies, with 35dB still considered a good result at 10kHz.

Selectivity defines how well the tuner rejects a strong station in the alternate channel (two channels away from the wanted station). 60dB is a good result here with 80dB verging on the exceptional. Tests were made to see how quickly the tuner achieves clean, noise-free mono and stereo audio as the aerial signal strength rises; absolute *sensitivity* for a tolerable 50dB signal-to-noise ratio was noted. Finally the *frequency response*, *distortion* and *channel balance* were checked to see how good the audio performance was.

AERIALS

Ultimately the performance of a tuner is dependent on the quality of the radio frequency signal fed to its aerial terminal. Unless you enjoy exceptionally good reception conditions where a free 'rabbit's ear' or similar ribbon aerial will give good results (and even so a proper rooftop rig will sound better – *Ed*), a good tuner deserves a well installed aerial. Up to £80 should be allowed, because buying a good tuner in the first place without considering its source is rather like buying a turntable with no money left over for records!

Incidentally, CD players can interfere with tuners on the AM bands, and may have to be located away from the tuner, or switched off when AM is being used.



CHOOSING AND USING . . . HEADPHONES

Headphones have not been tackled by *Choice* for several years, and although there have been no significant breakthroughs in the field we thought it would be interesting and worthwhile to listen to the current crop. Included in this test are twenty models: some are quite new; others are well established models such as the Stax *Lambda Pro*, which was used as a reference throughout.

The majority are dedicated to domestic hi-fi systems, and as such are fitted with standard 6.3mm jack plugs. However, a few have 'unimatch' plugs - 3.5mm Walkman size jacks with a screw-on 6.3mm adaptor.

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, such as those made by Beyer. 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.

HEADPHONE LISTENING

After initial familiarisation with the 'at the ear' headphone sound, I found the totally different listening experience to loudspeakers a lot more satisfactory than expected.

But because of the lack of sound pressure on the body, one never gets the impression of significant volume levels, even though pressure at the ear may be quite high. In fact many manufacturers warn against listening at high levels for fear of causing permanent damage to hearing.

By avoiding the variations in presentation of sound caused by different environments, headphones give a perhaps more accurate idea of what a producer intended a recording to sound like.

Another obvious advantage is the ability to pump up the volume without disturbing the neighbours, the wife or the dog.

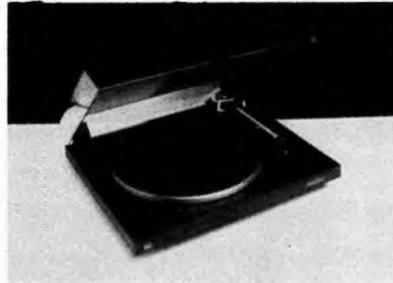
THE REVIEWS

The reviews include subjective observations on sound quality and comfort. The latter are partly based on comments from other people who lent me their ears so to speak, but the intelligent reader would do well to check his/her own personal fit before purchase. The usual Best Buy and Recommended tags are awarded where appropriate as some assessment of value for money. But perhaps more pertinent with headphones than with any other piece of equipment is the necessity to try before you buy; the comfort factor means that a pair that suits one person may be quite unsuitable for another.

The equipment used for the review included: Roksan *Xerxes* turntables, Rega *RB300* tonearm, Logic *Claro Black* & Goldring *Eroica L* cartridges and Nytech *CA252* amplifier. The material used included: U2 - *The Joshua Tree*, John Martyn - *Bless the Weather*, ZZ Top - *Afterburner*, Weather Report - *Domino Theory* and Mozart's *Sinfonia Concertante K.364*.

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AUDIO TECHNICA ATH 909

TECHNICA HOUSE, LOCKWOOD CLOSE, LEEDS

LS11 5UU. TEL: (0532) 771441.



The *ATH-909* is a recently introduced semi-open-backed model from Audio Technica. A circumaural design with soft upholstery and a reasonably wide adjustable headband, these factors combine with light weight to make a particularly comfortable headphone. The way the yolks that support the ear pieces have been designed to sit flush is quite attractive – and may also increase their chances of survival under adverse circumstances, such as being sat upon.

The lead is a fairly lightweight twin cable affair that exerts no tug on the 'phones in use, and is terminated with a standard jack plug.

Tonally there is a tendency to emphasise the treble, not in a bright unattractive manner but to the extent that one's attention is drawn to hi-hats and the like. In some ways they had a better top end than the reference *Lambda Pros*, but lacked that model's control over the rest of the dynamic range. The bass was a bit light and there was some loss of clarity up into the midrange, although a reasonable amount of detail came through nonetheless. However, there was a distinct lack of openness to the sound that is perhaps a

result of the semi-open back design.

Fortunately, with reasonably good recordings one's ears didn't feel threatened when the gain was increased, as is the case with other models that have forward top ends. I don't think that any of the models in the test were as good as these in the treble, but the compromised mid and bass makes them hard to recommend. Unless, of course, that sort of balance is what appeals to your ears.

GENERAL DATA

Type	circumaural, semi-open, dynamic
Mass	195g
Size rating	large
Length of cord	3m
Comfort rating	fair
Sound quality rating	fair
Price	£54.95

AUDIO TECHNICA ATH 910

TECHNICA HOUSE, LOCKWOOD CLOSE, LEEDS

LS11 5UU. TEL: (0532) 771441.



At an extra ten pounds, the *ATH-910* is very similar in appearance to the *ATH-909* but with one fundamental difference – closed backs. At its simplest this means that external sounds will interfere less with your enjoyment of the music, and that very little sound escapes from the headphones into the surrounding environment, theoretically making it possible for the TV and the hi-fi to co-exist in the same room . . . and hence domestic harmony (well maybe).

Comfortwise these were similar to the *909s* except for a matt plastic pad covering; also they felt a little cramped on my not-so-shell-like ears.

What's more important of course is the effect that this design has on the sound of the 'phones. Perhaps the most immediately obvious effect was that my foot started tapping to tracks that it had long ago become disinterested in – a remarkable feat one might say (groan).

Tonally the top end was slightly forward, but not to the extreme of the *909*, and the sound was fairly coherent throughout the range, if lacking the bass weight of the reference *Lambdas*. The one area

where the effects of the closed-back was most noticeable was in the lack of space around instruments, giving a rather constricted feel to the music. One had to concentrate hard to sort out the musical strands being contributed by each instrument.

However, the *910s* did possess a certain rhythmic correctness that many models lacked, and were most enjoyable to listen to. After all, isn't that what reproducing music is all about? A flat response may look good on paper, but does it make you smile? As you can tell, I liked the *910s* despite their unfashionable closed-back design, and would certainly recommend them to music lovers, if not necessarily hi-fi buffs.

GENERAL DATA

Type	circumaural, closed-back, dynamic
Mass	205g
Size rating	large
Length of cord	3m
Comfort rating	fair
Sound quality rating	good
Price	£64.95

RECOMMENDED

BEYER DT330 MK II

BEYER DYNAMIC, UNIT 14, CLIFFE INDUSTRIAL EST.,

LEWES, SUSSEX BN8 6JL. TEL: (0273) 479411.



These semi-open-backed circular headphones are fairly light and comfortable, the ear pads being covered in a thin, matt black plastic with soft foam padding. In practice I found that they pressed a little hard under the ear, and could have been more comfortable with rather less pressure; it is possible they may slacken off with use, but who knows?

The rest of the unit is fairly well designed and reasonably robust, with a plastic adjustable headstrap and swivelling earpieces. The lead is a straight twin-cable affair with standard jack connector.

The 330s sounded reasonably good but a bit dull in character, with instruments sounding confined and slightly claustrophobic. They never offended, however, and could be used at reasonable levels without any raw edges creeping in. You could say that they have been designed to sound at least pleasant under most circumstances, which is a more palatable option than the searing treble offered by some cheaper models.

Tonally the 330s have an uncommon bass forward character, and are not particularly clean with it. Vocals on a U2 track

seemed very muddy and unclear, to the extent that usually easily followed lyrics became difficult to make out. Treble was constrained and recessed, but one could still hear cymbal crashes. In fact if they weren't so bulky they would make suitable partners for your average personal stereo, complementing the rather top-forward nature of those beasts.

Perhaps I'm being too hard on what are, after all, quite enjoyable headphones that have been well built and can convey a sense of rhythm. What's more they *do* have some bass.

GENERAL DATA

Type	circumaural, semi-open, dynamic
Mass	190g
Size rating	large
Length of cord	2.5m
Comfort rating	good
Sound quality rating	poor
Price	£45

BEYER DT550

BEYER DYNAMIC, UNIT 14, CLIFFE INDUSTRIAL EST.,

LEWES, SUSSEX BN8 6JL. TEL: (0273) 479411.



The DT550 is a semi-open, dynamic design with a very similar outward appearance to the two other Beyer models in this review. Its model number and £69 price tag place it in between them, and so does the sound quality. From a comfort point of view the only real difference between these and the 990s is the less pleasant material used to upholster the earpads. The combination of light weight and good shape gave a good rating from the comfort panel.

The 550s feature a soft adjustable headstrap, and a flat four-cable lead, terminating in an ergonomically designed 6.3mm jack. The coiled lead didn't create any noticeable tug when used in normal circumstances, though its weight could be more obvious in a standing position.

Taken on their own, the 550s sound appealing and articulate, with a slightly gritty treble and 'keen' midrange. In comparison with the reference electrostatics they sounded a little muddy and unrevealing, the rolled off top end becoming more obvious.

When tried at higher volumes the top end got a bit painful, and I wouldn't recommend them to

headbangers. The semi-open design sounded reasonably spacious, and changed quite dramatically to a 'closed in' sound when I placed my hands over the outsides of the 'phones.

In the context of the competition at this price level, the 550s need some improvement to warrant enthusiastic recommendation, but have good qualities and may suit some systems reasonably well.

GENERAL DATA

Type	circumaural, semi-open, dynamic
Mass	200g
Size rating	large
Length of cord	3m
Comfort rating	good
Sound quality rating	good
Price	£69

BEYER DT990

BEYER DYNAMIC, UNIT 14, CLIFFE INDUSTRIAL EST.,

LEWES, SUSSEX BN8 6JL. TEL: (0273) 479411.

RECOMMENDED



Although designed along the same lines as the cheaper 330 model, the 990 is definitely more refined. The earpads are covered in a soft, slightly furry material, and they feel quite cosy to wear. The DT990 is a fully open-backed dynamic model with a coiled, four-cable lead that terminates in a standard 6.3mm jack plug. In normal use the lead didn't produce any noticeable tug, and overall they were quite comfortable. As with all the Beyer models, the earpieces swivel to make best contact with the side of the head.

Sonically they turned out to be both polite and interesting. While absolute dynamic range was slightly curtailed at both ends of the spectrum, what one did hear was of very good quality. Limitations were only obvious in comparison with units costing three or four times the price.

The top end was quite revealing of the quality of both material and equipment, but could also sound slightly out of control, and didn't encourage me to test its loudness potential. The midrange was excellent and made a good job of reproducing the John Martyn guitar and vocals track; if not picked out note

for note, it was still pretty clear. The bass was also quite impressive, if slightly 'soft at the edges'.

The 990s proved exceptionally revealing of subtleties on orchestral music, allowing the different instruments their own space, whilst retaining the coherence of the whole orchestra.

As dynamic headphones go these ones are fairly good, and are worth checking out if the price suits your pocket.

GENERAL DATA

Type	circumaural, open-backed, dynamic
Mass	230g
Size rating	large
Length of cord	3m
Comfort rating	very good
Sound quality rating	very good
Price	£130

JECKLIN FLOAT MODEL ONE

PRESENCE AUDIO, THE OLD POSTHOUSE, PLUMMERS

PLAIN, HORSHAM, W. SUSSEX. TEL: (0403) 76777.

BEST BUY



Looking more like a section of a motorcycle helmet than a pair of headphones, the *Float One* is best not worn in public, as the female contingent of the comfort panel was reduced to fits of laughter when I put them on. Unlike other 'phones, they don't enclose the ear, but rather have a foam strip behind the ear which is the only contact with the side of the head. This avoids the often claustrophobic effect of circumaural types; in fact the aural effect is more like having small loudspeakers mounted either side of one's head.

Like the other cheaper Jecklin models they are open-backed with dynamic drivers. This model has a flat lead composed of four cables, terminating in a standard jack plug, and was light enough to avoid any tug in use. Initially feeling a bit odd, they proved very comfortable in the long run because they allowed air flow around the ears and exerted little pressure on the side of the head. But they could also prove less suitable for some people as there is no size adjustment.

However, the actual sound makes up for any anomalies elsewhere. The sound was very good

indeed, and not significantly overshadowed by the *Lambda Pros* like all the other under-£100 models in this test. Maintaining contact with the head itself without distorting the ears would seem to be an advantage as far as headphones are concerned.

The *Float One* sounded very relaxed and natural, only foregoing absolute clarity and control to the *Pro's*. The tonal character is 'warm' with a slightly restrained top end and softened bass, plus a sense of spaciousness that puts them among the best.

Basically this model defies conventional appearance in favour of sound quality, and represents very good value under any circumstances.

GENERAL DATA

Type	circumaural-ish, open-backed, dynamic
Mass	480g inc. lead
Size rating	very large
Length of cord	3m
Comfort rating	good
Sound quality rating	very good
Price	£75

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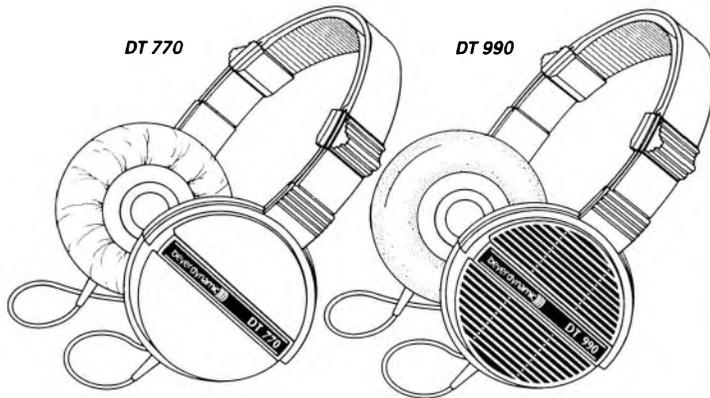
Perhaps we could persuade you that it will go nicely with other status symbols, like your Porsche.

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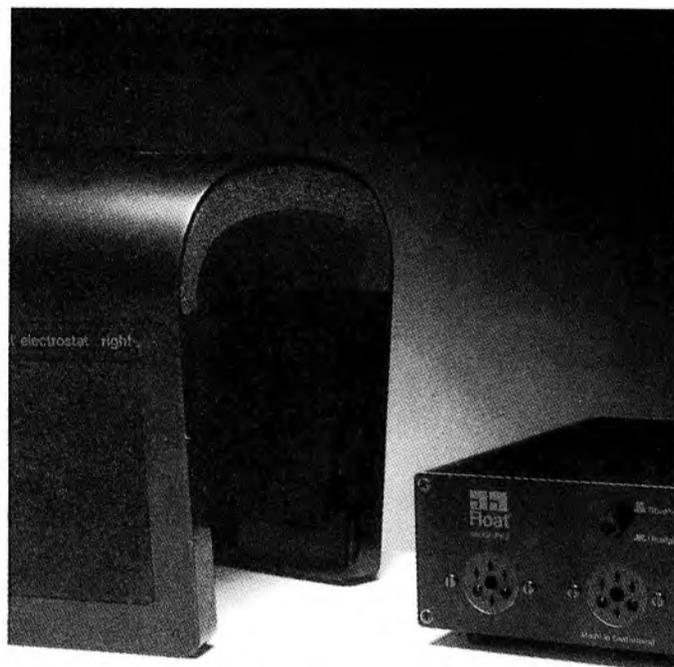


JECKLIN FLOAT ELECTROSTAT

PRESENCE AUDIO, THE OLD POSTHOUSE, PLUMMERS

PLAIN, HORSHAM, W. SUSSEX. TEL: (0403) 76777.

RECOMMENDED



Built using the same basic shell as the *Model One*, the *Electrostat* is the top model in the Jecklin range and differs from the others in using a mains powered energiser. This unit sits between the amp and speakers and features two sets of spring clip terminals to accommodate the incoming and outgoing signals. For the purposes of this listening test I used DNM single strand cable.

The long (3m) flat lead terminates in a six-pin lockable plug that fits into the energiser. It is recommended that the 'phones are left plugged in to warm up before use, and this procedure was followed. The comfort rating is the same as for the less expensive *Model One* – good long term comfort after initial familiarisation. Apparently the *Float* range was designed by a Swiss recording engineer for use in the studio, where long term comfort is an ergonomic (or even eargonomic) necessity.

Sonically quite exceptional, for my money these are the best headphones in the review. Characterised by remarkable clarity and control over an impressively wide frequency range, they were more

revealing than loudspeakers costing two or three times as much. Compared to the Lambdas the bass was much improved, and the presentation gave a significantly better impression of spaciousness, in some respects sounding quite unlike headphones. They also sounded more palatable at highish volume, and were very clean and solid.

The strength of the *Float* models lies in the openness created by the unusual ear to driver relationship, and they would be unsuitable for a noisy environment. However, under normal domestic circumstances they represent the state of the art in headphone design, and as such must be recommended.

GENERAL DATA

Type	circumaural-ish, open-backed, electrostatic
Mass	480g inc. lead
Size rating	very large
Length of cord	3m
Comfort rating	good
Sound quality rating	excellent
Price	£350

QUART PMB 25 II

SOUNDTEC MARKETING, UNIT 9, BELFONTRADING

EST., MUCKLOW HILL, HALESOWEN, W. MIDS B62 8DR.

TEL: (021) 550 7387.

BEST BUY



MB Quart are a German loudspeaker company whose products have recently been introduced to the UK. They also manufacture a range of six headphones and we have evaluated two pairs in this review. Despite a fairly conventional appearance, the \$40 *PMB 25s* feature a novel speaker suspension arrangement. Rather like an old fashioned microphone, the earphone is suspended with elastic cord from the supporting frame at four points, the idea being that the headband and frames remain in the same plane whilst the phones sit snugly over the ears. To be honest it doesn't seem to work that well and a swivelling earpiece would seem a more effective solution. However, with one exception the comfort ratings were 'good'.

The *25s* are a dynamic, open-backed design with a broad, adjustable headstrap and fairly large circumaural circular earpieces. The straight twin-cable lead terminates in a standard 6.5mm jack plug. Oddly the name Quart cannot be found on the headphones, and only the model name is printed on the headband.

The tonal character could be

called 'lower mid forward' to use the standard parlance, but I found them quite seductive and words like 'ripe' and 'full' came to mind. It was a warm yet lively sound, which I found very enjoyable after the rather dry and hi-fi-esque balances that had gone before. The *25s* brought new life to heavily overplayed test tracks, by adding an indefinable quality of musicality. Perhaps they just matched my ears and replay equipment, but I think that there is more to it than that.

If you're thinking of spending around forty or fifty quid on some headphones these should definitely appear on your shortlist.

GENERAL DATA

Type	circumaural, open-backed, dynamic
Mass	240g
Size rating	large
Length of cord	3m
Comfort rating	good
Sound quality rating	good
Price	£40

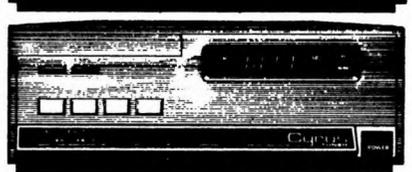
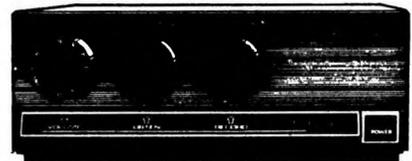
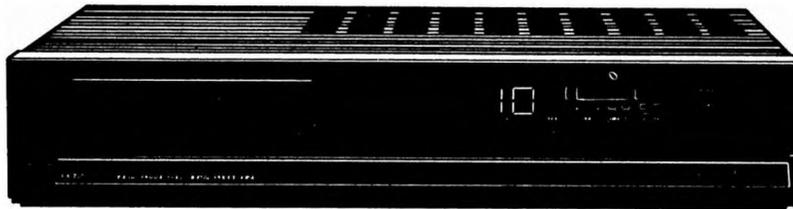
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QUART PMB 65

SOUNDTEC MARKETING, UNIT 9, BELFONT TRADING

EST., MUCKLQW HILL, HALESOWEN, W. MIDS B62 8DR.

TEL: (021) 550 7387.

RECOMMENDED



At a glance, the *FMB 65* Quart headphones are very similar to the cheaper *25* model, with the same unusual earphone suspension, but they differ technically in being a closed-back design. The most obvious visual difference is the wide headband which has large square holes in it, for both style and comfort.

Having larger earpieces than the *25*s, this model was more comfortable on me, but female members of the comfort panel rated the two quite similarly – it's a question of whether the headphones are properly functioning in a circumaural manner or not. The lead is a four-cable, coiled type with a 6.3mm jack that features finger indents for ease of use.

Sonically these are quite different from the *FMB 25*, being a lot more serious in intent and giving a flatter frequency response. The effect of the closed backs was quite noticeable when compared, but the sound was not incoherent – it just had a close-to-the-ear feel. In fact the different strands in a piece of music seemed well spaced out in a sort of layered manner.

Next to the *Lambda Pros* the Quarts sounded a little lacking in

clarity. However, they have a very appealing midrange, and extended fairly well to both ends of the spectrum. The strength of this model was its ability to reveal information on the disc that other, similarly priced, designs had missed, and do so in a musical rather than analytical fashion.

The *FMB 65*s offer a good standard of musical reproduction for a closed-back design, and competes with some of the more expensive open models to boot.

GENERAL DATA

Type	circumaural, closed-backed, dynamic
Mass	245g
Size rating	large
Length of cord	3m
Comfort rating	good
Sound quality rating	good
Price	£69.90

SENNHEISER HD 30

HAYDEN LABORATORIES, HAYDEN HOUSE, CHILTERN

HILL, CHALFONT ST. PETER, BUCKS SL9 9EW.

TEL: (0753) 888447.



These £12.99 headphones are the cheapest in the report, and have been manufactured specifically for the personal stereo market, and I should imagine represent an upgrade on the standard models included with 'boogie packs'. They are quite attractively designed using red plastic and a thin stainless steel headband, making them lightweight and comfortable. In fact all but one of the comfort panel rated them quite highly.

To suit Walkman type players the *HD30*s are fitted with a dual size convertible jack plug and have a short thin lead, the latter potentially a nuisance with less portable sources.

A 'fizzy' subjective character tended to make music sound a little 'synthetic'. Tonally lightweight, they have difficulty in providing an accurate sonic description of the program material, but on the plus side are quite 'lively' and don't sound too 'shut in'.

Taken in the context of the other less expensive models in the test, including Sennheiser's own *410* model, the *HD30*s don't really make the grade. Sounding rather rough around the edges, they are not the sort of 'phones that one

could describe as sonically comfortable. However, compared to the competition in the personal stereo market they may well fare considerably better. We don't have a 'cheap and cheerful' rating, but if we did this one would get it.

GENERAL DATA

Type	supra-aural, semi-backed, dynamic
Mass	45g
Size rating	small
Length of cord	1.2m
Comfort rating	good
Sound quality rating	poor
Price	£12.99

BEST BUY

SENNHEISER HD 410 SL

HAYDEN LABORATORIES, HAYDEN HOUSE, CHILTERN

HILL, CHALFONT ST. PETER, BUCKS SL9 9EW.

TEL: (0753) 888447.



These very simple looking headphones are the less expensive brothers of the 420s also reviewed, and at £26 are the cheapest specifically domestic headphones included in the test. They feature the usual dual fit jack plug, so the less selfconscious might use them with a Walkman. They are also very light and to my ears very comfortable, with large, foam supra-aural ear pads and a strong yet flexible headband.

Like the 420s they have a long straight twin-cable lead, that transmits the sound of anything knocking against it to the 'phones. But this is of no consequence in normal use: just sit still. (This may have something to do with the cables, which apparently use stainless steel wire to make them virtually unbreakable.)

Sonically surprisingly good considering their modest price, in some ways they were preferred to the 420s. The strength of the 410 lies in a tight clear presentation, underlined by a slightly 'forward' top end. They are only a little bass light, and what extension there is sounded clean and tight. The problem with allowing less expensive drivers to be this revealing seems

to be a degree of 'graininess' that can be less relaxing than 'warmer' sounding designs. However, this characteristic will be less of a nuisance with smooth, clean sources.

Although a little unsubtle, the 410s represent fairly good value for money, and I wouldn't expect their limitations to be very obvious in most circumstances.

GENERAL DATA

Type	supra-aural, open-backed, dynamic
Mass	82g
Size rating	medium
Length of cord	3m
Comfort rating	good
Sound quality rating	good
Price	£26

SENNHEISER HD 420 SL

HAYDEN LABORATORIES, HAYDEN HOUSE, CHILTERN

HILL, CHALFONT ST. PETER, BUCKS SL9 9EW.

TEL: (0753) 888447.



These modern looking headphones have the yellow earpads that have become Sennheiser's trade mark. The 'high tech' injection moulded strap and 'phone backs give them a distinctly contemporary look, as well as making them very robust and light in weight. The soft earpads press quite hard against one's ears, which is initially quite nice, but after a while becomes less comfortable; this factor outweighed the lightness element in the comfort ratings.

The thin, straight twin-cable lead has a dual size jack, and can be removed completely from the headphones as it is attached by small two-pin plugs. This is the case with all Sennheiser headphones, so that the lead can be replaced in case of damage, but of course the signal has to run through two extra electrical connections (the dual jack) before it reaches the drivers, which might degrade sound quality. (Then again, if tweak freaks could get hold of the small two-pin plugs, it would be possible to experiment with different cables!)

The 420s sound well controlled with fair bass extension and cohe-

rent presentation, giving a full and tangible quality to instruments and voices. When compared to the reference they seemed a little dull and lacking in clarity: choosing not to present a less than perfect top end, they go instead for a warm civilised balance. They will also go loud with little problem.

The sound reminded me of 'seventies style Quad amplification, that was a lot smoother than the warts'n'all approach of modern amps, and is representative of one school of hi-fi enthusiasm. But to combine that sort of amplification with these headphones may result in a rather syrupy sonic concoction.

These are the sort of phones that I would be hesitant about recommending to all and sundry, but they may well be just right for some ears. So try before you buy.

GENERAL DATA

Type	supra-aural, open-backed, dynamic
Mass	129g
Size rating	medium
Length of cord	3m
Comfort rating	good
Sound quality rating	good
Price	£45.50

SENNHEISER HD 540 REFERENCE GOLD

HAYDEN LABORATORIES, HAYDEN HOUSE, CHILTERN

HILL, CHALFONT ST. PETER, BUCKS SL9 9EW.

TEL: (0753) 888447.

RECOMMENDED



Sennheiser have obviously pulled out all the stops for their top of the range *540 Gold* model. A far cry from the other models in this test, the *540s* feature a padded headband and gold plated metal rings around each earpiece. Perhaps the most visually impressive element is the real wood presentation box, with brass fittings and the company name in attractive gold lettering.

So much for the trimmings. The *540s* are a fairly large, circumaural, open-backed design that use dynamic drivers, and are the most expensive of that type in this test. Quite light in weight, absolute comfort is restricted by the pressure exerted on the head, which was a little higher than average.

What is more important, however, is what do a pair of \$150 dynamic headphones sound like? These ones proved very revealing and created an excellent sense of space, quite unlike any other dynamic reviewed. They prove that the type can be subtle and informative, and are only surpassed by the better electrostatics when it comes to nuance of timbre and absolute control at higher volumes. They showed up the jangly

new strings on the John Martyn track, and revealed details that all but the electrostatics missed.

The dynamic drivers had a tighter but less extended bottom end than their planar counterparts, which makes for a more punchy sound, and may suit some tastes better than others. These are very classy headphones in all respects and warrant recommendation.

GENERAL DATA

Type	circumaural, open-backed, dynamic
Mass	250g
Size rating	large
Length of cord	3m
Comfort rating	good
Sound quality rating	very good
Price	£150

SONY MDR-E272EX

SONY UK LTD, SONY HOUSE, SOUTH ST., STAINES,

MIDDX. TEL: (0784) 6700.



These miniature intra-aural earphones resemble a pair dubbed *Nude Turbo* in Japan, but for reasons that don't require explanation Sony have adopted the rather more conservative *E-272EX* pseudonym for the British market. They are supposedly an upmarket version of the hearing aid lookalikes that have been adorning the ears of style conscious Walkpeople for the past year or so. They come with their own rather nifty case and gold plated 'unimatch' plug, although the Walkman-tailored 1.2m lead makes them a little impractical for the domestic equipment.

Being extremely lightweight they are quite comfortable to wear for short periods, although when they are removed one's ears are glad to resume their normal shape. The lead is remarkably thin and flexible, almost as if it were made purely of plastic, and weighs next to nothing.

I must admit that I was sceptical of their sonic abilities before I tried them, but was pleasantly surprised by these diminutive units. Although bass wasn't really apparent they had a nice midrange and

reasonable treble, and were quite listenable on most types of music. I admit to avoiding material of the ear searing variety throughout the review, but in some respects the *272s* proved more palatable than other more expensive 'phones in the test. They did have one irritating and unexpected foible: a degree of background amplifier noise like quiet tape hiss was apparent on all the material tried.

Whilst not exactly cheap the *E-272s* proved able performers and probably represent the best that is currently available in discreet ear-phones.

GENERAL DATA

Type	intra-aural, 'open-air', dynamic
Mass	5.5g
Size rating	very small
Length of cord	1.2m
Comfort rating	poor
Sound quality rating	fair
Price	£30

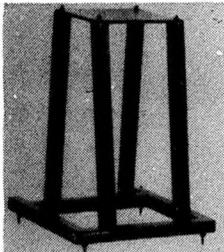
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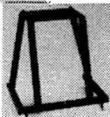
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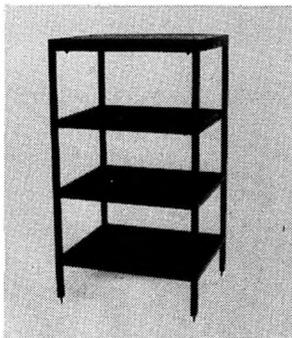
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SONY MDR-A60

SONY UK LTD, SONY HOUSE, SOUTH ST., STAINES,

MIDDX. TEL: (0784) 6700.



Here we have the designer headphone. The *MDR-A60* was designed by Luigi Colani and adheres to his 'bio-design philosophy'. The result is a pair of highly 'aerodynamic' lightweight headphones that house very similar looking drive units to those found in the *E272* model. They fold up quite neatly and fit into a plastic holder that one can wind the fine cable around. As you will have guessed they are specifically intended for personal stereos; although they feature the dual size 'unimatch' jack (gold plated), the short cord makes them less than ideal with stationary sources.

Despite the 'designer' tag, these headphones are not particularly comfortable – in fact I found the opposite to be the case. Admittedly they weigh very little, but the way they sit in the ear with the speaker facing forward seems a bit strange. However, I've seen plenty of people wearing more down to earth versions of the same form, and the editor swears by something very similar, so they can't be that bad. Neither do they look very robust, being mostly made of thin hard plastic with a slick pearly black finish, but I guess that once

you've reached this stage of personal stereo valhalla, you will have learnt not to sit on your 'phones.

Oddly enough they didn't sound as convincing as the *E272* earphones whose drivers they appear to share. This is probably because of the way the sound is directed forwards rather than into the ear. Predictably devoid of anything much below the midrange, they tended to sound a bit 'small' in the manner of small transistor radios. They made plausible enough sounds, however, and were reasonably informative if a little 'thin'.

GENERAL DATA

Type	intra-aural, 'open-air', dynamic
Mass	20g
Size rating	very small
Length of cord	1.2m
Comfort rating	poor
Sound quality rating	poor
Price	£40

SONY MDR V4

SONY UK LTD, SONY HOUSE, SOUTH ST., STAINES,

MIDDX. TEL: (0784) 6700.



A closed-back, supra-aural headphone, the *MDR-V4* is a reasonably lightweight design that can be folded up and kept in the pouch supplied. They are embellished with red 'for digital' legends and are probably intended for the *Discman* portable CD players made by Sony.

As on-the-ear headphones go the *V-4s* are reasonably comfortable and don't press too hard. The coiled lead, attached on one side only, can exert some tug if allowed to fall more than a couple of feet or hang between head and amplifier, which is a minor nuisance. The plug is what Sony call a 'unimatch' and features a standard 6.3mm jack screwed over a 3.5mm one for use with *Walkman's* etc. They are very nicely finished and reasonably well built, and should be able to endure moderate levels of abuse. However, having spent the required fifty quid, I expect most owners will take reasonable care of them.

Sonically I found them a little disappointing: the lower registers were rather obviously lacking, and the upper treble was a wee bit 'frayed'. One strength was the resolution of detail in the mid and

treble, which was quite informative. But at the same time they sounded rather 'cold' and 'flat', distorting instrumental timbre to a significant degree. The tonal balance would suit a warm, bass heavy source, which is hardly how I would categorise compact disc. That's not to say, however, that the *MDR-V4s* aren't enjoyable headphones with suitable material at moderate levels. It's just that they didn't stand up as well as some other models in comparison to the reference.

A feature that may be of some use is portability, and the *V4s* will fold into quite a neat and compact package, making them suitable for jet-setting (or train-setting) 'Walkpeople'.

GENERAL DATA

Type	supra-aural, closed-back, dynamic
Mass	165g
Size rating	small
Length of cord	3m
Comfort rating	good
Sound quality rating	fair
Price	£50

SONY MDR V6

SONY UK LTD, SONY HOUSE, SOUTH ST., STAINES,

MIDDX. TEL: (0784) 6700.



The *MDR-V6s* are larger than the other *V* models and have longer, oval circum-aural earpieces. These are set so that when the headband is at the top of the head the 'phones are at the right angle for one's ears, which seems to be a logical and effective system as these are reasonably comfortable headphones. However, for some ears they don't really fulfill the circum-aural precept of resting on the side of the head, being a little on the small side, and in my case resting partly on the ear.

Like the *V-4s* they fold up to an extent, and come with a suitable carrying pouch. The coiled lead terminates in a 'mismatch' jack which can be either 6.3mm or 3.5mm in diameter. The fully adjustable headband has padding and the legend 'studio monitor' emblazoned on it for maximum credibility. The whole thing is very well built and nicely finished, giving the impression of durability and quality.

Though still a bit lacking in bass these are a definite improvement on the *V-4s*, being a lot more civilised and quite dynamic. They are revealing and able to articulate vocals and other midrange content

quite informatively. The reproduction of electric bass guitar on the U2 track seemed quite realistic if too high in pitch, though this didn't detract from one's enjoyment. Taken on their own without comparison they work convincingly; it is only the comparison that shows them up.

If you need closed-back headphones for practical reasons then these are worth considering. But they don't really compete sonically with open-back models at a similar price.

GENERAL DATA

Type	circumaural, closed-back, dynamic
Mass	230g
Size rating	medium
Length of cord	3m
Comfort rating	very good
Sound quality rating	good
Price	£70

STAX SR 34

PATH GROUP PLC, UNIT 2, DESBOROUGH IND. PARK,

DESBOROUGH PARK RD., HIGH WYCOMBE, BUCKS

HP12 3BG. TEL: (0494) 459981.



The *SR-34* is the least expensive Stax 'earspeaker' available, and uses an electret diaphragm, which unlike electrostatics functions without a DC energising voltage. More conventional in appearance than the other two Stax models, they still require an *SRD-4* adaptor. This has to be fitted in between amp and speakers and features spring clips for the outgoing signal. Obviously it would be an advantage to have an amplifier with two sets of output terminals in this situation, as it would with the whole Stax range.

The *SR-30*, as the headphones themselves are marked, are a supra-aural type which feel fine initially, but tend to press rather hard on the ears and become uncomfortable after a while. What's more, the padded headstrap has sprung stainless steel under the vinyl and is unlikely to stretch with use. The flat, straight four-cable lead terminates in a five-pin plug that fits into the adaptor. Being reasonably light and uncoiled it didn't create any tug on the 'phones.

Sonically the *SR-34* had some of the magic of electrostatic designs, but lacked the absolute clarity and

control of the *Lambdas*. Bass was very tight and well extended, whilst the top end sounded lively but a little wearing when the volume was pushed. Not surprisingly the midrange was the *34s forté*, sounding sweet and open with fine detail. They had an appealing rhythmic quality that is hard to define, but important to the enjoyment of music.

To be honest, the *SR-34* doesn't offer *Lambda Pro* quality on the cheap, but they are nicely built headphones with some attractive sonic qualities nonetheless.

GENERAL DATA

Type	supra-aural, open-backed, electret
Mass	225g inc. lead
Size rating	medium
Length of cord	2.5m
Comfort rating	fair
Sound quality rating	very good
Price	£140

STAX SR GAMMA

PATH GROUP PLC, UNIT 2, DESBOROUGH IND. PARK,

DESBOROUGH PARK RD., HIGH WYCOMBE, BUCKS

HP12 3BG. TEL: (0494) 459981.

RECOMMENDED



Unlike the oblong *Lambda*, the less expensive *Gamma*'s earpiece is almost circular in shape, but retains the same electrostatic driver type. Being smaller they are a bit lighter than the *Pros*, and a little tighter on the ear, but I guess that they could stretch with use. Whilst being reasonably comfortable, they were a bit small for my ears and also got sweaty in use. However, this was the case with a lot of the plastic upholstered models and not a problem to those with more petite ears.

Retaining the same six-core, flat lead as the *Pros*, they were driven from a *SRD-6SB* adaptor that hooked up to the speaker terminals in the same fashion as the *Lambda*'s *SRD-7*. But this cheaper adaptor was only equipped with spring clips for the outgoing speaker cables. This could prove a pain if you use anything bigger than, say, Naim cable, and want to leave the unit in circuit.

Whilst being overshadowed to an extent by its bigger brother, the *Gamma* still fared well on audition. Nearly as lucid and only slightly less dynamic, they are still very musical and refined headphones. Showing good tonal range,

they displayed an excellent mid-range and reasonable bass, but on upping the volume the treble wasn't quite as smooth as one might like, sounding a little frayed at the extreme edges. Then again, they were one of the few models I trusted enough to risk increasing the volume significantly.

If they feel comfortable and you don't compare them with the cream, you'll have very little to complain about.

GENERAL DATA

Type	circumaural, open-backed, electrostatic
Mass	306g inc. lead
Size rating	large
Length of cord	2.5m
Comfort rating	very good
Sound quality rating	very good
Price	£199.85 plus £100 <i>SRD-6</i> adaptor

STAX SR LAMBDA PRO

PATH GROUP PLC, UNIT 2, DESBOROUGH IND. PARK,

DESBOROUGH PARK RD., HIGH WYCOMBE, BUCKS

HP12 3BG. TEL: (0494) 459981.

RECOMMENDED



This open-backed electrostatic has become something of a reference in hi-fi circles, and so comes with a fair reputation behind it. Although fairly heavy, most of the weight is supported by a wide limitation suede headstrap, and the pressure, exerted circumaurally, is just right.

The flat, six-core lead is reasonably light but does have some pull if allowed to trail to the floor. However, I found it almost unnoticeable when just falling onto the seat beside me. The lead is terminated in a five pin plug that fits into the *SRD-7SBmk2* adaptor. This has a short lead containing four stranded cables which attach to the amplifier's speaker terminals. Unfortunately the terminals for the outgoing speaker cables on the back of the adaptor, although of good quality, do not accept 4mm banana plugs. The adaptor features sockets for both professional and normal Stax 'earspeakers', a bypass switch for normal speaker use, and is finished to the same high standard as the headphones themselves.

The *Lambda Pros* were used as the reference for the review and as such were the first pair I tried. I

was impressed. It soon became clear that, despite being a little bass-shy, these were very revealing transducers. In fact, quite a lot more informative than the (admittedly cheaper) loudspeakers I normally use. Perhaps most striking was the ability to present each musical element so clearly; acoustic guitar notes that had previously blended together became separated and complex multi-instrument tracks were almost analytically sorted out. What's more, I could work out the lyrics on a ZZ Top track - remarkable!

I would still rather listen to loudspeakers, but these 'earspeakers' do warrant some attention. They are like a stethoscope for a hi-fi system, revealing subtleties that hadn't previously been apparent.

GENERAL DATA

Type	circumaural, open-backed, electrostatic
Mass	460g inc. lead
Size rating	large
Length of cord	2.5m
Comfort rating	very good
Sound quality rating	excellent
Price	£360 plus £185 <i>SRD-7SBMK2</i> adaptor



HEADPHONES CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

Jason Kennedy concludes the headphone tests with a run down of the best performing models.

For the most part it would seem that headphones still sound like headphones and that no dramatic improvements have been introduced since our last foray into the area. Those covered in this test displayed a wide variety of sonic styles, though the more expensive ones at least seemed to be on the right track – providing a subjectively flat response.

Considering the actual production costs relative to something like a loudspeaker it was surprising to find that one had to spend at least £40 to get a half-decent pair of headphones. What's more, the standard of budget loudspeakers has dramatically improved over the last six or seven years, although the headphone market is obviously far smaller and perhaps less competitive.

On the other hand even the least expensive of those tested didn't give me a headache and several, not necessarily dear models, were extremely enjoyable. Whilst not really comparable to the loudspeaker experience, headphones offer a more analytical means of listening, emphasising different elements that, depending on the standard of your loudspeakers, you may not have previously noticed. Another important strength of the medium, which must not be overlooked, is that you would have to spend up to four or five times more on a pair of loudspeakers to get the same amount of information. For instance one would be hard-pressed to find a pair of sub-£1,000 speakers as revealing as a pair of £100 headphones. The speakers may sound emotionally more satisfying, tonally more accurate, and definitely go down deeper, but

if it's information you're after, headphones are hard to beat.

Most of the comments made about the comfort were based on my own findings unless otherwise stated, and the 'comfort rating' in the data section were gleaned from marks given by a panel which comprised Patsy Hutton and Tyl and Janet Kennedy (my long suffering parents). Their help was invaluable in assessing which models were really suitable for most people.

Circumaural models seemed to be the most acceptable, but weight was also an important factor and lightweight supra-aural models that didn't exert too much pressure on the ears were well received. A good example is the Sennheiser *HD30* which was the least expensive on test. However, only a few of the 'phones on test proved comfortable in the long term, the majority getting hot and sweaty quite quickly. The cause was partly the way one's ears are covered, and partly because the padding material was virtually always plastic or vinyl; those that had some sort of soft acrylic covering had an instant advantage. It would be good to see the same sort of progression as car seats, *ie* from vinyl to cloth, happening in the headphone field.

BEST BUYS AND RECOMMENDATIONS

The price limit set for the Best Buy category in this test was \$75, an amount which covers the majority of headphones in the test. The Best Buy label denotes exceptional value for money and is no mean achievement. The fact that only a few of the headphones achieved this accolade does not

mean that the others do not merit attention, as the particular fit and tonal character of a model is a matter of personal preference as well as being related to the equipment with which they are to be used.

The Recommended flag denotes particularly good performance and is not related to price, but can be attributed to a model which comes close to Best Buy quality and offers good value for money. Again, the personal fit element is important and it would be unwise to purchase a pair of headphones without first trying them.

BEST BUYS

Sennheiser HD410SL (£26)

At only \$26 the *410s* offer good clarity and are more comfortable than many other models at twice the price. Perhaps suited to warm sounding ancillaries, they are well worth a listen.

Quart PMB25 II (£40)

This model also places sound quality a little above comfort, but achieved a 'good' rating on both counts plus being very musical and enjoyable.

Jecklin Float Model One (£75)

Undoubtedly offering exceptional sound quality for the price, they give an excellent impression of spaciousness and have a very good frequency range. There seems to be some division of opinion as regards comfort as they are heavy at 480g including 3m lead.

RECOMMENDATIONS

Audio Technica ATH-910 (£65)

These new closed-back headphones from AT are well designed and make very musical sounds, and will be useful if you

want to listen in a less than silent environment.

Quart PMB 65 (£70)

This is a quite revealing design for the price, with a fairly flat frequency response and an attractive musical quality. Comfortwise, they are middle of the road.

Sony MDR V6 (£70)

This well built closed-back model from Sony offers good sound quality of an articulate and dynamic nature whilst being portable and comfortable.

Beyer DT990 (£130)

These very smooth and yet revealing dynamic headphones gave a good impression of spaciousness and were comfortable to wear.

Sennheiser HD540 Reference Gold (£150)

Top of the range from this market leading brand is a dynamic and incisive headphone that comes complete with a smart wooden case.

Stax SR Gamma (£300)

Very comfortable and sonically effortless 'phones that are hard not to enjoy. The seamless clarity of electrostatics is very alluring and only potential buyers should risk trying them.

Jecklin Float Electrostat (£350)

The heavy rigid design of these 'phones has a significant effect on the exceptional sound quality that they produce; the unusual fit doesn't suit everybody but the sound takes some beating.

Stax SR Lambda Pro (£545)

Something of a legend in its own right, the *Lambdas* are incredibly revealing and offer a standard of musical reproduction only hinted at by loudspeakers at the same price.

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Choosing a good hi-fi dealer is the most vital step in acquiring the system that is right for you. This unique directory gives full information on dealers in your area.

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LYON AUDIO, 16 Peartree Business Centre, Peartree Road, Stanway, Essex CO3 5JN. (0206) 560259. QED, Rogers, Denon, Systemdek, Nad, Minitr, Rotel, Pink Triangle, JBL, J.A. Michell, Exposure. Dem facilities available. Open Mon-Sat 9am-6pm. Home trial facilities, free installation, credit facilities up to £1,000. Credit cards: Access, Visa, Amex, Diners Club, Hi-Fi Markets, Eurocheque. Service dept. available.

GLOUCESTERSHIRE

ABSOLUTE SOUND AND VIDEO, 40/42 Albion St, Cheltenham. (0242) 583960. A—R, Denon, Dual, Linn, Meridian, Mission, NAD, Rotel, Technics, Yamaha, etc. (Closed Wed). BADA MEMBER 
AUDIO EXCELLENCE, 58 Bristol Road, Gloucester. (0452) 300046. Audio Research, Dual, Krell, Linn, Magneplanar, Naim, NAD, Yamaha and lots more. Closed Mon.
ROBBS OF CHELTENHAM, 3 Clarence St, Cheltenham. (0242) 584404. Sansui pure hi-fi, Kenwood, Sony ES, Dual, Technics, QED, Heybrook. Dem facilities. Open 9-5.30 Mon-Sat. Instant free credit. Credit cards: Visa, Access. Service dept.

HAMPSHIRE

HAMPSHIRE AUDIO LTD, 2-12 Hursley Rd, Chandlers Ford (0703) 252827/265232. Quality CD and analogue agencies. 5 dem studios. Large free car park. BADA MEMBER 

TRUE-FI SOUND AND VISION, 10/12 Grosvenor Rd, Aldershot. (0252) 26390. Akai, Aiwa, B&W, Nakamichi, Hitachi, JPW, Mission, Mordaunt-Short, Nagaoka, Sony, Technics. Dem facilities available. Open 9.30-6.00 Mon-Sat. Free installation, instant credit up to £1,200. Credit cards accepted: Access, Barclaycard. Service dept.

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ACOUSTIC ARTS Ltd, 101 St Albans Rd, Watford, Herts. (0923) 45250. A&R, Audiolab, Denon, Magneplanar, Quad, Rogers, Meridian, TDL, Jadis, Krell. Dem facilities: 2 dem studios, ring for appointment. Open Mon-Sat 9.30-5.30. Home trial facilities, free installation. Instant credit up to £1,000. Credit cards: Access, Visa. Service dept. BADA MEMBER 
THE AUDIO FILE, 40 Hockerill St, Bishops Stortford, Herts. (0279) 506576. Linn, Roksan, Rega, Naim, A&R (Camb), Heybrook, Rotel, Denon, Epos, QED. Demonstration facilities, no appointment required. Open 9.30-5.30 Mon-Sat. Home trial facilities. Free installation, credit facilities up to £1,000. Credit cards: Access, Visa, Diners, Amex. Service dept. available.
W. DARBY & CO. Ltd, St Peter's St, St Albans. (0727) 50961. B&O, SonyES, Quad, A&R Cambridge, Revox, Denon, Yamaha, Luxman, Ariston, Thorens. Demonstration facilities, no appointment required. Open Mon-Sat 9.00-5.30. Home trial facilities, free installation, credit facilities. Credit cards: Access and Barclaycard. Service dept.

ISLE OF MAN

ISLAND COMPACT DISC CENTRE, Parliament Square, Ramsey. (0624) 815521. Musical Fidelity, Sugden, Celestion, Harman Kardon, Teac, Castle Acoustics, Philips, A&R, JBL, Luxman. Open Mon-Sat 9.00-5.00pm. Dem facilities. Home trial facilities, free installation. Full credit, no limit. Credit cards: Access, Visa, elite. Service Dept.

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JOHN MARLEY HI-FI CENTRES, 2 Station Rd West, Canterbury. (Canterbury) 69329. Also at Dover - (0304) 207562. B&W, Heybrook, Magnum, M.Y.S.T., Nakamichi, Pink Triangle, Rotel, Sansui, Technics, Quad. Dem facilities available. Open Mon-Sat 9.00-5.30 closed Thurs. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa, Creditcharge. Service dept.

LANCASHIRE

AUDIO COUNSEL, 12 Shaw Road, Oldham. (061) 6332602. Linn, Naim, Rega, A&R Cambridge, EPos, Mantra, Inca Tech, Denon, Monitor Audio, Heybrook. Dem facilities, appointment required. Open Tues-Sat 10-5.30. Thurs till 7pm. Free installation, credit facilities. Up to £1,000. Credit cards: Access, Visa, Credit Charge.
CLEARSTONE HI-FI, 235 Blackburn Rd, Bolton. (0204) 31423. Best makes, Linn, Creek, NAD, etc. Dem studios. Laser vision and compact disc centre. BADA MEMBER 
HI-TECH AUDIO, 7 Moor Lane, Clitheroe, Lancs BBY 1BE. (0200) 26563. Mission, Audio Innovations, Rogers, Quad, Rotel, NAD, Elite Rock, B&W, Castle, Wharfedale. Dem facilities, appointment required. Open 9.30-5.00, closed Wednesdays. Home trial facilities, free installation, credit up to £1,000. Credit cards: Access, Visa, Amex, Diners. Service dept. Mail order.
MONITOR SOUND, 54 Chapel St, Chorley. (02572) 71935. A&R, Dual, Mission, Quad, Rogers, Rotel, Spondor, Thorens, Nakamichi, Yamaha, etc. Dem facilities, 2 dem rooms. Open Mon-Sat, closed Weds. Free installation, instant credit up to £1,000. Credit cards: Access, Visa, Service dept.

LEICESTERSHIRE

SOUND ADVICE, The Sound Factory, Duke St, Loughborough LE11 1ED. (0509) 218254. A&R, Creek, Linn products, Epos, Mission Cyrus, Naim, Rega, Roksan, Rotel, Yamaha. Dem facilities, domestic size and furnished studios. Callers welcomed. Demonstrations by appointment. Open 9.30-6.00 Mon-Sat. Free installation. Credit facilities. Credit cards: Access, Visa, Amex. Service dept.

LONDON

AT LABS, 159 Chase Side, Enfield, Middlesex (01) 367 3132. Open Mon-Sat 10-6. Two single speaker dem rooms. Export worldwide. Service dept, car park. Amex, Visa, Access. BADA MEMBER 

AUDIO T. 190 West End Lane, London NW6 (01) 794 7843. Open Mon-Sat, 10-6.00. Two single speaker dem rooms. Access, Amex, Visa. BADA MEMBER 

BILLY VEE, 248 Lee High Rd, Lewisham, London SE13 5PT. (01) 318 5755/952 1321. Aiwa, A&R, Creek, Dual, KEF, Linn, Heybrook, Quad, Naim, Rega. Dem facilities 2 single system studios ring for appointment. Open Mon-Sat 10-7, closed Thurs. Home trial facilities, free installation, interest free credit up to £750.00. Credit cards: Access, Visa. Service dept. BADA MEMBER 

CORNFLAKE SHOP, 37 Windmill Street (just off Tottenham Court Road), London W1. (01) 631 0472 10am-7pm, Mon Sat. Cambridge, DNM, Epos, Koetsu, Naim, PS Audio, Roksan, SME, Van den Hul. Excellent demonstrations, 2 demo rooms, full delivery and installation service. Full credit facilities. Credit cards: Access, Visa.

COVENT GARDEN RECORDS, 34 Charing Cross Road (01) 379 7335/7427. Quad, B&W, Meridian, Mission, Yamaha, Sony, Philips, A&R Cambridge, Nakamichi, Rotel. Dem facilities - no appointment required. Open Mon-Sat 10am-7.30pm. Home trial facilities, free installation - to suit the customer. 7.30am-11.30pm weekdays, 9am-9pm weekends. Credit cards: Access, Visa, American Express, Diners Club. Service dept.

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MUSICAL IMAGES, 45 High St, Hounslow, Middlesex (01) 570 7512. AR, A&R, B&W, Bose, Denon, Dual, Harmon Kar-don, Musical Fidelity, Nakamichi, Quad. Single speaker dem room. Open 9.30-6 Mon-Sat. All credit cards.

SUBJECTIVE AUDIO, 12 Park Avenue, Palmers Green, London N13 (01) 886 2650. A&R, Burmester, Krell, Magnepan, Meridian, Linn, Nakamichi, John Bowers. Dem facilities. 3 single speaker dem rooms, appointment required. 10-6 Tues-Fri, 9-5 Sat. Home trial facilities, instant credit up to £1,000. Credit cards: All. Service dept.

TELESONIC Ltd, 92 Tottenham Court Rd, London. (01) 636 8177. A&R, B&O, B&W, Haller, Luxman, KEF, QED, Quad, Nakamichi, Rogers. Dem facilities available. Open Mon-Fri 9-6, Sat 9.30-4. Home trial facilities, free installation, credit facilities. Credit cards: Access, Amex, Diners, Visa. Service dept.

THE SOUND ORGANISATION Ltd, No. 1, Cathedral St, London Bridge, London SE1 9DE. (01) 403 2255/3088. Counterpoint, Denon, Exposure, Koetsu, Linn, Naim, PS Audio, Roksan, Rega, SME and others. Dem facilities available, ring for appointment. Open Tues-Sat, 10-7. Free installation. Credit cards: Access, Visa. Service dept. BADA MEMBER 

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ALTERNATIVE AUDIO Ltd, 93-95 Hobs Moat Rd, Solihull. (021) 742 0254 (sales), 0248 (service). A&R, Audiolab, Denon, KEF, Marantz, Meridian, Mission, M.A., The Source, Philips. Dem facilities available, appointment required. 10-6 Tues-Sat, closed Mon. Home trial facilities, 3 demo rooms, service dept, free installation, instant credit. Credit cards: Access, Visa, Amex.

FIVEWAYS HI-FIDELITY Ltd, 12 Islington Row, Edgbaston, Birmingham. (021) 455 0667. A&R, Denon, Dual, KEF, Meridian, Musical Fidelity, Nakamichi, Philips CD, Quad, Revox, etc. Dem facilities. Single speaker dem room. Open 9.30-6 Tues-Sat. Home trial facilities, free installation, credit facilities. Credit cards: Access, Visa. Service dept.

GRIFFIN AUDIO Ltd, 94 Bristol St, Birmingham. (021) 692 1359. Linn, Naim Audio, Rega, Creek, Denon, Nakamichi, Quad, Mission, Monitor Audio, Rotel. Dem facilities 2 single speaker rooms. Open Mon-Sat 9.30-6. Home trial facilities, free installation, interest free credit up to £1,000. Credit cards: Access, Visa. BADA MEMBER 

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ABSOLUTE SOUND AND VIDEO, 19 Old High St, Headington, Oxford. (0865) 65961. A&R, Denon, Linn, Mission, NAD, Rotel, Yamaha. Also 256, Banbury Rd, Summertown. BADA MEMBER 

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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 facilities available. Open Mon-Sat 9-1, 2-5.30, Wed 9-1. Home trial facilities, free installation. Credit up to £1,000. Credit cards: Access, Visa. Service dept.

STAFFORDSHIRE

GRANGE HI-FI LTD, 153 Branston Road, Burton-on-Trent (0283) 33655. Pink Triangle, Systemdek, Denon, Audio Innovations, A&R, Cambridge, Quad, Rotel, Elite Rock, Snell. Dem facilities - no appointment required. Open Mon, Tues, Thurs, Fri, Sat 9-6.00pm, Wed 9-1.00pm. Free installation. Credit facilities. Credit cards: Visa, Access. Service dept.

SUFFOLK

BEECHWOOD AUDIO, 3 Brentgovel St, Bury St Edmunds (0284) 68351. A&R, Ariston, B&W, Kef, Meridian, Musical Fidelity, Nad, Nakamichi, Pink Triangle, Quad. Single speaker dem room. Open Mon-Sat 9.30-6. Home trial facilities, free installation. Instant credit up to £1,000. Credit cards: Access, Amex, Diners, Visa.

EASTERN AUDIO, 41 Bramford Rd, Ipswich. (0473) 217217. Quad, Audio Lab, Denon, Dual, Marantz, Mission, Nad, Nakamichi, Technics, Arcam. Dem facilities available. Open Mon-Sat 9.30-6.00pm. Free installation. Credit facilities - Credit cards: Access, Visa. Service dept available.

SURREY

AERCO Ltd, 11 The Broadway, Woking (04862) 4667. A&R, Ariston, Exposure, HK, A.R., Heybrook, JBL, KEF, Magnan, NAD, Pt. Quad, Revox. BADA MEMBER 

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UNILET PRODUCTS Ltd, 35 High St, New Malden, Surrey KT3 4BY. (01) 942 9567. Mon-Sat 9-6. Thurs 9-7. Credit cards: Amex, Access, Diners, Visa. Dem facilities. Large stock. BADA MEMBER 

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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 MEMBER 

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.

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HASTINGS HI-FI, 31-32 Western Rd, St Leonards On Sea. (0424) 442975. A&R, B&W, Mission/Cyprus, NAD, Nakamichi, Quad, Rotel, Systemdek, Tannoy, Yamaha. Dem facilities 2 single speaker dem studios. Open Mon-Sat 9-6. Home trial facilities. Free installation. Credit facilities. Credit cards: Access, Amex, Visa. Service dept.

SUSSEX (WEST)

BOWERS AND WILKINS Ltd, 1 Becket Buildings, Littlehampton Rd, Worthing (0903) 64141. B&W, Dual, JVC, KEF, Nakamichi, Philips, Shure, Quad, Sony, Technics. Dem facilities 2 dem rooms. Open Mon-Sat 9-5.30, Weds 9-1. Home trial facilities free installation, instant credit up to £1,000. Credit cards: Access, Visa. Service dept.

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TYNE & WEAR

RED RADIO SHOP AND HI-FI CENTRE, 11 Olive St, (Off Park Lane) Sunderland. (Sunderland) 5672087. Aiwa, Bose, Denon, JVC, Luxman, Michell, Pickering, Spondor, Thorens, Trio. Dem facilities available. Open Mon-Sat 9-5.30. Free installation, interest free credit. Credit cards: Visa. Service dept.

WILTSHIRE

ABSOLUTE SOUND AND VIDEO, 60 Fleet Street, Swindon. (0793) 38222. A&R, Denon, Dual, Linn, Meridian, NAD, Rotel, Technics, Yamaha. (Closed Wed).

BADA MEMBER 
PR SOUNDS, 5 King St, Melksham. (0225) 708045. Pioneer, Akai, JBC, Dual, Ortofon, Philips, Toshiba, B&W, Celestion. Open Mon-Sat 9.00-6.00pm. Dem facilities, home trial facilities, free installation. Full credit up to £1,000. Credit cards: Access. Service dept.

YORKSHIRE (NORTH)

ELITE HI-FI, 178 Kings Road, Harrogate HG1 5JG (0423) 521 831. Voyd, Elite Rock, Systemdek, Celestion, Helius, Audionote, Snell Acoustics, JPW, Nakamichi, Teac. Dem facilities - 2 demrooms. Open 7 days a week 9-6. Free installation. Service dept. BADA MEMBER 

THE SOUND ORGANISATION, 36 Gillygate, York. (0904) 27108. Linn, Naim, Rega, Roksan, Epos, Ruark, Gale, Denon, Rotel, Mantra. Dem facilities available. Open Tues-Sat 10-6. Home trial facilities, free installation, instant credit (written details on request). Credit cards: Access, Amex, Visa, Diners. Service dept. BADA MEMBER 

YORKSHIRE (WEST)

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789115. A&R, Audiolab, Creek, Heybrook, Linn, Musical Fidelity, Naim, Quad, Rega, Rogers. Dem facilities available, ring for appointment. Open Tues-Fri 9.30-6, Sat 2.30-5.30. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Creditcharge, Visa. Service dept. BADA MEMBER 

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SCOTLAND

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ANGUS

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WALES

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ACTON GATE AUDIO, 4 Ruabon Road, Wrexham. (0978) 364500. Quad, Rotel, Nad, Onkyo, AR, B&W, Sansui, Revolver, Castle, Target. Opening times: Mon-Sat 9.30-5.30pm, closed Wed pm. Dem facilities available. Home trial facilities, free installation. Full credit, credit cards: Access, Amex. Service dept.

GLAMORGAN

AUDIO EXCELLENCE, 134 Crwys Road, Cardiff. (0222) 28565. Audio Research, Dual, Krell, Linn, Magneplanar, Naim, NAD, Yamaha and lots more. Closed Mon.

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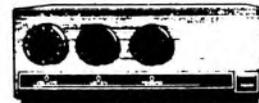
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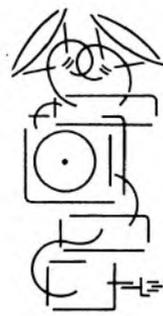
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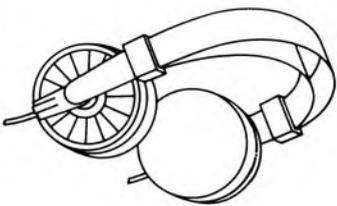
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Pre-packaged one make systems have been commercially very successful, with advantages like cosmetic consistency, competitive pricing, and (assumed) technical compatibility. However, despite the mass market clout of the consumer electronic giants, the hi-fi tradition of specialised separate components seems as strong as ever, and certainly represents the route taken by those who place sound quality ahead of other criteria.

Yet those who choose the separates route still have lingering doubts – usually completely unjustified – over the compatibility of components from different manufacturers. Gross incompatibilities are very rare nowadays, only likely to rear their heads amongst the most exotic components such as valve gear or second-hand items, and unusual even here. Meanwhile the subtle 'fine-tuning' of component matching is almost exclusively the preserve of the specialist, and a major reason for the superior sound of the well chosen separates system. Indeed, the delicate art of 'supercompatibility'



really takes over the major role at a 'super-fi' level, and might be regarded as the key to 'real' hi-fi.

Superficially the pre-packaged system offers better value, purely in terms of the features available for the price. But the buyer who takes the trouble to analyse his or her needs and preferences will often come to the conclusion that step-by-step building of a separates system will provide greater long-term satisfaction, giving flexibility for future upgrading if so desired.

A QUESTION OF PRIORITIES

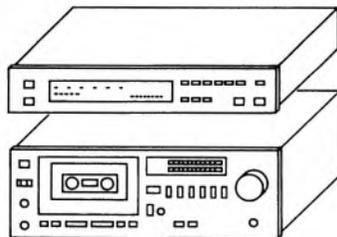
The key advantage of separates is

the opportunity to choose one's own preferences as priorities. Taking the trouble to try and establish these, leads most people to give up, assuming that they don't know enough even to start. But the process needn't be that difficult.

Begin by establishing whether you like to choose your own music, or have it chosen by someone else. This helps sort out what priority should be given to radio, but bear in mind that the best radio music is live radio music, which is very rare and often quite esoteric; when radio is merely an alternative source of pre-recorded material, the results will inevitably be inferior to those obtainable directly from the same source in the home, given a reasonably decent 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 radio tuner when funds permit.

There will always be controversy over the relative qualities of LP, CD and cassette, with earnest protagonists often trying to advance their prejudices by rubbishing rivals. LP is still the choice for ultimate sound quality – particularly for those prepared to



spend a substantial sum on a good quality turntable system. Furthermore the vinyl repertoire is still the cheapest, largest and most varied, especially if one acknowledges a secondhand market extending back 30 years. However, LPs remain tied to the home, are prey to warps and surface noise even when purchased new, and do not survive

rigorous physical abuse at all happily. Though bulky and heavy to store, the 12-inch cover has been turned to good use for artwork and liner notes, creating a pride of ownership somehow un-matched by CD or musicassette.

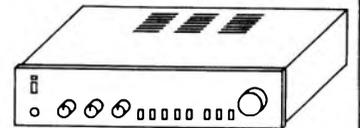
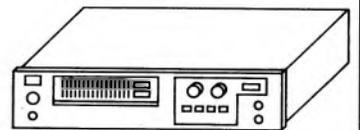
Cassette has never really challenged vinyl's potentially superior quality, but it is a multiple role format, offering 'go anywhere' flexibility, a uniquely useful recording capability, plus a broad catalogue of pre-recorded musicassette material. Although there are several potential rivals for recording from radio or pirating copyright material, the cassette still wins on convenience and compactness, though the sudden rise in popularity of double mechanism 'dubbing' decks remains mysterious. As a hi-fi medium cassette suffers from pre-recorded material which has been improving but is still patchy in quality, and can usually be bettered by a home recording, while any such home recording is inevitably poorer than the original.



There is also the worry that a tape made on a specific machine usually replays best on that machine, which may cause aggravation when upgrading a few years hence. Though such opportunities are rarely possible or practical, a live recording onto cassette using good quality microphones can be the hi-fi equal of any other source.

CD is the new 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. Player prices are still on the high side (typically £200), but dropping. However, disc prices are still nearly twice those of LP and cassette, (they're expected to drop in the New Year) which is a significant disincentive for the music lover who is effectively starting from scratch. A major influence over signal source priority will be how many LPs, tapes and CDs a person already owns. To replace even the key items of a large LP collection with CDs will cost a great deal of money.

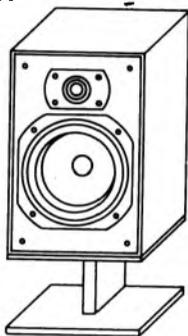


A MATTER OF PRECEDENCE

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).

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. Recently, however, this perspective has become steadily discredited by an alternative 'theory of precedence', which stresses that no subsequent component can make up for the inadequacies of its predecessors – all it can do is supply its own additional degradations. In such a context it is not uncommon to find more than half the system budget allocated to the record player.

with scrimping and saving made on amplifiers and loudspeakers, even though these are used all the time whatever the source. And such an argument applies just as strongly to those who wish to



record their LP records on to cassette, for convenience and use elsewhere.

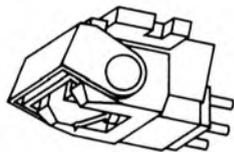
MAXIMISING POTENTIALS

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. Just lining the components up along a shelf or sideboard is a recipe for mediocrity, however much has been spent on the individual components themselves.

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. Though it is not really practical to move the walls around (and stud type walls behave differently from brick ones in any case), the odd strategically

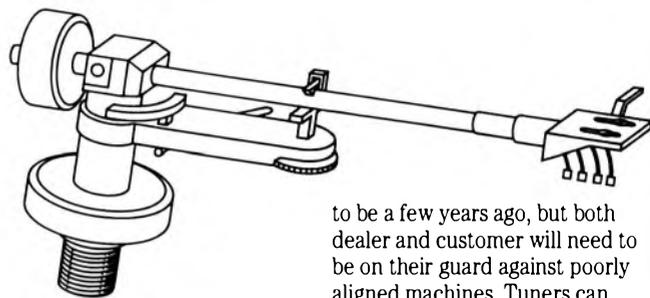
placed wall hanging, say above a fireplace, can work wonders in removing an unpleasant 'flutter echo' effect, while a decent carpet is almost mandatory. 'Live' rooms are usually those that are sparsely furnished with hard wall coverings, so the overall live/dead acoustic balance can often be modified according to the furniture (or even the number of people) present.

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 will be designed to operate close to a rear wall, others a metre or so out into the room, but all loudspeakers seem to benefit from being closely



mechanically coupled *via* proper stands to the floor.

There is some debate about the best form of fixing, and in some instances the floor resonances themselves can become excited, particularly if a single concrete casting, and this may cause undesirable side-effects. However, adjustable spikes through to the floor proper or seated into the tops of cross-head screws are generally regarded as the best solution in most circumstances, and seem to give the best rigidity. Some speakers will work best with another set of spikes operating upwards into the loudspeaker itself, but small pieces of Blu-tack are a popular alternative. There is no need for paranoia about using spikes through normal pile carpets because the holes will be almost impossible to find when the stands are removed, but polished wooden floors do present a problem here,



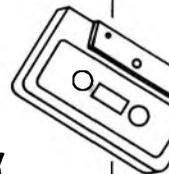
and hard plastic studs may be the only satisfactory solution.

Most decent quality turntables are fairly immune from feedback from loudspeakers, so it should not matter too much if these items are sited fairly close to each other. Indeed it is debatable whether any advantages gained from keeping the turntable well away are not lost through the need to use longer connecting cables. Turntables are usually susceptible to footfall shock, so one solution may be to use a wall bracket, but these do not sound as good as a floorstanding table as a rule. It may sound unlikely, but amplifiers and CD players (and presumably cassette decks too) can also benefit sonically from carefully stand- or bracket-mounting in a high quality system.

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.

Getting the best from a cassette deck is usually a question of making sure first of all that your deck does a decent job of replaying a good quality music cassette, and then finding out which tapes in the different price groupings give the best record/replay performance. The most common problem with cassette decks is in their alignment: matters are better than they used

to be a few years ago, but both dealer and customer will need to be on their guard against poorly aligned machines. Tuners can occasionally suffer similar problems, though this is even more unusual; most radio difficulties are likely to come from an inadequate or inappropriate aerial, after skimping on the less glamorous part of the budget. CD players have fewer consistency problems than analogue systems, though it is mildly ironic that they too seem to derive some sonic benefit from spiked stands or tables in a high quality system, and a poorly aligned machine may give poor disc tracking.



THE FINAL LINK

The key to getting the best results from a separates system lies in finding an experienced and skilled dealer in the first place. One who takes the trouble to find out what you really want and then demonstrate some likely alternatives, without trying to cram his own particular prejudices down your throat. To some extent the customer's task must be to discover for himself whether the dealer in question is competent or not. Membership of trade organisations like BADA can be a worthwhile pointer to a degree of professionalism, but the bottom line is whether the dealer in question can create a good sound in his own shop. If he can't, there is precious little chance of him doing so in your home. The best dealers should lay on demonstrations so you can hear the differences between components for yourself, and hear the sort of improvements which can be had at different price strata. You can then establish the sort of performance you are prepared to accept within whatever budgetary constraints you have set.

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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 former 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 £220	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Akai APA201 £80	Poor Average-	It 'lived down' to our expectations sounding 'dead' and 'smeared', with little depth and poor bass	Solid, autoret, direct drive, 5g P-mount		48
Alphason Sonata/HR-100S-MCS £695/£359	Excellent Very Good	Highly capable audiophile system with real resolution and control. Bass is powerful and dynamic ability unbridled	Manual, subchassis, belt drive, 10g	R	This
Ariston Q-Deck £140	Good Average+	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid	BB	This
Ariston RD60 £219	Good Good	With the Enigma arm, this balanced and communicative turntable falls only slightly short of the RD90 on sound quality	Manual, belt drive, subchassis, 11.5g	BB	48
Ariston RD40 Q/Enigma £388	Average+ Good	Worth considering for stylish appearance and decent performance, but undermined by RD60 in value for money terms	man/electronic, belt drive, subchassis 11.5g		48
Bang and Olufsen TX2 £288	Average+ Average+	Fully automatic, it can interface to B&O's remote control system, is attractively styled and even sounds respectable!	Automatic, belt drive, subchassis, 6g (B&O carts. only)		48 (Summary)
Dual CS503-1 £125	Poor Average	Slated as a replacement for the CS505, the 503-1 needs careful system matching to mask rumble and microphony, but is good enough to benefit from a better cartridge	Semi auto, belt drive, low mass arm	R	This
Dual CS5000 £200	Average Average+	The rare 78 facility may give grandma's collection a new lease of life but the player did not merit recommendation on price vs sound	Electronic, belt drive, subchassis, 10g		48
Heybrook T12 turntable & arm £279/£249	Average Good+	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, belt drive, 14g	R	This
Linn Axis £313	Good+ Good+	Selling new performance-for-price standards this cleverly engineered and competent deck has many of the qualities of the Sondek LP12	Electronic, belt drive, semi subchassis, 13g	BB	48/Coil
Linn Sondek/Ittok (Troika) £471/£399 (£546)	Excellent Excellent	Superb sound – the best LP12 combination yet. The Troika gives the system real solidity and strength, stretching the deck and arm qualities to the full	Manual subchassis player, belt drive, 14g	R	This
Logic Tempo/Datum II £240	Good Good+	The general character is lively and exciting, if a little full, with solid, clear open midband, and good stereo staging	Manual/electronic, decoupled plinth, 15g	BB	48
Lux PD290 £167	Average Average	For the non-critical user who likes Lux styling and who requires a basic turntable	Semi-automatic, direct drive, 10g		40
Manticore Mantra £300/£330 (Arm)	Good+ Good+	Fitted with a Rega RB250 arm variant and AT95E cartridge the Mantra fared very well indeed with a fine midrange and good focus	Subchassis, 12g, manual	BB	48/Coil
Mission 775LCT £200	Average+ Average+	Gives a tidy, coherent and well-integrated sound: a punchy performer if a bit bass light	Solid plinth, manual, 12g		40
NAD 5120 £90	Average Average-	Offering near hi-fi quality on a suspended sub-chassis deck fitted with an Ortofon OM10 cartridge can't be bad at this price	Semi-automatic, subchassis, 9g	BB	48
Oak/Moth £175	Average- Average-	Despite the excellent Moth tonearm, motor vibration on the Oak makes for a sonically poor performer	Solid, manual, 12g		48
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 'welle'	Manual, solid, belt drive, unipivot, 11g		This
Rega Planar 2 £135	Average+ Good	A remarkable product at the price, surprisingly articulate and confident	Integrated turntable, manual, 11.5g	BB	48
Rega Planar 3 £188	Good Good	A long time leader in its price category, the '3' (with its excellent RB300 arm) sounded nicely "musical" in a balanced and coherent manner	Integrated turntable, manual, 11.5g	BB	48
Revox B291 £629	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, pre-fitted cartridge		This
Rotel RP-830 £160	Average Average	Reasonable sound, but nothing to get excited about. Bass quality not well integrated, but control OK, mid/top are fine	Manual, integrated, belt drive, solid, inc cartridge	R	This
Source/Odyssey RP1 From £1,884	Very Good	Mixed. The turntable has tremendous power and authority, but as tested suffered pitch imprecision. The arm is rather ill controlled and lacks resolution and focus	Manual, belt drive, subchassis, motor, outboard PSU, 15g		This
Systemdek II £199	Good+ Good	Rating above average for its price the II sounded open and clear, if a bit soft in the bass	Manual/electronic, belt drive, subchassis, 15g	BB	48
Systemdek IIX £199	Good+ Good	The more conventional appearance of the IIX has made it popular, performing competently, but essentially sounding similar to the II	Manual/electronic, subchassis, 15g	BB	48
Technics SLBD-22 £90	Average- Average-	Not bad for the price and a great improvement on the L20, it performs reasonably when not stretched	Semi-automatic, solid plinth, electronic, 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 TD280 £159	Average Average	Not impressive in the context of other Thorens models. The sound was considered lively if somewhat coarse and brash	Electronic, solid plinth, 12.5g		48

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DIRECTORY

Thorens TD166III £179	Good Good	Old turntables never die; this revived 166 yet again takes its place near the top of its class	Autolift, subchassis, 7g	BB	48
Thorens TD316 £219	Good Good	A competent, well built if not dynamic sounding machine, ably holding its own in its price category	Electronic, subchassis, 4.5g	R	48
Thorens TD320 £319	Good+ Good	The top of the range and a solid performer providing a stable focused sound, and not critical of siting	Electronic, subchassis 7g (available without arm)	R	48

MOTOR UNITS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Ariston RD90 Superior £900	Good+ Good	Good but slightly damped sound quality, with powerful and stable bass. The quid pro pro is a certain lack of pace, energy and resolution.	Belt drive, subchassis, electronic		This
Audio Labor Konstant £2560	Good+ + Very Good	The space-station-like solid alloy frame needs a substantial shelf, but absolute stability renders a confident, neutral sound	Belt drive, subchassis	R	48/Coll
Elite Rock £350	Good Good	Tight, tidy sounding player which works with a wide variety of (non-tangential) arms, giving almost CD like precision and clarity. Good bass depth, but dry balance.	Manual, belt drive, solid, arm damping, various optional extras	R	This
Goldmund Studio £2350	Very Good Excellent	A reference point for high end audio, only exceeded by the even more extravagant Reference. Currently being reworked into a more competitive (!) package	Electronic, direct drive, solid subchassis	R	Coll
Logic Gemini £700	Good Average+	Innovative twin-motor design but insufficiently developed. Rates good overall but sounds a bit slow and lacking authority	Subchassis, electronic		48
Michell Synchro £235	Good Good	A particularly happy blend of qualities endows the Synchro with a blend of subtlety and force – the mailed fist in the velvet glove. Easy on the ear in the best sense	Manual, belt drive, suspended motor unit	R	This
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		This
Pink Triangle PT T00 £539	Very Good Very Good	A substantial improvement on its predecessor, the T00's new outboard power supply and motor gave a neutral sound with fine depth and detail	Electronic, subchassis	R	48/Coll
Roksan Xerxes £595	Excellent Excellent	This unique design cuts a swathe through the conventions of turntable design, providing superb resolution and stereo. Setting up is critical, and for experts only	Manual, belt drive, solid/decoupled	R	This
SEE Revolver £127	Average Average	Nicely balanced, but unimpressive timing and lightweight bass made this deck rather average for the price. Manufacturer has since made several changes, but not re-submitted for review	Manual, belt drive, solid plinth		48
Systemdek IV £448	Good+ Good+	Clarity and definition in the midrange and treble were outstanding. It was better for firm support; less happy on floor tables	Electronic, belt drive subchassis	R	43
Thorens TD160S Mk IV £225	Average Average+	Good value suspended sub-chassis turntable which doesn't need specialist setting up, and which performs consistently and well. Bass is little over-warm	Manual, belt drive, subchassis motor unit	R	This
Thorens TD521 £625	Average Average+	Niche product. Unexciting, rather undynamic and insubstantial sound quality, but facilities compensate	Manual, belt, suspended motor unit, 78rpm, pitch control, 12" arm/16" records		This
Zaruthustra Soliloquy £1995	Very Good Good+ +	Attractively designed heavyweight platform, offering very good sound quality but at a hefty price	Electronic, subchassis, belt drive	R	48/Coll

TONEARMS

NAME PRICE	LAB SOUND	COMMENTS	ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
Airtangent £1698	Very Good Very Good	This linear tracking air-bearing tonearm delivers the goods despite its extravagant price	7.5g (vert)	R	48/Coll
Alphason Opal £110	Good Average	This is a straightforward adequate sounding low cost arm, priced just above where it rightly belongs	10g		This
Alphason Delta £165	Good Average+	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason Xenon £210	Good Good+	A trimmed down HR-100S-ES, the Xenon has inferior bearings and a simpler finish, but sounds crisp and coherent. Fits any Linn cutout	12.75g	R	This
Alphason HR 100S £359	Good+ + Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	48/Coll
Ariston Enigma £126	Average Average+	Good but not the best in its class: mid-band sounds a little uneven; treble a trifle "brash"	11.5g		48
Audio Technica AT1120 £132	Good Average+	This low effective mass (5g) arm suits fairly high compliance MM cartridges; gives pleasant tonal balance with good stereo imagery	5g		35
Decca International £49	Average+ Average+	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48 Summary
Eminent Technology £960	Good+ Good+ +	One of the best sounding tonearms around, the linear tracking Eminent delivers impressive stereo imagery, focus and transparent sound	9g (vertical)	R	48/Coll
Goldmund T3F arm £3850	Excellent Excellent	This complex parallel tracker created an "ear-opening" experience when tested with a (since updated) Goldmund Studio turntable	16.5g	R	Coll 2
Grace 6707 £299	Good Good+	This venerable is still capable, if not competitive with modern alternatives	7g		48
Helius Orion 2 £490	Very Good Very Good	Very expensive but with a performance that merits recommendation	12g	R	48
Kusma £349	Very Good Very Good	A classic performance: solid and dynamic with exceptional bass weight and speed, if a little 'untidy'	14.5g	R	48/Coll
Linn LV Plus £129	Good+ Good	The fixed headshell provides an improvement over the LVX resulting in better clarity detail and punch	13g	BB	48
Linn lftok LVII £399	Very Good Very Good	Suitable for many turntables this top-quality arm performs best with the LP12, the combination exceeding the sum of both parts	13.5g	R	48/Coll
Logic Datum 2 £230	Very Good Good+ +	Rated sonically very good with fine depth focus and transparency, good air and life, albeit slightly 'untidy'	15g	R	48/Coll
Mission Mechanic £600	Good Good+	Nearly right, but inconsistency with level and vague imagery spoil what is otherwise a firm, powerful advocate for black vinyl	11g		This
Moth Arm £65	Good Good+	The ultimate budget arm? Refined, detailed, sweet and natural – performance improves in line with the rest of the system	12g	BB	This
Rega RB300 £90	Good+ + Good+ +	Despite its modest price this sets exceptional performance standards and could be used on a number of high-quality turntables	10 – 11g	BB	48/Coll
SME 3009 Series IIIS £156	Good Average+	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48
SME 3009 Series III £216	Good Average+	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009R £272	Average+ Average+	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48

DIRECTORY

SME Series IV £675	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	This
SME Series V £1138	Excellent Very Good	Excellent in terms of design engineering and sound quality, this arm arguably sets a new reference standard regardless of price	10.5g	R	48/Coll
Souther Tri-Quartz £850	Average Good	A unique parallel tracking arm that makes up for what it lacks sonically in its unusual appearance	3-4g		48
Well Tempered Arm £545	Good++ Good++	The overall performance of this arm "grows" on the listener, justifying the possible mounting complications and radical styling	6.8g	R	48/Coll

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 AMP MATCHING	VALUE	BACK ISSUE FULL REVIEW
A&R C77 £20	Average+ Average+	A sensible moving magnet package with good bounce at a competitive price	6-16g Normal	BB	48
A&R P77Mg £47.50	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	R	48
A&R E77Mg £57.50	Average Average	Our sample had a disappointing stylus, but gave a coherent, rich and laid back sound, with good 'scale'	3-8g Normal	R	48
ADC TRX1 £49.90	Average Average	Sounding bright and "tinkly" but with a rich bass this model may endear itself to those who like canaries and gongs. Now quite competitively priced	6-15g Normal		38
ADC TRX II £69.60	Average Average+	Comments like "fiercely exciting" treble and "plummy" bass made this cartridge seem overpriced, though price reductions now make it more competitive	6-15g Normal		38 (Summary)
Audionote 102VDH £795	Good Very Good	One of the best, giving 'an extraordinarily relaxing midrange clarity'. But it picked up a bit of surface noise and dust and needs a transformer	8-18g Very low (transformer)		43
Audioquest MC5 £200	Average Average	Offers high-output benefits but the drooping frequency response and severe VTA error preclude recommendation	10-20g Normal		54
Audioquest 404BL £299	Average Average	Lateral stereo imaging is thwarted by huge VTA error and the meagre tracking margins do little to help. Sound quality is not competitive	8-20g Low		54
Audio Technica AT 105 £13.95	Average Average	Tight budget people may enjoy this cartridge whose "overall performance was very good for the price"	6-16g Normal		43
Audio Technica AT95E £14.95	Average- Average	Clear, dynamic if richly balanced, the magnetic '95E is a definite Best Buy	8-14g Normal	BB	48
Audio Technica AT 115E £27.95	Average Average	Clear and detailed sound quality although a bit on the "heavy" side. Sonically lagged the cheaper 110E!	5-16g Normal		43
Audio Technica AT3200XEI £42.95	Average+ Average	This high output MC sounds better than it looks, with a decent 'laid back' sound quality	6-18g Normal	R	43
Audio Technica ATF3 £70	Average+ Good	Giving a big and generous sound, the ATF3 also has lively pace with good focus and depth, offering a near ideal balance for the price	4-12g Low	BB	48/Coll
Audio Technica ATF30CC £70	Good Good	Slight generator asymmetry but low overall distortion and broad arm matching, plus a lively balanced sound	8-18g Low	BB	54
Audio Technica AT 140ML £99.95	Average Average	Pricy product this. Prefers low-medium mass arms and low capacitance loading, and is sonically unremarkable	6-12g Normal		43
Audio Technica ATF50CC £100	Average+ Good	Decent output, good channel balance and a thoroughly refined sound sets the standard at £100	9-20g Low	BB	54
Audio Technica AT33ML £238.95	Average+ Good	A little expensive but technically competent, and sonically pretty good; low output MC with rather garish gilt finish	6-16g Low		43
Audio Technica ATOC7 £245	Good+	Technically and subjectively this cartridge represents a new dawn for AT, in the twilight of analogue audio	6-13g Low	R	54
Azden YMT0VE £12.50	Average Average-	A good tracker. Sounds rather bunched-up but not totally incoherent - for very basic systems only	5-15g Normal		54
Azden GM1E £30	Average- Average-	Of academic interest only, this high o/p mc is seriously flawed in sonic terms	8-18g Low/normal		54
Azden GMP5L £99	Average+ Average+	Although no P-mount system will do this cartridge justice, it can still be enjoyed in its universal mode. The subtle balance may prove irresistible to some	4-10g Low	R	54
B&D MMC5 £21	Average+ Average	Cheapest in the family - smooth treble and good focus, but the bass was left in the wings	5-15g Normal		38 (Summary)
B&D MMC4 £33	Good Average+	Solid and well balanced in the midrange, the '4 lacks bass impact	5-15g Normal		48
B&D MMC3 £50	Good Average	Slightly "laid back" sound quality but a good performer for the price. Best suited to B&D equipment	5-15g Normal		48
B&D MMC2 £75	Good Average+	Only a modest improvement on its cheaper brothers (and sisters)	5-15g Normal		48
B&D MMC1 £97	Very Good Good	Great clarity and detail at high frequencies but a slightly plodding bass. It may appeal more to the classical enthusiast	5-13g Normal		48
Cello Chorale £799	Good Very Good	Looking like a piece of NASA gadgetry the Chorale's transparent treble delicacy was without equal. A serious audiophile choice	4-10g Low o/p	R	48/Coll
Clear Audio Gamma £285	Average Average+	Brimming over with enthusiasm, the unusual-looking Gamma is more than an audio oddity, but it lacks a little subtlety at times	4-11g Low		54
Clear Audio Delta £450	Average+ Good	Midway between the Gamma and exotic Pradikat, the Delta sounds like neither! Nevertheless, it delivers the goods	6-17g Low	R	54
Decca Maroon £109	Poor Average+	Utterly different from other cartridges, the Maroon combines Heaven and Hell with good bass and midband but poor top-end control	8-16g + damping Normal		48
Decca Super Gold £248	Average- Good+	Sometimes a bit fierce in emphasising record surface faults, it is perhaps best at revealing the excitement and tension in music	8-20g + damping Normal	R	48/Coll

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DIRECTORY

CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM AMP MATCHING	VALUE	BACK ISSUE FULL REVIEW
Denon DL110 £60	Good Good	Firmly recommended as a fine all-rounder, this high-output moving-coil model is likely to perform well in nearly all circumstances	6-16g Normal	BB	48
Denon DL160 £80	Average+ Good	Although listeners just preferred the 110 its brother here proved a twin in lab tests and is still "thoroughly competent"	6-16g Low		43
Denon DL 103 £90	Average Good	This classic spherical stylus model gives lively sound with powerful bass, and is popular in broadcast studios	6-16g Low	R	48
Dynavector DV-50X £60	Good Average	A high-output MC model with impressive lab performance, but whose tip and sound quality both disappointed	6-14g Normal		48
Dynavector DV10X IV £60	Average Average+	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g Normal	R	48
Dynavector DV23RS £150	Average+ Good	Sound quality was described as "shut-in", lacking energy and sparkle but with some "edginess" in high frequencies	10-22g Low		28
Glanz MFG 110EX £24	Average Average	A little bright but giving detailed bass and clear treble this was competitive at the price	6-16g Normal	R	Systems
Glanz GMC20E £129	Average Average	You could try haggling but we thought the makers of this number were demanding too much lucre for their product	3-6g Low		48
Goldring Epic £18	Average- Average	An unpretentious "punchy" partner to a budget system, giving decent dynamics and focus	6-14g Normal	R	48
Goldring 1010 £33.95	Average+ Average-	Listening results were a disappointment for a design which "looks right" in many respects	8-16g Normal		43
Goldring G1010 £34	Average Average	A bit fiddly to set-up but rewarding once accomplished. The big and bouncy sound belies its price. Sensitive to amp loading	10-20g Normal	BB	54
Goldring 1020 £49.95	Average+ Average-	Like the 1010 this one strutted finely onto stage but couldn't project to the "gods"	8-16g Normal		43
Goldring 1040 £74.95	Average+ Average-	High frequency extension was improved by the van den Hul tip, nice looking model - no great actress	8-16g Normal		48
Goldring Eroica L £89	Average Average+	Open and relaxed sounding, the L version is just that bit more refined than its high output brother	7-18g Low	R	54
Goldring Electro II £135 complete	Average Average+	A pretty decent allrounder that did not excel sufficiently to warrant recommendation	8-16g Normal		43
Goldring Electro 11LZ Boron £199 complete	Average Average+	Well balanced sound but lacking low frequency authority, midrange focus and "punch"	12-20g Low		38 (Summary)
Grace F9E II £240	Good Good	For lively presentation, excellent separation and general satisfactory sonic delivery - consider this model	5-10g Normal		48
Grado XTE+ I £20	Average- Average	Bass and treble are a trifle coloured but the midband proved highly enjoyable. Ideal for budget systems	6-13g (damping) Normal	R	54
Grado XF3E+ £45	Average- Average	Downturning balance disguises the brightness of this cartridge, bit of a mixed bag at this price	9-20g (damping) Normal		54
Highphonic MCA3 £320	Very Good Good+	Exquisitely crafted by a group of ex-Denon engineers, this superb tracker had a sweet and seductive (if rather bright) treble	5-12g Low		43
Kiseki Blue Silver Spot £375	Average+ Good	Solid performance from a very solid cartridge but lacks some of the magic of other Kiseki's. Compliance too high	5-12g Low		54
Kiseki Purpleheart Sapphire £645	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		Collection
Koetsu Black K £550	Good+ Good+	Impressive in scale and dynamics but with some criticism of bass muddling and high treble tizz. Listen before deciding	6-18g Low	R	48/Coil
Koetsu Red £835	Good+ Very Good	Named like a rare, and perhaps dangerous, little oriental fish this famous cartridge sounded "almost larger than life"	10-25g Low	R	48/Coil
Linn Basik £18	Average- Average	This goes much further in delivering the goods than its price tag might indicate	6-14g Normal	BB	48/Systems
Linn K9 £64.88	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	BB	48/Coil
Linn Asaka £249	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	R	48/Coil
Linn Karma £399	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	R	48/Coil
Linn Troika £546.25	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		Coil
Madrigal Carnegie Dne £685	Average+ Good	Looks like a duck but sounds much better, certainly worth auditioning. Compliance too high	5-11g Low		54
Milltek Aurora £198	Good+ Good+	An overall feeling of relaxed ease characterised this clear and atmospheric Kiseki-built cartridge	8-16g Normal	R	48/Coil
Millteh Olympia £298	Average+	Warm and detailed sound - packs the punch of the best m-c's with high output as a bonus	12-20g (damping) Normal	R	54
Mission 773HC £150	Good Good	A sufficiently well-balanced and competitively priced "old-timer" which still warrants recommendation	6-16g Low	R	38
Monster Alpha 2 £479	Good Good+	In the final analysis this fine allrounder is insufficiently exceptional in any specific respect to justify fully its high price	6-14g Low		Collection
NAD 9100 £12	Average- Average	Clearly a Best Buy model for rock music fans, opera and choral music lovers might do better to avoid its tracking (in)abilities	10-20g Normal	BB	38
NAD 9200 £26	Average- Average-	Although competent in many respects, overall the 9200 must be considered an undistinguished contender	6-19g Normal		28
Nagaoka mm4 £8	Average- Average-	Clear punchy sound that delivers the rudiments of a good performance	6-16g Normal	R	54
Nagaoka MP10 £17	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and bass were energetic, bouncy and punchy	5-13g Normal	R	48
Nagaoka MP11 Boron £38	Average Average+	Responding well overall in PM's equipment and listening room, this model was mildly criticised for low level and dynamic limitations	5-13g Normal	BB	48
Nagaoka MP10SB £40	Average Average+	Stilton's mods have improved the fine detail resolution of this popular budget model	5-15g Normal	R	54

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 60



NEWSLETTER

Vol 3 No 9 – February 1988

The theme of this newsletter will be more direct in the matter of how the authentic High-end experience can be brought into your home. Our regular readers and friends will know that we share the prevalent view that Audio Research are well in the lead when it comes to amplifiers which do not mask the music. Thus the new SP-9 pre-amplifier at its price of £1,695 is a fine investment to start your move into the authentic High-end experience. Link it up with your existing integrated amplifier, or listen to it with a Quad 306 power amplifier!

We have already sold some SP 11 Mk. 2 pre-amplifiers, and can confirm that it is astonishing in its resolution of detail, power and subtly unimagined to have been hidden in records old and new. The cost is high, but you get your moneys worth, unlike investing in the stock market!

Whatever your budget, The Music Room can demonstrate the best value in purist sound-engineering. Thus, we can let you hear the famous value-for-money valve pre-amps by Concordant (under £700) and Croft (an amazing £150!). If solid-state pre-amps are your preference, we recommend the excellence of the PS 4.5 at £695.

ENTER SUMO

The Music Room is delighted to announce a range of American high-end amplifiers which do not cost the earth. We are approached regularly with products which purport to be high-end but inexpensive, but SUMO products represent something of a breakthrough: good news for American, and now British Audiophiles. The pre-amp and the "baby" power amp. cost £695 each, so book now for an audition as a stampede is inevitable.

TURNTABLES

The Oracle Delphi Mk. 3 with or without Air-Tangent tonearm speaks for itself to anyone who cares to listen. It gives an open, rich but detailed three-dimensional soundstage and let's be honest, if looks could kill . . . The

Alphason Sonata is something of a British equivalent as is the Michell Gyrodek with its new acrylic platter, both at a much lower cost. (We have a second-hand Oracle Delphi Mk. 2 with Sumiko arm on sale for only £995.)

We are overwhelmed by the precision engineering of the new bearing of the Roksan Xerxes, and its sound quality is immediately apparent upon listening. With the excellent value Rega RB-300 or RB-250, or the Mission Mechanic/SME IV or V the case for the Roksan can be conclusively demonstrated in one of our interview rooms. The SME IV at £675 is still in very short supply, but well worth the wait. A deposit of £75 and three to four weeks will transform your record collection forever!

THE BEST SELLERS

Our best selling-product for 1987 in Glasgow was the Systemdek 2X turntable. The reasons are clear: to buy a top quality subchassis turntable without compromise and with tonearm for £199 is proof that we do cater for those who wish to buy sound-engineering for a reasonable price.

Our best-selling amplifiers are from Audiolab, Cambridge Audio and Musical Fidelity all of whom offer a degree of excellence which is ensured by careful matching to the rest of your System. These British integrated amplifiers now reach a truly amazing standard, so now is the time to part-exchange your old Japanese receiver!

Our best-selling speakers are Monitor Audio and Rogers. These two distinguished ranges refine "box" technology to a degree unimaginable only five years ago, and at very reasonable prices from £169! The ultimate, however, rests with panel loudspeakers, but do not panic . . .

AFFORDABLE MAGNEPLANAR

The favourable currency exchange rate now makes available the amazing SMGa Special (black & chrome or brown and brass) at no increase in price, namely £697. We have commissioned a beautiful and rigid set of feet to upgrade the performance, and we urge our

customers to listen to the newly revised SMGa's. They represent an economic entry to real high-end Hi-Fi, because no other product at a comparable price gives the open, flowing sound from these panels. And they do not demand exotic power-amplifiers.

The Magneplanar range extends right up to the top with models such as the new 2.5, the III and the Tympani IVa all featuring the ribbon tweeter technology. As with all authentic High-end equipment, you soon forget the equipment as the musical realism convinces you that High-end Audio is a better investment than the next share issue.

ACCESSORIES, NECESSARIES

These offer amazing improvements and facilities at low cost, but are too numerous to list. Please send sae for our four-page catalogue. This includes several state-of-the-art cables and interconnects which bring the performance of the £1,000 unaffordable cables down to earth. This alone is worth your sae, but our catalogue contains much more!

APPROVED & GUARANTEED USED EQUIPMENT

An obvious saving is to buy good used equipment, but until now this has been something of a risk. There have been several cases this year of "butchered" Audio Research equipment being offered second-hand for low prices to tempt the unwary. Some of this is imported from Europe, some have old or ill-matched valves, repaired by inexperienced engineers on the cheap.

Absolute Sounds of London have now launched a scheme to protect buyers of used Audio Research through their elite franchised dealer network. An approved used product will have new valves of the recommended types and be fully refurbished and guaranteed for 12 months. The first two products on offer are an SP-8 for £995, and an SP-11 Mk II for £3,995 (or your mint SP11 I plus £995, or your SP-9/SP-10 etc.).

We also have a customer cancel-

led new KRELL KSA-100 Mk. II at a saving of £250 on this scarce model, and a pair of Apogee Duetta Mk. I in grey, mint condition at £2,250. These are a perfect match for Krell, Meitner or Tandberg amplifiers – otherwise, hesitate. STOP PRESS: Threshold S/150 mint condition, bargain at £995. We have a pair of ProAc EBS at £1,000, the amazing Accoustat-X at only £425 (beautiful in white, the electrostatic bargain of the year but like the owner, we lack the space!) and finally our ex-dem Infinity Reference RS IIb, slightly scratched and dented, hence £2,300, but acoustically perfect.

LONDON AGENT AND OVERSEAS

We have our man in London who takes care of our Southern customers' installations and after-sales service. And for overseas customers, we can arrange a 48-hour airfreight service at low cost which has been working well for us.

STEREO SHOWCASE

Our shop at 98 Bath Street, Glasgow offers the best in "designer" and lifestyle Hi-Fi, TV and Video equipment such as Nakamichi, Marantz, Philips CD and a new B&O Studio featuring the Link system of sound and vision remotely controlled and accessible throughout the house.

MOBILE FIDELITY

We also have a specialist shop offering the best advice and installations of in-car Hi-Fi to the same standards as our domestic equipment, that is sound engineering rather than gimmicks.

CONCLUSION

No-nonsense, fair-dealing and the best value and expertise if your goal is to achieve a soundly engineered reliable system which will give years of satisfaction. See the rest, the speak to us!

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DIRECTORY

CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM AMP MATCHING	VALUE	BACK ISSUE FULL REVIEW
Nagaoka MP11 Gold £45	Average— Average+	There were mild criticisms directed at most areas, but in general the sound was clear, open and even	3-8g Normal	R	48
Nagaoka MP11 Gold SB £70	Average— Average	Excessive price loading for a blob of aluminium	2-6g Normal		54
Ortofon VMSSE II £14	Average Average	Sound quality was thought fair for the price, though a little 'untidy'	8-18g Normal		38 (Summary)
Ortofon OM5E £16	Average— Average—	The OM10 is a hi-fi cartridge – the OM5E is not	5-16g Normal		43
Ortofon OM10 £21	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	BB	48
Ortofon VMS 10E II £21	Average— Average—	Some of its stable-mates fared rather better, and showed less evidence of tracking problems to boot	Normal		38
Ortofon VMS20E II £35	Average Average	One of the most popular cartridges ever, sound quality was a bit laid-back and tracking could have been better	3-10g Normal		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	R	48
Ortofon X1 £50	Average Average	The cheaper X1 scored higher marks with our listening panel than the X3, but both were a disappointment	6-15g Normal		48
Ortofon VMS30E II £52	Average+ Average	Rather an old soldier in relation to turntable technology, it will perform undemandingly in demanding circumstances	5-13g Normal		38
Ortofon MC10 Super £65	Average Good	"What a delightfully sweet-sounding cartridge this is..." we said	5-15g Low	BB	48
Ortofon OM40 £75	Average Average+	Highly competent engineering, secure tracking and decent sound quality are major strengths. But it's a little cold, a little polite	3-8g Normal		48
Ortofon X3 £75	Average Average	A lack of bass power, definition and a "zitty" top end makes this competent but uninviting (see above)	5-15g Normal		48
Ortofon MC20 Super £180	Average+ Good+	An "inviting" sound quality; polite rather than exciting it approaches much more expensive models, but does not better them	6-15g Low	R	48/Coil
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		
Ortofon MC2000 £450	Very Good Good+	There are few grounds on which to fault the MC2000, but extremely low output means the expense and aggravation of a transformer	5-10g Very low (transformer)		38
Pradikat by Clear Audio £1225	Average+ Very Good	Sounded absolutely glorious, creating a full sense of scale and a large well-focused soundstage – but watch for record wear	8-18g		Coil
RATA RP20 £22	Average— Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g	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	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		43
Rega RB100 £38	Average Average+	Remarkable mechanical performance in the right system context, but "try before you buy"	5-12g Normal	R	48
Shure M92E £15	Average— Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal		43
Shure M99E £24	Average— Average—	Sister to the 92E This is a solid but not particularly exciting cartridge	5-10g Normal		38 (Summary)
Shure ME75E0 £24	Average Average—	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal		38
Shure M104E £32	Average— Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal		38
Shure ME97HE £43.95	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	R	48
Shure M105E £45	Average Average—	A slightly 'spitty' sound lacking deep bass and dynamic contrast, but can be used in virtually every system where it will perform "unobtrusively"	5-12g Normal		38 (Summary)
Shure M110HE £55	Average Average	Sound quality was thought eminently presentable, but not exciting; smooth clear high frequencies, but a loss of bass definition	5-10g Normal		38 (Summary)
Shure M111HE £67	Average Average	Early reviews of this cartridge complained principally of the price – which has since come down	5-10g Normal		38 (Summary)
Shure ML120HE £95	Average+ Average+	Quite decent sound quality and a generally fine balanced performance	6-18g Normal		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		43
Shure V15 VMR £195	Good Average+	Initial listening gave promising results, but extended familiarity gave the feeling of a lack of energy and a "shut-in" sound	5-12g Normal		38
Shure Ultra 500 £452	Good Good	There was no doubting the accomplishments of what could well be the finest moving magnet cartridge around	6-14g Normal		48
Supex SM100E £115	Average Average+	Delivers as much musical information as many moving coils – the bass in particular having an attractive bounce	6-15g Normal		38
Supex SD900IV £350	Average+ Good+	The 900 is an inherently fine cartridge, but despite a recent update it is beginning to show its age	10-18g Low	R	48/Coil
Supex SD901IV £375	Average+ Good+	This high output model delivered sufficient subjective and objective performance, plus good compatibility, to justify its price tag	8-18g Normal	R	48
Supex SOX2000 £651 L £721 H	Good Good+	The high-o/p 2000 was preferred on listening tests to the low-o/p model, which even so has a unique place among the top designs	6-16g Either		48
Van Den Hul MC10 £699	Good Good+	A neutral balanced performer giving transparent midrange, fine depth and focus with firm extended bass. Gosh!	5-10g Low	R	48/Coil
Van Den Hul MC One £799	Good Very Good	This extended all the positive qualities of the '10 but added greater authority and scale – worth it for the extra money	6-12g Low	R	48/Coil

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

HI-FI CHOICE

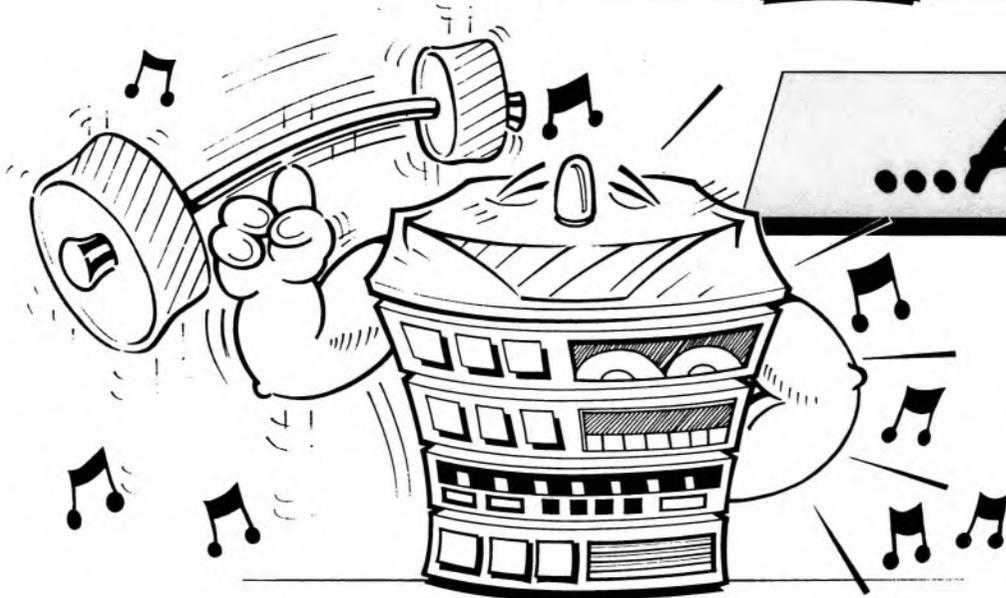
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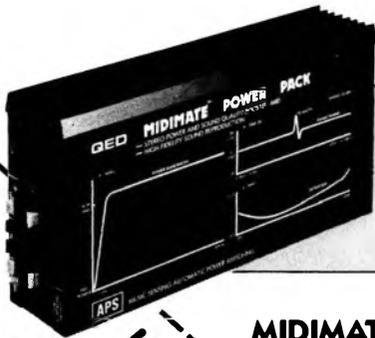
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AMPLIFIERS

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, and 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
A&R Arcam Alpha £149.90	Average+ Average	This good all-rounder sounds musical if slightly softened	Good build and presentation	5 inputs hdphMM/MC tone controls 30W	R 50
A&R Arcam Delta 90 £329.90	Good Average+	Well balanced and sweet-natured in any given system with MC capability, but pricey		70W MM/MC 5 inputs tone controls	R 50
Audio Research SP8 £1998	Very Good Good++	The sound from this valve pre-amp was good enough to do justice to the finest ancillaries		5 Inputs MM	R 48
Audio Research MT00 £2850 each	Good+ Excellent	These high end valve mono-block power amps justify their cost by providing near state of the art sound quality. Our reviewer was so excited he bought them		100W	R 50
Audio Research SP11 £5150	Very Good Excellent	Current state of the valve pre-amp art. A reference point		Straight line MM/MC Disc + phase invert	R 50
Audiolab 8000C £300	Very Good Good	Bettering the high standard set by the integrated 8000A this pre-amp sounds more tidy and refined, if a little clinical and cold		5 inputs MM/MC Disc hdph tone controls	R 50
Audiolab 8000A £325	Very Good Good	A strong contender using high grade circuitry and providing good sound quality on all inputs. Hard to fault at the price		5 inputs MM/MC disc 50W hdph tone controls	BB/R 50
Audiolab 8000P £465	Very Good Good+	A gutsy performer providing high levels into both 8 and 4ohm loads. A power-amp to keep the competition worried		100W	R 50
Beard P35 £695	Good Good++	A superbly built and engagingly rhythmic valve power amp, sounding sweet and slightly soft in the classic valve style		35W	R 50
Beard 506 £995	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	R 50
Beard M70 £1595 pair	Good Good+	A substantial British monoblock power amplifier, but not a great deal more impressive than the P35 at half the price		70W	R 50
Burmester 838 £1490	Very Good Good+	A disc-only minimalist pre-amp, strong points include excellent build, extreme neutrality, dry clean bass and notably sharp stereo focusing		MC only, MM option	Collection
Burmester 846 £1599	Very Good Good+	Usually coupled with the 838 this high-level pre-amp provides many and versatile input facilities		6 inputs	R Collection
Burmester 850 £3995	Good+ Good+	Each of these mono power amplifiers contains separate high current 25W amps giving a refined coherent sound over most of the frequency range		100W	R Collection
Cambridge Audio P40 £200	Good Good	A very fine sounding integrated amplifier with simple facilities and MC cartridge capability		5 inputs 40W MM/MC straight line	BB 50
Cambridge Audio C75 £260	Good+ Good++	Whilst not quite on par with its A75 companion this pre-amp provided excellent stereo imagery but was a touch "heavy" in character		MM/MC disc	R 50
Cambridge Audio A75 £280	Very Good Good++	This strong power amplifier sounded open and effortless, with fine bass drive and dynamics, albeit a touch grainy and harsh at high frequencies		100W	R 50
Cello Audio Suite £6000+	Excellent V Good/Excellent	Cello's pre-amp represents a whole new ball game in flexibility and sound quality (or war of attrition on your wallet)		Optional inputs MC etc	R 50
Conrad Johnson MV50 £1795	Good+ Good++	Coupled with the PV5, this CJ power amp performed well on audition		50W	R Coll
Conrad Johnson PV5 £2010	Good+ Good++	The PV5 is a classy sounding valve pre-amp, and natural partner to the MV50		5 inputs MM	R Coll
Conrad Johnson Motif MC-8 £2500	Very Good Good++	A cheaper alternative to the '7, this pre-amp is an undoubted success in maintaining the Motif sound but does not compare on sound quality		MM/MC	R 50
Conrad Johnson Premier Three £3775	Good+ Very Good	The Three is a musically accurate and graceful pre-amp which proved versatile on a wide range of inputs		5 inputs MM/MC	Coll
Conrad Johnson Premier Four £3900	Good+ Good++	Ambience was the Four's forte – this power amp proved exceptionally revealing of instrumental locations		100W	Coll
Copland Pre and power amps £649 each	Good+ Good	At £649 each this simple Danish valve pre/power combination is expensive, though the power amplifier sounds very easy on the ear		3 inputs MM, 12W	50
Counterpoint SA7 £747	Average+ Good+	Simple valve Californian pre-amp offering inspiring transparency for the price		4 inputs straight line MM/MC	R Coll
Counterpoint SA12 £1250	Good+ Good+	A real power-house power amp, beefy and load-tolerant although like the SA7 a trifle untidy at frequency extremes		100W	R Coll
Creek 4040 £145	Average+ Average	This simple integrated model had a controversial sound, liked by some, plus an acceptable lab performance		4 inputs MM 12W	R 50
Croft Micro £150	Average+ Good+	A real upsetter this excellent valve pre-amp put the cat among the pigeons proving good sounds can be made at budget price levels		4 Inputs MM straight line	R Coll
Croft Super Micro £250	Good Good+	With industrial looks and double mono operation, it rated particularly well on disc input, although not so hot on CD		4 inputs MM straight line	R 50
Croft Series IVS £730	Good Good++	A lively and "fast" valve power amplifier, delivering the goods with a pleasing "classical" tonal quality		40W per channel	R 50
Deltec DPA 100S £1900	Very Good 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-707 £100	Average+ Average-	Originally a budget "best-buy" the 707 still merits recommendation with a sound quality that sets it apart from "rack-system" standards		25W MM 4 inputs hdph	R 44
Denon PMA-250 £125	Good Average	As a "budget-plus" integrated amplifier the '250 gave an open sound with lively dynamics and should appeal to a wide range of tastes		25W MM hdph	BB 50

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HI-FI CHOICE

DIRECTORY

AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
DNM 3 £1000	Good+ Good++	The DNM3 in its acrylic case is a remarkably revealing and neutral state of the art pre-amp	5 inputs MM/MC twin vol controls	R	44
Exposure VIII £310	Very Good Good	This power amplifier created a good impression of speed and power, but was a trifle fierce in the treble	50W	R	50
Exposure VII £340	Very Good Good	A double mono transistor pre-amp with a notably dynamic and punchy character, though not suited to all tastes	3 inputs MM/MC	R	50
Haffer DH120 kit form £295	Good	We didn't build one; see below	60W		44
Haffer DH120 assembled £360	Very Good Good	On sound quality results were substantially good, but this power amp won't set the world on fire at this price	60W		44
JVC AX-22 £110	Average Average-	Serves a market that buys on features rather than sound quality. Includes special "flashing light" power meter	55W MM tone controls		50
Kenwood KA-550 £130	Good Average	Decent sound quality and build at an affordable price, it also has a capable moving coil input - something of a rarity among the competition	40W hdp Tone controls MM/MC	R	50
Krell PAM5 £1589	Very Good Good+	Superbly built, the Pam 5 pre-amp gave good definition throughout the frequency range with a good measure of excitement	MM/MC	R	50
Krell KSA50 Mk2 £2495	Very Good Good++	This power amp still holds its own with good depth and ambience and excellent stereo focus	50W	R	50
Krell KMA-100 II £5900 pr	Excellent Excellent	A genuine reference standard power amp, capable of justifying a wildly extravagant price tag in an appropriate system	100W, Monoblock	R	Coll
Le Tube £585	Good+ Good+	If moving coil sensitivity is not required then this pre-amplifier will offer a clean view with very good stereo	3 inputs MM	R	44
Linn LK2 £373	Good+ Good	This pre-amp was marginally less successful than the LK1 but the pair (of Linns) worked well together and are well worth considering	5 inputs MM/MC		50
Linn LK1 £425	Good+ Good	A durable tolerant power amp, setting a respectable standard on both lab test and audition	60W		50
Linx Stratos £999	Good+ Good+	Facing strong competition in the UK this New Zealand pre-/power combination gives good sound quality... but not exceptional at the price	120W MM/MC straight line		50
Luxman LV-105 £599	Very Good Good	Superbly finished and built, in a sense this model managed to capture the "valve" sound with an easy musical quality and good bass register	85W MM/MC		44
Magnum A100 £1995 pair	Good++ Good+	Given their massive power rating a pair of A100's make a fine stereo power-amp; ideal for high levels and with a wide dynamic range for digital programme	320W	R	50
Marantz PM26 £110	Average Average-	Well built and attractively presented this just manages recommendation, though sonically falling somewhat short of the best examples of its type	30W MM sliding tone controls	R	50
Marantz PM45 £200	Good+ Average	Generally pleasant and polite with above average clarity; there was some softening in the bass, restricting dynamic output somewhat	40W MM/MC tone controls	R	50
Mission Cyrus One £150	Good Good	A reference standard amplifier for its price category the Cyrus 1 attained a high sonic standard. A stylish, neutral performer	5 inputs MM - medium MC 30W straight line	BB	50
Mission Cyrus Two £300	Good+ Good+	A significant improvement on the already competent 'One, the 'Two remained neutral and confident over the whole frequency range	50W 5 inputs MM/MC Disc straight line	BB	50
Mission Cyrus Two with PSX £500	Good+ Good+	Although making the 'Two more powerful, the PSX power supply does not offer significantly better sound quality	A power supply, see above		50
Musical Fidelity A1 £249	Average+ Good	Fine-ranking in terms of overall sound quality for money, the excessive heat output could be hazardous to your vinyl if you're careless	20W MM/MC 4 inputs straight line	R	50
Musical Fidelity A100 £439	Good+ Good+	This is another one recommended for fine sound with which you could keep your Chinese carry-outs warm	50W MM/MC 5 inputs	R	50
Musical Fidelity P170 £499	Very Good Good+	Acquitted itself well, later samples showing steadily increasing refinements	85W	R	50
Musical Fidelity MVT Mk 3 £1199	Very Good Very Good	The MVT pre-amp was "simply a knockout in its class", providing competition for £2000-plus amplifier systems	MM/MC 5 inputs	R	50
Musical Fidelity P270 £1199	Very Good 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 A370 £2199	Very Good Very Good	Arguably the finest sounding power-amplifier manufactured in the UK	185W	R	50
Myst TMA3 £288	Very Good Average++	This excellently-constructed, no-frills, dependable amplifier should offer long life with above average sound quality	35W MM/MC 4 inputs		50
NAD 3020e £110	Good Average+	A little light in balance and "weight" but superior to run-of-the-mill budget amplifiers	20W MM/MC 4 inputs	BB	50
NAD 2200 £339	Good++ Average+	Not recommended on grounds of sound quality, but worth serious consideration for its exceptional power output	100W		44
Naim NAIT £258	Average+ Good	Well built with good load tolerance the NAIT delivered a fully competitive sound in spite of its modest measured power output	15W pc MM 3 inputs	R	50
Naim NAC 32 £425	Very Good Good+	A natural partner to the Naim power-amps, with power supply options at different prices	MM/MC, 5 inputs	R	50
Naim NAP 250 £966	Very Good Good+	Well-matched to the Naim pre-amps, and capable of high quality sound levels over the whole dynamic range	70W	R	50
Nuance £795	Very Good Good+	A subtle civilised pre-amp though a little lacking in resolution and detail; suited to some tastes but not top-drawer	4 inputs MC	R	50
Perreaux SA3 £690	Very Good Good	This exotic New Zealand-built pre-amp did not really offer the sort of sound quality expected at the price	4 inputs MM/MC		44
Perreaux 1850 £990	Very Good Good	This power amp's musical qualities were disappointing, though powerfully delivered. Build and finish were exemplary	180W		44
Plenitude £795	Very Good Good+	Rating slightly higher than its Nuance partner, this power amp provided a tight, controlled sound, if somewhat lacking in scale and grace	80W	R	50
PS Audio PS4.5 £696	Very Good Good+	Sonically the best pre-amp in its class, but on the bright side, so purchasers should try it with their prospective equipment	MM/MC	R	50
QED A230/240CD/240SA £119/£149/£199	Good Average+/Good	Each model proves a worthwhile step up. The cheaper A230 was civilised, while the '240s were more dynamic with fine resolution of space and depth	4 inputs 40W hdp (MM) (240 SA MC)	BB	50
Quad 34 £269	Very Good Average+	This well-built durable pre-amp 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

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DIRECTORY

AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Quad 405 £329	Very Good Average+	Not an impressive power amp but easy on the ear if not pushed and very reliable	100W		44
Quicksilver £1775 pair	Good+ Good++	A remarkable valve power amplifier with little to criticise; fast, articulate bass, neutral midrange and open clear top end	60W	R	50
Radford STA25 Renaissance £977	Good Good++	Offering superb midrange performance if not quite as good at the extremes, the Renaissance valve power amp is a genuine audiophile product	25W	R	50
Robertson Forty Ten £987	Very Good Good+	Here is a neat little power amp (60W) you can fit and forget, it proved most satisfying over long listening sessions	60W		Coll
Rotel RA-820BX II £150	Good Good	Rating very highly for the price, it proved a hard and fast amplifier, easily achieving a best buy rating	4 inputs MM hdph 25W	BB	50
Sansui AU-G11X £139	Good+ Average	Tightly controlled if somewhat congested and lightweight, but a reasonable compromise between features and sound quality	25W MM hdph 4 inputs, tone controls	R	50
Sansui AU-G30X £199	Good++ Average	A very competent amp with no glaring faults, performing well with phono and compact disc inputs	4 inputs MM 45W tone controls hdph	R	50
Sansui B2301 £1880	V Good Good	Rating better than the pre-amp and providing generous power output, this amp could not be considered competitive in its price bracket	300W		Coll
Sansui C2301 £2306	Excellent Good	Sansui's flagship pre-amp did not really rate well given its price, but is not short on features	All facilities		Coll
Sony TAF 500ES £349	Good+ Average-	Not too hot at the price, lacking in bass action, rating poorly on vinyl, and only marginally improving on CD	75W hdph tone controls MM/MC		50
Sony TAF700ES £500	Good++ Average	Scoring higher than the 500 but still not offering the sort of standards set by the competition. But many buttons to push	100W MM/MC tone controls		50
Tandberg 300BA £564	Very Good Good	Although featuring comprehensive facilities this pre-amp was considered a little clinical and lacking in musical integration	6 inputs tone controls hdph		44
Tannoy SR-840 £1713	Very Good Good+	A "muscle" power amp, capable of impressive levels into difficult loads while remaining quite subtle and revealing	250W	R	50
Technics SU-500 £100	Average Average-	Technics have something of a knack in creating models which just border on what we regard as the minimum standards for Hi-Fi. This is an example of that	40W MM hdph tone controls		50
VTL Minimal £340	Good Good	Providing decent sound quality at the price, this basic pre-amp sounded open and clear in mid and treble	3 inputs (MM)	R	50
VTL 50W £1150	Good Good	Rating good on audition and providing complementary characteristics to the minimal pre-amp, these monoblock power amps sounded a little slow and unrevealing	50W 3 inputs	R	50
Yamaha AX-300 £120	Good Average	A lively and dynamic performer, offering a credible if bright sound at a competitive price	30W hdph tone controls (MM)	R	50

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 Research BBX £100	Average Average-	Spacious and informative sound quality with bass well under control. Not that there was much bass to control	40 x 25 x 19cm shelf or 50cm stand near wall	88.5dB/W 70Hz		53
Acoustic Research 22BX £160	Average Average	Basically well-engineered with sound "nicely out of the box". Some of our "ears" were less enthusiastic	47 x 29 x 22cm shelf or 50cm stand near wall	89.5dB/W 55Hz	R	53
Acoustic Research 35BX £250	Average Average-	This is quite loud, with some boom and tizz, making it suitable for supine strummers of imaginary guitars perhaps	58 x 26 x 27cm free space on 40cm stands	91.5dB/W 55Hz		53
Apogee Scintilla £4950	Good Very Good	These take-me-to-your-leader speakers gave exceptional transparency and can achieve excellent results in a true audiophile system	145 x 88 x 9cm free space on floor	79dB/W 20Hz	R	46/Coll
A&R Arcam Three £150	Average+ Average-	Arcam's baby speaker did not delight our listeners, but it might do better in less expensive systems	34 x 18 x 23cm close to wall at head height	88.5dB/W 95Hz		53
A&R Arcam Two £250	Good Average	Most things to most men this compact is unlikely to disappoint with its lively "bally" character though lacking weight... a bit	38 x 23 x 28cm near wall shelf or 40cm stands	88dB/W 55Hz		53
A&R Arcam One £349.90	Good Average+	Some boxiness in the midrange and fizz in the upper treble prevented this from getting the "R" tag	47 x 27 x 33cm open stands, free space	88dB/W 55Hz		46
Audiostatic ES200 £1495	Average Average+	Sounding forward and unbalanced with limited bass power, these excelled in transparency and detail, and might suit some tastes	150 x 53 x 23cm low (10cm) stands away from wall	79dB/W 45Hz		46
Audiostatic ES300 £1995	Average+ Good	Marred by similar problems to its cheaper ES200 stablemate, this line source electrostatic was superb in the upper-mid and treble but lumpy in the bass	44 x 5 x 93cm free standing	82.5dB/W 30Hz		46
Avance 120 £279	Average+ Average+	This unusual "after eighties" looking speaker has the recipe for success, but not quite the right seasoning yet	42 x 30 x 30cm 30cm from wall on 40cm stands	86.5dB/W 60Hz		53
B&W DM100 (I) £100	Good+ Average	This market leader has recently been 'improved' - though the original was good enough	37 x 22 x 22cm open stands near wall	89dB/W 75Hz	BB*	46
B&W DM110 (I) £140	Good+ Average+	Another established favourite, it has recently been 'improved', but not yet checked by us	49 x 26 x 25cm open stands	89.5dB/W 56Hz	BB*	46
B&W LM1 Mk II £199	Average+ Average	Probably one of the best 'micros' ever made, worth considering for special applications (boats or vehicles). Upgraded since our review	24 x 15.5 x 20cm shelf or flush mount	86.5dB/W 80Hz		31
B&W Matrix 1E £595	Very Good Good+	There was enthusiastic and consistent praise for these speakers with their "revealing and seductive" midrange	41 x 23 x 32cm free space on 35cm stands	85.5dB/W 50Hz	R	53

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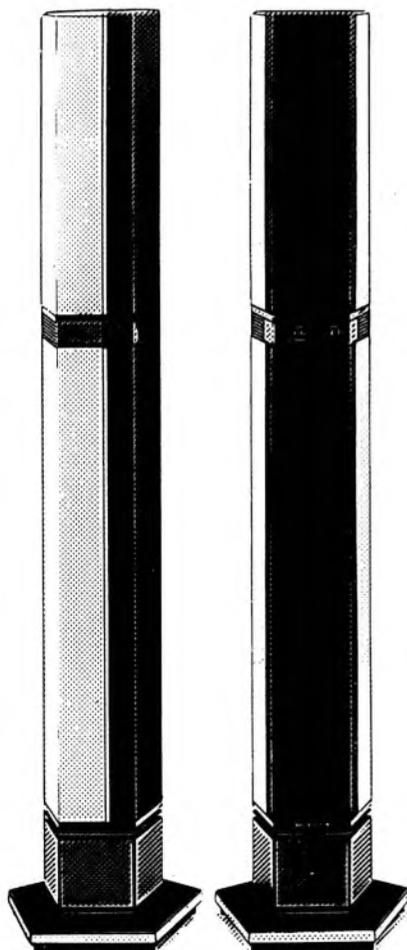
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LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
BBC LS3/5A £164	Good+ Average+	As a working tool it does its job but as a piece of value engineering this old-timer is beginning to look a bit grey-haired	30 x 18.5 x 16cm open stands, free space	81.5dB/W 57Hz	R	Coll
Boston A4011 £110	Average Average-	Competent performance for size and price but below average relative to the UK competition	34 x 21 x 20cm on stands near wall	88.5dB/W 63Hz		41
Castle Clyde £112	Average+ Average	A tidy little performer packing punch, but beginning to show its age in the light of new competition	37 x 21.5 x 22cm open space on stands	89.5dB/W 64Hz	R	46
Castle Durham £179	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 £269	Good Average+	Comfortably recommended, a sweet smooth sound with good overall balance of engineering-based performance	55 x 37.5 x 30.5cm open space on stands	88dB/W 46Hz	R	31
Celestion DL4 (II) £109	Average+ Average	Strong stereo and controlled bass gave BB status, 'shrill' top end only real criticism. (Now in untested Mk II form)	38 x 21 x 23cm stands near wall	89dB/W 85Hz	BB*	46
Celestion DL6 (II) £139	Average Average+	The control and power sets it well apart from the run-of-the-mill. It has since been updated	45 x 25 x 25cm open space on stands	88.5dB/W 60Hz	R*	46
Celestion DL8 (II) £199	Good Good	An easy speaker to live with that will not 'close up' when driven loud. (Also updated since our review)	50 x 28 x 27cm on stands open space	88dB/W 55Hz	BB*	46
Celestion SL6S £350	Good Good+	A luxury compact speaker that gives a sweet treble sound with fine musical detail	37.5 x 20 x 27cm free space on 40cm stands	84dB/W 50Hz	R	46
Celestion SL600 £700	Good Good++	Clearly an exceptional device in terms of design and transparent sound quality. An audiophile miniature	37 x 20 x 25.5cm open space on stands	83dB/W 55Hz	R	46
Celestion 6000 £1470	Very Good Very Good	A genuine full-range audiophile quality speaker system - with Star Wars styling to suit a high tech environment	Complex, on floor in free space	82.5dB/W	R	Coll
Gale 301 £259	Average Average+	Of unusual, distinctive appearance this produced a mixed response, being lively but lacking depth	44 x 23.5 x 22cm on stands quite near wall	86.5dB/W 63Hz		46
Gale GS402 £599	Average+ Average+	Clean but rich and powerful bass; stereo focus was not a strong point, but it is worth considering	61 x 35.5 x 28cm on matching stands near wall	88dB/W 48Hz		46
Goodmans Maxim Two £80	Average+ Average	More wham-bam-thankyou-mam sound that imitates much bigger speakers when you let these babies yell. (A well-controlled yell)	26 x 17 x 19cm near wall on shelf or stand	86dB/W 85Hz	BB	53
Goodmans Point 3 £90	Average+ Average-	Recommended as good value for money, but our listeners' differing opinions mean your ears should judge for themselves	47 x 25 x 20cm shelf/high stand near wall	90dB/W 80Hz	R	53
Goodmans Point 7 £170	Average+ Average	Basically competent performance-mix and a lot of speaker for the money, but a certain lack of refinement nonetheless	69 x 33 x 26cm free space on 35cm stands	89dB/W 47Hz		53
Harbeth HL Mk 4 £475	Good+ Good+	Recommended for the good results at its price, and only mildly criticised for heavy bass and a mild 'chestiness'	64 x 33 x 30cm free space on 46cm stand	89dB/W 40Hz	R	53
Heybrook HB1 £169	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 HB2R £269	Average+ Average	Criticism of the mid and treble balance made this dynamic model less attractive on listening test than was hoped	41 x 23 x 23cm on stands, tilted, near wall	88dB/W 61Hz		46
Infinity Reference Standard IIB £3850	Average+ Good+	Sonically easy to live with, these had areas of truly great performance, but were complicated by many controls	160 x 57 x 30cm free space on low stands	90dB/W 25Hz	R	46/Coll
JBL TLX-3 GI £130	Average Average-	Lively and punchy but also untidy this little speaker may have deviated from the Hi-Fi standard but cannot be summarily dismissed	38 x 25.5 x 22cm free space on stands	87dB/W 55Hz		46
JBL L 60T £370	Good+ Good	Well balanced and offering realistic value for money, the fine treble and extended bass make it suitable for larger rooms	78 x 30.5 x 26.5cm low stands or floor	88dB/W 40Hz	R	46
JBL 18Ti £559	Good+ Good	Beautifully engineered, well finished miniature with many good points, but unexceptional overall. Try the cheaper L20T	34 x 24 x 22.5cm 50cm from wall on rigid stands	85.5dB/W 53Hz		46
JBL 250Ti £3300	Good+ Good+	In general this speaker did not show the required level of dynamic presentation transparency and stereo depth expected of a pricey flagship model	132 x 57 x 36cm free space on floor	89dB/W 53Hz		46
JPW AP2 £145	Good Average+	Few grounds for criticism but purchasers should check out the treble qualities to avoid hammering the ear anvils	46 x 26 x 25cm 40cm from wall on 45cm stands	89dB/W 65Hz	BB	53
JPW AP3 £210	Good Average+	Pretty good stereo and well balanced overall it had its own character which is well suited to vinyl replay	52 x 25 x 29.5cm near wall on stands	90dB/W 57Hz	R	46
JWS Quintet £100	Poor Poor	Poor stereo focus with up to 3dB channel difference, coloration, boom, "sting" and the grille rattled.	19 x 19cm close to wall head height	86dB/W 55Hz		53
KEF C10 £94	Good Average-	Listening panelists gave this a poor reception	30 x 20.5 x 17.5cm stand near wall	87.5dB/W 75Hz		46
KEF C40 £209	Average+ Average-	Criticisms were made of a lack of fine detail and loss of depth and transparency, but it could handle power well	65 x 24.5 x 26.5cm free space on stands	90dB/W 55Hz		46
KEF 103/3 £630	Good+ Good	Technically impressive, excellent bass/power handling for size, but not for the audiophile system. Better among cheaper components, and good in a large room	56 x 27 x 30cm supplied stands free space	90-95dB/W 35Hz		53
KEF 104/2 (inc KUBE equaliser) £800 (£900)	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	53
KEF 107 £1890	Very Good Good+	A welcome sense of ease and lack of strain at most normal levels. Minor criticisms included a dulling in the extreme treble. Excellent bass extension	116.5 x 33 x 45cm on floor in free space	87.5dB/W 20Hz	R	Coll
Linn Kan £271.95	Average- Average-	The acid test of "blind listening" may dissolve the Kan's high status with strong criticism, but the answer, as always, is: "suck it and see"	30.5 x 19 x 16.5cm back to rear wall on rigid stands	85dB/W 90Hz		41
Linn Isobarik £1568	Good Good++	Exceptional capabilities in the dynamic range and bass performance; demands serious consideration as a state of the art contender, but odd stereo	76 x 33 x 41.5cm low stands against rear wall		R	Coll II
Magneplanar SMGa £697	Average- Average	Tonally 'rich', in the right room it proved a satisfactory musical experience	122 x 48 x 4.5cm on floor clear of wall	85dB/W 56Hz		46
Magneplanar MGIIla £2750	Good Very Good	Another excellent true-audiophile loudspeaker this American panel speaker helps to convey much of the original character of the music	180 x 62 x 38cm well clear of walls	84-86dB/W 35Hz		46
Marantz LD20 DMS £130	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
Meridian M30 £725	Average+ Average	Pricy but easy on the ears and worth considering especially where space is at a premium	38.5 x 18 x 32cm free space on stands	Active 40Hz		46
Mission 70II £100	Good Average	Lively and transparent, the 70 II was favoured for its speed, though the sound had a mildly 'thin' tonal balance	35 x 21 x 21cm on stands or shelf near wall	89dB/W 68Hz	BB	46
Mission 700LE £130	Good Average	Mission re-submitted this popular model and again got a positive review - which proclaims their (and our) consistency	38 x 21 x 21cm straight ahead stand near wall	89dB/W 66Hz	R	53
Mission 737 £240	Average+ Average	To its credit the 737 was generally articulate and well integrated but stereo was poor and it could sound loud and hard	54 x 25 x 27.5cm low stands near wall	89.5dB/W 58Hz		46

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DIRECTORY

LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Mission Argonaut £700	Good Good	Perhaps not the most subtle or sweet these were recommended for their excitement, drama, power handling and... good looks	95 x 23 x 31cms floor-standing near wall	91dB/W 40Hz	R	53
Monitor Audio R100 £130	Average+ Average-	Tonally quite neutral, but with small box character, negligible low bass and a rather 'hard' midrange	40.5 x 25 x 21cm free space on stands	87.5dB/W 70Hz		46
Monitor Audio R252 £150	Average+ Average	Rating well for its price this model displayed a rather rough top end and a generally dry character helped by good detail and focus	47 x 25 x 24cm stands quite near rear wall	89dB/W 62Hz	R	46
Monitor Audio R352 £250	Good Average	Well-built and finished, 'sensitive' speaker which is easy to drive and capable of extracting good results from any good amplifier	64 x 25 x 32cm on stands in free space	90dB/W 50Hz	R	46
Monitor Audio R700 MD £269	Average+ Average+	Lively and involving with good, punchy, if rolled off bass. The metal dome speaker gives a clean and open treble	32 x 21.5 x 25cm on stands 0.4m from wall	87.5dB/W 62Hz	R	46
Monitor Audio R352MD £280	Good Average+	Better suited to CD than vinyl perhaps, this is clearly good value for money. But some found it coarse while others praised its cleanliness	64 x 25 x 32cm 25cm stands in free space	89dB/W 42Hz	R	53
Monitor Audio R652 MD £369	Average Average+	Mild bass and crossover weaknesses were criticised, but the sound was quite well liked and it is decently built	51 x 20 x 26cm free space on 40cm stands	86.5dB/W 45Hz		53
Mordaunt Short MS10 II £90	Average Average-	One of the best miniatures around. A borderline Best Buy because of the bass limitations, which may depend on your taste	29 x 20 x 17cm wall bracket	86dB/W 75Hz	BB	53
Mordaunt Short MS100 £179	Average+ Average+	A mid 'forward' tonal balance is main drawback but other aspects such as ambience, transparency and stereo depth compensate	32.5 x 22.5 x 21.5cm stands near wall	85dB/W 80Hz	R	46
Mordaunt Short 45Ti £220	Good Average	A sensitive tandem-bass number that can be driven loud but loses its balance a bit and can be unsubtle	63 x 26 x 30cm low (20cm) stand near wall	90.5dB/W 52Hz		53
Mordaunt Short MS300 £309	Average+ Average+	Not considered particularly competitive in its class, though it has good power handling and stereo focus	54 x 22.5 x 25cm on stands near wall	89dB/W 65Hz		46
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	53
Quad ESL-63 £1458	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	46
Rogers LS2 £170	Good Average+	A coherent and polite speaker considered more suited to classical music. Tonally well balanced, neutral and with good power handling	36 x 23 x 22cm on stands near wall	86.5dB/W 51Hz	R	46
Rogers LS6 £240	Good+ Good	Sonically fitting in between the LS2 and 7, the 6 was a consistent success on audition - well balanced with an open and informative nature	51 x 27 x 28cm open stands, free space	87.5dB/W 50Hz	BB	46
Rogers LS7i £360	Good+ Good+	A fine combination of classic qualities at reasonable price produces the "R" tag, but try to get a pair home on approval to check for bass 'heaviness'	56 x 27 x 28cm free space on 40cm stands	88.5dB/W 48Hz	R	53
Roksan Darius £1150	Average Wrong but interesting	A controversial speaker which when set up right can deliver impressive performance, but with a far from neutral balance	98 x 31 x 51cm integral stands near side walls	88dB/W 50Hz		53
Rotel RL850 II £120	Average+ Average	Strongly recommended. Well-balanced, clear, with decent focus and fine stereo, but tendency to 'heaviness' needs decent stands and space	44 x 25 x 24cm free space on 40cm stands	86.5dB/W 50Hz	BB	53
Royd A711 £99	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		53
Royd A25 £100	Average+ Average-	Receiving mixed reactions on audition, the A25 is flawed but offers a lot of speaker for the money	51 x 29.5 x 24cm, stands near wall	87dB/W 52Hz	R	46
Ruark Broadsword £700	Average- Average-	Fancy cabinetwork is no real compensation for technical weaknesses which led to three mentions of "suckout" in our review	43 x 23 x 28cm free space on 40cm stands	82dB/W 43Hz		53
Sony APM10ES £100	— Average	An obvious Best Buy at its highly competitive price point, it can do justice to a good hi-fi system of Sony or specialist origins	40 x 25 x 20cm, 40cm stands 40cm from wall	87dB/W 55Hz	BB	53
Sony APM 20ES Mk II £150	Very Good Average+	A smooth integrated sound with little to criticise at the price. If anything, a little bass forward, but remarkable nonetheless	43 x 25 x 29cm, free space, stand	86dB/W 50Hz	BB	46
Sony APM22ES £249	Good+ Average+	Sounding notably clear, the 22ES scored well on listening tests was easy to drive and achieved high sound levels	51.5 x 29 x 30cm free space on 40cm stands	88.5dB/W 46Hz	R	46
Spendor Prelude II £320	Good+ Good	Good clarity and detail were evident everywhere in this speaker. Though a little boxy or muddy in the midrange it is strongly Recommended	50 x 26 x 28cm open stands in free space	88dB/W 52Hz	R*	46
Spendor SP2 £420	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	46/Coll
Spendor SP1 £640	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	46/Coll
Spendor SA3 Passive £1320	— Good+	Same as Spendor SA3 active	85 x 38 x 46cm low	89dB/W 32Hz	R	46
Spendor SA3 Active £2308	Good+ Very Good	Substantial speakers designed to deliver high sound levels and killer bass. Suited to larger rooms and power hungry ears	85 x 38 x 46cm low rigid stands in free space	89dB/W 32Hz	R	46
Spica TC-50 £595	Average+ Good	These American wedge-shaped-cabinet speakers just merit recommendation at their price and were detailed and clear	40 x 33 x 28cm free space on 50-60cm stands	85dB/W 48Hz	R	53
Tannoy Westminster £3300	n/a Good+	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few pockets and rooms	Huge, flat against rear wall, away from corners	96dB/W (manuf.)	R	Coll
Technics SBC 250EK £130	Average+ Average-	Despite a fairly even tonal balance, the 250EK sounded muddled in the midrange and dull in character	36.5 x 23.5 x 20.5cm free space, stands	86dB/W 60Hz		46
Technics SB-RX50 £500	Very Good Average+	With its unique coaxial drive unit the RX50 proved a smooth and well balanced loudspeaker, its minor weakness being a mildly excessive low bass	48 x 30 x 26cm free space on 40cm stands	86dB/W 40Hz	R	46
Wharfedale 504 £129	Average+ Average	Acquitting itself well on audition, the 504 produced a clear, reasonably balanced sound with above average treble	21 x 18.5 x 20cm stands, near wall	85dB/W 75Hz	R	46
Wharfedale Delta 50 £130	Average+ Average-	Given the price this was a mild disappointment - there is nothing obviously wrong but it just seemed a bit mundane	48 x 27 x 19cm near wall on 40cm stands	88dB/W 55Hz		53
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
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.

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 60

DIRECTORY

CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal – at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes – see **Comments**.)

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 dependant upon factory alignment. The mechanical integrity of the mechanism itself is another crucial factor, that is often reflected in the asking price.

All modern hi-fi decks have Dolby B and the majority have Dolby C besides; the very worthwhile HX Pro system is becoming steadily more

widespread. Remote control remains rare, though sometimes it is available as a system option. Three-head recorders allow simultaneous checking of the recording being made. Auto-reverse is a useful convenience feature, but usually with some mechanical compromise, while double-mechanism 'dubbing' decks of dubious quality are fashionable at the bottom end of the market. The welter of different 'music search' systems available is some indication of their frequent ineffectiveness.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa AD-F260 £90	Good Poor	Well equipped conventional budget recorder measured rather better than it sounded	Dolby B, C, Bias adjust, auto tape select		52
Aiwa AD-R460 £149	Average Average—	Some worthwhile features but sound quality was not especially liked	Auto reverse, Dolby B, C, Track search, Bias adjust		52
Akai GX-6 £329	Good Good	There is a strong sense that someone has really thought this one through; it has an indefinable 'specialness'	Dolby B, C, Bias adjust, Track search	R	52
Denon DR-MD7 £140	Average+ Excellent	Despite minor operational and measured shortcomings, sound quality is excellent for the price	Dolby B, C, Record bias adjust	BB	52
Denon DR-MT2HX £220	Good Good+	Well constructed and pleasant to use, a lack of true pitch constancy kept it from sounding superb	Dolby B, C, HX Pro, Track search, Bias adjust	R	52
Denon DR-M30HX £319	Good Good+	Ergonomically fine with infra red remote, the M30 fared well on pre-recorded material and was at its best with ferric tapes	Infra Red Remote, Dolby B, C, HX Pro, 3 Head, bias adjust	R	52
Denon DR-M44HX £400	Excellent Excellent	A well designed deck that also performed fine sonically, working very well with ferric and metal tapes	3 head auto tape set up, real time counter, Dolby B, C, HX Pro,	R	52
Harman Kardon TD202BL £249	Average Average	A competent middle-ranking performer but lacks sonic incisiveness and is a bit expensive	Dolby B, C, Bias adjust		52
Harman Kardon CD491 £695	Good Good+	Excellent audio engineering and tremendous flexibility make this an audiophile cassette deck 'par excellence'	Dolby B, C, MPX Bias/Sensitivity adjust, Track search	R	52
Hitachi D-007 £300	Average— Poor	This double 'dubbing' deck proved a mixed bag – good in parts but disappointing overall	Continuous auto reverse, twin deck, Dolby B & C, dubbing, High Speed		52
JVC TD-X202 £130	Average Average	A bit of a mixed bag, with rather basic controls and an unimpressive sound quality	Dolby B & C		52
JVC TD-X502 £250	Average— Average	Inconsistent sound quality and lab performance, alongside complex ergonomics and elaborate search facilities	Dolby B & C, Music Search, Intro Scan, Remote Option		52
JVC TD-V66 £350	Average Average	A user-friendly modern player marred by a 'lazy' undynamic sonic character	Auto Tape Sel., Track Search, Dolby B & C		52
Kenwood KX550HX £150	Average Average+	This well-laid-out and attractive deck ultimately lacks the edge to stand out in a competitive field	Dolby B & C, HX Pro, Auto tape select, Track search		52
Luxman K-100 £199	Average+ Average+	Poorly laid out but it fared quite well on metal tapes. Commercially recorded tapes sounded bright and cramped, however	Dolby B & C		52
Luxman K-105 £349	Average Average	Rating quite well for an auto reverse deck, and featuring complex track search facilities, it was not sonically competitive on price	Auto Rev, Dolby B & C, Auto Tape Sel.		52
Marantz SD-35 £160	Good Good+	Rock steady tape transport gives very competitive sound quality for the price. Based on rock steady tape transport, this slightly bright replay may not appeal to some	Auto Select, Dolby B & C	BB	52
Marantz SD-4511 £200	Good+ Good+	Well built and dynamic sounding player, working better as a recorder than with musicassettes	Dolby B & C, Separate MPX, Auto selection	R	52
Marantz CP230 £250	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, Bias adjust, Pitch control, Portable	R	52
Nakamichi BX-125E £395	Good Good	This well engineered budget Nakamichi fared very well on all but pre-recorded material. Fundamentally very, very right	Dolby B & C	R	52
Nakamichi BX300E £645	Good Good	Playback of tapes made on the machine is excellent, sounding quite unlike a cassette deck. Musicassettes were not so hot	Optional Remote, B & C	R	52
Nakamichi CR-7E £1500	Excellent Excellent	Remarkably this deck is not only ergonomically but also sonically superior to the Dragon, particularly on record/replay	B & C, Auto Tape Type, 3 Head, Infra Red Remote	R	52
Nakamichi Dragon £1750	Excellent Excellent	Previous to the birth of the CR-7E, this machine stood head and shoulders above the rest. It is still the ultimate for musicassette replay	Dolby B & C, Auto Azimuth Correction, Manual EQ and Bias, Auto Reverse		52
Onkyo TA 2130 £140	Average+ Average+	Rating fairly well on both pre-recorded and record/playback, ergonomics were a little poor but overall performance was generally consistent	B & C, Auto Tape Select, Intro Scan	R	52
Revox B215 £1461	Good Average+	Superb engineering and good sound, but lacking the subjective qualities that characterise the very best hi-fi equipment	Dolby B, C, Remote control, Headphones		52
Rotel RD-830 £99	Average— Poor	A pretty fundamental if slightly dated design with little sonic merit but an attractive enough price	Dolby B		52
SAE CT02 £495	Average+ Good	Looking most unlike a cassette deck designed in the States and proving competitive in its price group. Not sonically that outstanding, however	Auto repeat, Track Skip, Real Time Counter, B & C, Auto Select	R	52
Sony TC-FX150 £90	Average+ Average+	Recording and playing back on this deck itself gave acceptable results, whereas pre-recorded stuff was a joke. But it's a good £90 worth	Dolby B & C	BB	52
Sony (WMD6C) ProWalkman £249	Good+ Excellent	"One of the finest sounding cassette decks on the market today. A mandatory Best Buy, which also fits in your pocket".	Dolby B, C, Portable, Mic/Headphones	BB	52
Sony TC-K444E SII £349	Good Average	Even the best this deck has to offer is not truly commensurate with the price	Dolby B, C, Memory stop and replay, Headphones		52
Sony TC-K700ES £499	Excellent Excellent	Firmly in the esoteric league, this is easy both to operate and to listen to. Best points: first class imagery, focus and stability	Dolby B, C, Auto tape select, Memory/ auto play, Bias/sensitivity adjust	R	52
Teac V-200 £80	Average— Average+	At this price you don't get fireworks, but it offers real value for money and sounds open and honest	Dolby B	R	52
Teac V-210C £99	Poor Poor	It could have been our sample but we found inadequate speed stability and a 'messy' sound	Dolby B, C, Bias adjust		52

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

Doug Brady Hi-Fi

We have in stock all of the products awarded "Best Buy" and "Recommended" in this guide if they meet our requirements of reliability and good build quality. Your "Best Buy" could well be featured in this Issue, but your "Recommended" procedure is to first come to **DOUG BRADY HI-FI**. Here you will be able to find your "Hi-Fi Choice" and make your "Best Investment".

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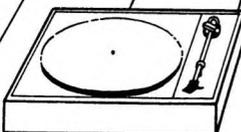
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All branches have to clear used, demonstration and surplus models in all price ranges. Space does not permit details here, but call in or send S.A.E. for a list.

The Audio File

HI-FI IN PERSPECTIVE ...



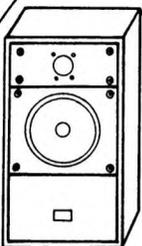
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DIRECTORY

CASSETTE DECKS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Teac W300 £115	Poor Average—	Sonically a mixed blessing, it does well with pre-recorded tapes but home-made recordings sound a little rough	Twin-deck high speed dubbing, Dolby B	52	
Teac W-310C £129	Average— Average—	Dubbing performance is poor, especially using the high speed mode but normal record and replay performance standards are not too bad	Dolby B, C, Twin transports, bias adjust	52	
Technics RS-B305 £140	Good+ Excellent	Well built and offering excellent sound quality at the price, working well with metal tapes if not so hot on pre-recorded material	Dolby B & C, dbx	BB	52
Technics RS-T22 £150	Excellent Average	Good value for a twin deck machine, and fairly simple to use, but sonically no competition for single transport machines	Twin, Dolby B & C High Speed Dub.	52	
Technics RS-B705 £250	Average Average—	3 heads for the price of two, but not the sound quality to go with them	3 head, Dolby B & C & HX Pro	52	
Technics RS-T8DR £400	Poor Poor	Flexible and pleasant to use but poor transports led to poor sound on our latest sample	Twin Deck Auto Rev, High Speed Dub, Auto Tape select, B & C & DBX	52	
Yamaha KX-200 £140	Good— Good	Cheap, well-equipped and workmanlike with the sound quality less obviously processed than most – the whole is more than the sum of the parts	Dolby B, C, Headphones, Track search/scan, Optional remote	BB	52
Yamaha K-340 £160	Average Average	This deck doesn't make the grade on the grounds of poor speed stability, and an unwelcome degree of record level dependency	Dolby B, C, HX Pro, Auto search/scan, Optional remote control	52	
Yamaha K222 £200	Poor Poor	Beautifully made, but it makes little sense in purist audio terms	High speed dubbing twin deck, Dolby B, C, Auto search, Track sensing	52	
Yamaha KX-400 £200	Good Good+	A highly commercial package with every widget under the sun. Happily it sounds good too.	Auto reverse, Dolby B, C, HX pro, Track search/repeat remote control	R	52
Yamaha K-540 £210	Average Average	Satisfactory but not especially satisfying, and also a bit gimmicky, it failed to match its brothers' good-performance-at-the-price ratings	Auto search/repeat, Dolby B, C, HX Pro, Bias adjust, Remote	52	
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	Dolby B, C, HX Pro, Bias adjust, Auto search/repeat, Remote, headphones	52	

TUNERS

The radio medium operates at a much lower profile than TV, but in areas outside pop music the BBC service is the envy of the world. Live Prom concerts can rival all other sources from a hi-fi perspective. Only the FM (VHF) bands give stereo hi-fi sound, though AM (MW & LW) are useful for receiving certain transmissions in the UK.

Something of a hi-fi afterthought, tuners are

often selected merely to match a chosen amplifier cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested in a high quality outside aerial system is usually well spent.

Tuners come in two basic types. Analogue models tune gradually (and usually manually) across the bands, and can have analogue or digital displays; they are often preferred for sound quality, and are certainly best for AM bands. Digital tuners offer convenient automatic tune facilities and hold many station positions in pre-set memories.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
A&R Arcam Alpha £149	Good Average+ +	Attractively classic British analogue tuner with sound quality comfortably better than most	FM/AM Analogue	BB	50
A&R Arcam Delta £270	Very Good Very Good	Hi-fi sound on FM, good on AM, a dependable British all-rounder	6AM, 6FM presets, FM/MW, LW display manual tune	BB	This
Creek CAS3140 £150	Very Good Good+	A true front-rank tuner, excellent ergonomics and audiophile sound quality albeit with the minor handicap of having FM only	FM only	BB	50
Denon TU 45L £130	Average+ Average+	Poor AM sound quality may be a deterrent but the FM performance fully merits recommendation	FM/AM Digital	R	50
Harman Kardon TU920 £299	Good Average	Rather weak sound quality for the price despite good lab test results	16 presets, AM/FM, digital auto scan, active tracking		This
Harman Kardon TU915 £325	Good Good	This gave good FM performance but was thought "wretched" on AM. (Psst... you don't necessarily buy a tuner for the AM.)	FM/AM 16 presets auto seek		50
Hitachi FT-MD 5500 £230	Excellent Good+ +	A powerful, good sounding tuner with versatile facilities	16 presets, FM, AM, MW auto scan digital, signal meter	BB	This
Hitachi FT5500 II £250	Very Good Good+	Soundwise highly rated on FM, and on AM basically satisfactory – a versatile all-rounder	Auto and manual tuning, 16 presets	R	44
JVC FX-1100 £355	Good+ Average+	A sophisticated model with 40 (!) AM/FM presets although the sound was unexceptional at this price level	Multi function computer, signal meter, digital auto tune		This
Marantz ST35L £160	Good+ Average—	It works well enough but the sound could be better for the money	16 presets, AM/FM, digital auto scan, active tracking		This
Meridian 204 £495	Good+ Good	Pleasant sounding with a fine finish but does not make the grade at this price	FM only, auto scan, digital, remote, clock timer		This
Mission Cyrus £180	Average Good+	Best Buy material on sound quality but radio frequency performance let it down	FM/AM auto seek tuning	R	50
Musical Fidelity T1 £300	Good+ Very Good	Top class FM stereo sound on good signal strengths from this audiophile model. Watch out for local CB!	FM only, analogue box dial, manual tune, signal meter	R	This
NAD 4020B £139	Good Average+	Not the quietest or most sensitive tuner tested, it still provided good sound for the money, being "musical and ambient"	Analogue FM/AM	BB	50
Naim NAT 01 £1098	Very Good Very Good	There may be better sounding tuners in the world, but we have yet to hear one	No presets. Two box, flywheel tuning FM only, Analogue	R	50
Nakamichi ST-7E £750	Good+ + Good+	Exceptionally good for weak-signal areas, and good all round	16 AM/FM presets, Schotz enhanced sensitivity, auto time digital		This
Nikko NT-540 £154	Good Average	Lab report was promising but the sound was rather dated	8 presets, AM/FM, digital auto scan		This
Onix B.W.D.1 £520	Good+ + Good	Unexceptional sound despite the costly power supply option	FM only, manual digital, variable bandwidth		This
Pioneer F551L £100	Good+ Good+	High value budget tuner, very little to argue about (includes long wave)	12 FM, 12 AM presets, auto scan, digital and signal strength meter	BB	This
Quad FM4 £289	Very Good Good+	Fine sound, excellent ease of use, good build and finish and a more than satisfactory technical performance	7 presets, Digital	R	50
Revox B261 £1174	Excellent Good+	A sophisticated and well-executed example of modern broadcast design; could be the logical choice for the deep-pocketed radio enthusiast	FM only, twin headphones, 20 presets	R	50

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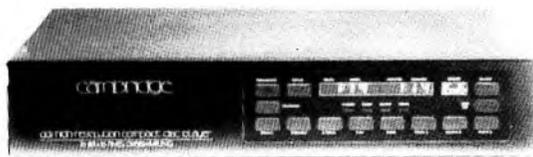
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TUNERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Rotel RT-830L £110	Good+ Good	Fine sounding budget audiophile material, no frills, no fuss	Manual dial analogue, FM, MW, LW	BB	This
Rotel RT-850L £150	Good+ Good+	Scoring well on listening tests and one of the best sounding tuners at its price level, it was a bit let down on AM but RF performance was good	FM/AM, digital	BB	50
Sansui TU-D99XL £249	Very Good Good+	This slimline compact model gave good FM sound quality and strong RF performance. But the AM sounded unpleasant	FM/AM, 16 presets	R	50
Sony ST 500ES £200	Good++ Average-	Disappointing sound quality but good lab performance. (Includes long wave)	10 AM/FM presets, auto scan digital		This
Sony ST-S 700ES £299	Very Good Very Good	First class in every respect including FM sound quality. Even AM was well above average	FM/AM, 10 presets, digital scan	BB	50
Tandberg 3001 £1295	Excellent- Good	An enthusiast dx model, versatile performance and generally good sound, excellent build	8 presets, FM only, analogue, manual dial, var. bandwidth, signal meter		This
Technics ST-500L £100	Average+ Average+	Fine RF performance and fair FM sound at bargain price = Recommended tag. Alas the AM sounded as if it was coming "down a long lorry tunnel"	FM/AM 16 station presets, scan	R	50
Technics STG45AL £140	Good+ Good	Good sound on FM, weak AM but clever facilities and a good lab test	16 FM presets or 8 FM/8 MW-LW, digital auto scan, auto memory	R	This
Technics ST-G7 £400	Very Good Good+	Muffled AM, but fine stereo FM quality and well built	16 presets, digital	R	50
Yamaha TX-1400 £130	Good++ Good+	Good FM sound, let down by poor AM but otherwise good value	16 presets, auto scan, digital, FM, MW, LW	BB	This
Yamaha TX-500 £150	Average+ Average	Under a gaudy coat, this sensitive tuner gave reasonable stereo results. However, the AM had again been thrown down a well	20 presets (10 buttons) digital		50

CD PLAYERS

This new all-digital music source seems set fair to becoming properly 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 CD's sound less involving than top quality vinyl replay.

Introduced five years ago at around £500, CD players now average 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, 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 pre-amp, there are no problems connecting a player to a normal amplifier.

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research CD-04 £290	Good Average+	Stylish but basic player, based on Philips 14-bit 4 x oversampling with respectable sound tweaks and remote control	Remote Control, headphones	R	51
ADC CD-250X £230	Good+ Average	Well made and engineered, and above average soundwise; trumpets could sound 'thin' though violins were liked so it may prefer Stephan Grappelli to Miles Davis	Skip and search, manual, repeat and 16-track programming	R	53
Aiwa DX-500 £179	Average- Average-	Adequate build quality and reasonable features, but this unit did not do very well in the lab and was sonically a disappointing experience	No remote control or headphone socket, but scan, skip, search etc		53
Akai CD-A70 £299	Average Average	A full feature 16 bit 2 x oversampling remote control player with fine presentation and finish and a pleasantly laid back sound quality	Full width rapid access, keypad programming, remote control		51
Cambridge Audio CDI £1500	Good+ Excellent	Advanced design and circuitry give this top class two-box machine exceptional performance, so the intrinsic qualities of CD, (eg. silent surfaces), make themselves felt	No headphones, seven audio filters, skip and scan	R	Coll
Denon DCD 300 £210	Average+ Average+	Unspectacular all round competence with remote control can't be bad at the price	Skip, remote control, headphones	BB	51
Denon DCD 1700 £599	Good+ Good++	The overall sound was strong and coherent approaching reference standards. Fine build quality and facilities make this a firm contender	Remote, skip, scan, headphones, programmable	R	51
Denon DCD-3300 £1200	Good++ Good++	Sounding tight and coherent though not significantly better than the cheaper 1700. Very well built and comprehensively equipped	Remote control, with volume, keypad programme, scan, search, headphones		51 51
Ferguson CD-04 £149	Average+ Average	Could well provide an answer for those appalled by the complexities of many CD players, who seek a low cost, good quality, simple performer	Track skipping, nine track memory	BB	51
Goodmans GCD-500S £160	Average- Average-	User-friendly but flimsy build quality and second class sonics make this poor value even at the price	Audible scan and track skip, programming		51/45
Harman Kardon H0100 £399	Average Average-	With a mixed subjective performance this well built player failed to make the grade in its price class	Skip and scan, programmable		51
Hitachi DA-7000 £180	Good Average	Generally competent, especially considering the price, this was well built and styled if lacking in some facilities - a good budget starter	Memory and repeat, plus the basics	BB	53
Hitachi DA007 £330	Average Average	Unusually fitted with wooden end cheeks and comprehensively kitted out, but only average in sound quality	Full remote control, adjustable headphone output keypad programming		51
JVC XL-M700 £599	Average Average+	An autochanging, twin drawer player offering fair sound quality and the possibility of endless play!	Auto changer, full remote control, random play, intro scan repeat		51
JVC XL-V1100 £659	Average+ Average+	A substantial and very well built flagship model with 16 bit 4 x oversampling, though sound quality was disappointing at the price	Full remote, headphones, scan, skip, intro-scan		51
Kenwood DP9900 £299	Average+ Average	A good all-round package, just deserving recommendation, but comparable sound quality can be found more cheaply elsewhere	Headphones, remote control, (manual override)	R	51
Luxman D-100 £449	Average Average-	Sparsely equipped with a slightly old fashioned sonic character, offering little but physical weight for a quite high price	Remote control, skip, scan, headphones (variable)		51
Marantz CD273 £199	Good Good	An ambitious machine at the price, offering pretty good sound quality but a slightly below average build standard	Skip, scan, programmable	BB	51
Marantz CD873 £240	Good Good++	Putting many 'audiophile CD's to shame in terms of sound quality this proved another winner, though there was slight criticism of control accessibility at times	No remote control, but the usual skip, scan etc	BB	53
Marantz CD-273SE £240	Good+ Good+	The Euro-tweaked version of the standard 273, this model fulfills pretensions to audiophile standards at a budget price	Manual control, skip and scan (audible), 20 track programming, repeat	BB	51
Marantz CD65 £250	Average+ Good	Comfortably above average sound quality, this best selling model still represents good value for money	Search and programme, manual control	BB	51
Marantz CD75 £300	Good+ Good++	It delivers a sound quality that can rival machines twice the price even though it may lack some luxury touches	Remote control, search, programmable	BB	51/Coll
Marantz CD94 £800	Good++ Very Good	Clearly the best Marantz CD player, with high build quality and good objective and subjective performance	10 digit keypad, headphones, favourite track selection, remote	R	51

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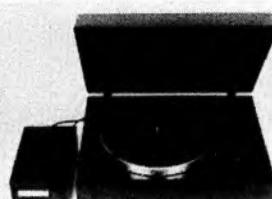
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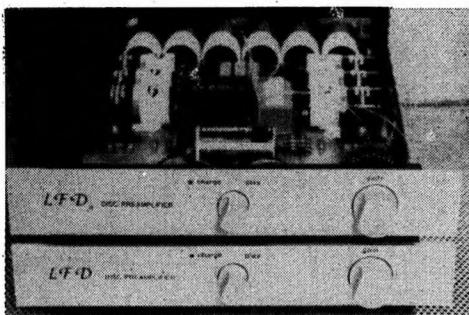
MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Meridian 207 £950	Very Good Very Good	A very stylish two box player with onboard pre-amp, providing excellent sound quality and remarkable flexibility	Fully remote, full track search, programming	R	51/Coll
Mission PCM7000 £600	Good Good++	Stylish with a large informative LCD display this deserves recommendation on the basis of sound quality alone	Remote volume control, digital filtering	R	51/Coll
Nakamichi DMS-3E £995	Good Good+	Superbly built and presented this expensive machine was a bit of a "stuffed shirt" when it came to sound quality	Remote control, skip and scan, headphones		51
Nakamichi DMS-4E £1200	Very Good Very Good	Solidly controlled and comparatively simple this clearly represents one of the major benchmarks for CD sound quality, though the midrange sounded a touch thin	Skip and scan, headphones	R	51
Nakamichi DMS-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 DMS-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
Philips CD 160 £200	Good Average+	A little tinny in construction and "plasticky" in feel, this popular model rated well on sound quality despite its budget price	Skip, (20 track) programming, repeat/display	BB	51
Philips CD360 £250	Good+ Good+	Fine lab performance and exceptional listening test results, plus the 200 disc favourite track selection makes this modestly priced unit a Best Buy	Remote control, favourite track selection, skip	BB	51
Philips CD473 £250	Good Good+	In the forefront as regards sound quality, this is one of the best sounding Philips players yet, we were unable to catch it out on classical through Jazz program	Favourite track selection, remote control with volume, headphones etc	BB	53
Philips CD960 £700	Good++ Good++	Simple to use with exemplary lab performance, this showed no sign of weakness while sound quality improvements over mainstream models more or less justify the price	Full remote control, favourite track selection, etc	R	51/Coll
Pioneer PD-6050 £230	Good Average+	Much liked on Jazz and rock program this was highly rated in terms of value for money. The midrange sounded a little forward and thin though	Everything but a digital out socket and remote volume control	BB	53
Pioneer PD-M70 £399	Average Average	A remarkable catalogue of features justify the price. Soundwise it rated just above average overall	Remote control, 6-disc autochanger, 8 programme memory, headphones etc		51
Revox B226 £756.70	Good+ Good	The traditional Revox house style is combined with the fine Philips 16 bit chip set, but this player doesn't really offer sound quality to match the price	Infra-red remote control, full search, scan, programming		51/Coll
Rotel RCD-820 £249	Average++ Average+	Though essentially a Philips clone, the 820 does offer a very respectable sound quality for the price, plus remote control	Remote control, 20 track programming, repeat, step	R	51
Rotel RCD 820BX £350	Good Good	A respectable performer with adequate build quality and features, this got the "R" for good musical reproduction	Remote control, repeat, 20 track programming, step	R	51
Sanyo CDP-M50 £200	Average- Average-	A no-frills mid-sized package, this was not up to the usual Sanyo sonic or technical standards but it was well built	Skip, search, repeat, 16-track memory, programmable		53
Sharp DX-R700H £249	Average- Average-	A workmanlike player that does not offer exemplary lab or sound quality but which is well-built with good facilities and should perform well in use	Remote control, track selection keypad, skip, scan repeat programming		53
Shure Ultra D6000 £495	Average+ Average+	Ergonomically well thought out with full function remote control, but not really scoring sonically considering its price	Remote control (full function inc volume)		51
Sonographe SD1 (by CJ) £799	Good Very Good	Distinctive with oak end-cheeks, using Philips based 14 bit x 4 oversampling, Conrad Johnson electronics make this a musically rewarding player	Full search programme and timing	R	51/Coll
Sony CDP-M20 £179	Average+ Average	Keeping pace with improvements in the marketplace, it combines decent performance with good build and is competitively priced	20 track programme, skip and scan, repeat and random play	R	51
Sony D30 £230	Average- Poor	At 50p per hour to run, the sound quality is poor compared to mains machines although reasonably competent overall for a Discman	LCD display, skip, shuffle, and repeat, "in-ear" headphones		51
Sony CDP-310 £250	Average++ Average	Fine build, facilities and healthy enough sound quality - recommended, but look around the range	Remote control (+ usual)	R	51
Sony CDP-M50 £269	Good+ Average+	Fine build quality, good technical performance and extravagant features make this a very competitive package	Shuffle, skip, search, remote headphones	R	53
Sony CDP 710 £299	Good+ Good++	One of the outstanding contenders in our 1987 edition. The build was cool, the sound was hot	Remote control, 20 digit direct entry keypad, etc	BB	51
Sony DT00 £300	Average Average-	The best all round portable tested, but also the most expensive, and still no substitute for a conventional player	Skip, repeat, 21 track programming, headphones, LCD display		51
Sony CDP-222ES £449	Good Average+	Exceptional build quality and presentation plus respectably good sound quality merits the "R", but some of its kin were preferred	Remote control, 20 digit keypad, track access, programming	R	51
Sony CDP 555es £1000	Very Good Very Good	Extravagant build quality, sophisticated features and near state-of-the-art performance, it competes effectively with more expensive models	Remote control, 20 digit keypad, track access, programming	R	51
Teac PD-250 £250	Average Average	16 bit 2 x oversampling with fair if lightweight build quality. Sonically falling short of recommendation, but not bad all the same	Remote control, skip, scan, programming		51
Teac ZD3000/ZD5000 £899/£999	Very Good Average+	Although achieving a superb technical performance, these players are not competitive on sonic grounds in this price category	Full remote control, keypad, fast track skip, headphones		51
Technics SL-P 111 £179	Good Average	An above average sound quality at a well below average price, but this is only most things to most men	Skip, audible scan, programme repeat, preset edit play	BB	51
Technics SL-P220 £229	Average++ Average	Sound quality keeps this out of the top ranks but the facilities (wow) and fine technical performance will make it hard to resist for some	Everything except a digital out socket, which is no great loss to most	R	53
Technics SL-XP5 £250	Average- Poor	A contender for the "World's smallest" title, this beautifully crafted miniature falls short in terms of sound quality	Headphones, "high cut" filter, skip, search		51
Technics SL-P520 £350	Good+ Average+	With features and facilities to satisfy the most eager button pusher, this also produced decent sound quality	High/Low scan ratios, headphones, memory, programming and more	R	51
Technics SLP 720 £400	Good++ Good+	More buttons for sonic pilots - this was the most sonically super of the top Technics models	Search dial cueing, high scan speed optics, disc menu, programming	R	51
Technics SL-P1200 £800	Good+ Good+	Looking more like a desk work station than a stackable component, this will appeal to the creative recordist and semi pro user. Sounded pretty good	Headphones, remote control, search dial cueing, etc		51
Yamaha CD-X5 £200	Average+ Average	Good build quality, respectable lab performance, and decent enough sound delivery for your money	Skip, scan, manual only, etc	R	51
Yamaha CDX-900 £450	Good Average+	A real button bristler with extensive facilities; well built; but sound quality might suggest a lower price	Programme calendar, remote control, 26 key direct track entry		51
Yamaha CDX-1100 £700	Good+ Average+	A pearly king might like the button overkill here... yet despite exceptional lab performance, listeners were not unduly impressed. It's worth considering	Volume handset, random play, space insert, 26 direct track entry keys		51

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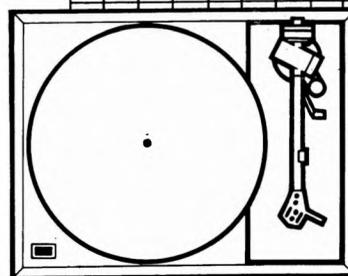
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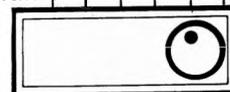
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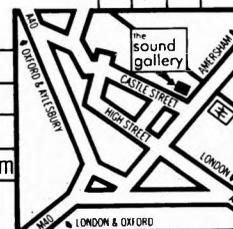
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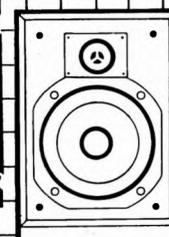
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CD MIDI SYSTEMS

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	BACKISSUE FULL REVIEW
Aiwa V-990DX £750	Good Good	Refined up-market system with most modern features. Sound quality is good all round – even the speakers are acceptable.	Remote, timer, auto source select	R	54
Aiwa V1500DX £999	Good Good	Remarkable features level even includes independent record feeds to each cassette. High class build, satisfying sound, but best without loudspeakers	Separates system, twin auto-reverse cassette, full remote, timer	R	54
Akai 990 £1400	Average Average+	A gadget oriented expensive system with good compact disc player and remarkable loudspeakers. Let down by the tuner and turntable and not helped by obscure ergonomics	Twin deck cassette, Auto rev., Remote Control, Auto source selection		Systems
Binatone Laser CD System 2000 £270	Bad Bad	A bit of a disaster even at the price. Built to extremely low standard with an appalling turntable. CD and loudspeakers OK, but let down by amp	Twin cassette		Systems
Ferguson HF03 £400	Average+ Good	An all round success with British built speakers and all sources achieving a reasonable standard. Compact disc was weak compared to other units	Twin cassette	BB	Systems
Fidelity MS202 £340	Bad Bad—	Very cheap and poorly finished. Thin, raw sound to match appearance and build	Twin cassette, one-piece system		54
Fisher Midi System M46CD £500	Average Average	Somewhat overpriced, the M46 is let down by a poor amplifier and worse speakers. Other elements perform reasonably, CD being its strongest point	Twin transport		Systems
Fisher Midi System M56CD £580	Average Average	Fitted with a pretty good amp, but dire loudspeakers; otherwise a competent combination including a pretty fair cassette deck	Twin cassette, 5-band graphic Equaliser		Systems
Fisher 2400 £600	Average Average	An ambitious and competent package with a strong amplifier and CD player. Given its new lower price it would have merited recommendation if the loudspeakers hadn't let it down	Twin deck, Graphic eq, 5-band		Systems
Goodmans 5100 £380	Poor— Bad	A combined electronics package, with performance standards only too typical of the breed. Speakers good for type but don't compensate	Twin cassette, one-piece system		54
Goodmans 5200 £459	Average+ Average+	Offering possibly the best speakers around in this midi system market, the Goodmans wins on a fair standard for the price, though the turntable was not too hot	12 Band Graphic Eq, Twin deck	BB	Systems
Goodmans Maxim-Midi System £550	Average Average+	De-luxe version of 5200 system – very good value for money and readily upgradeable. Sonics rough but OK and speakers good; CD crude	All separates with twin cassette	R	54
Hitachi MD280 £430	Good Good	Better than average cassette and CD – even the turntable and the loudspeakers work satisfactorily. Good all-rounder	Remote, auto T/T, twin cassette, extra tape & aux inputs		54
Marantz Studio System £449	Average+ Good	More a hi-fi system than a true midi package. It's good if uninspired. A stronger amplifier could help	Only amp, CD, & speakers – rest optional	R	54
Marantz Concert System £649	Good+ Good+	Well matched and achieved high fidelity standards. Strong characterisation with some treble loss – this wasn't quite neutral, but a pleasure to listen to	Only amp, CD & speakers – rest optional	BB	54
Marantz MX673CD System £999	Average+ Average	Tremendously flexible audio/visual system. Sound quality is satisfactory at best and ergonomics a mess	Various A/V inputs, remote, speakers optional	R	54
Mitsubishi CD51 £429	Average Average—	In some ways a well balanced system, in that the amp and speakers smooth the rougher edges of some sources, but not very satisfactory on the whole	Remote, twin deck		Systems
Mitsubishi E602CD £500	Poor— Poor—	Totem-pole aesthetics match the mixed constructional quality. Sound quality is already poor, but featured synthesised bass can make matters worse still	Spare in/output set, twin cassette		54
Mitsubishi 100R £650	Average Average+	A pretty good package, flawed by 'tinny' loudspeakers, but having a fair turntable – a rarity in this category of equipment	Remote, Multidisc CD, Twin	R	Systems
Philips FCD 565 £370	Poor Poor	An unimpressive system. While the compact disc player and tuner were OK, its main tonal characteristic on all sources was a coarse top end	Double deck, 5 band graphic eq		Systems
Pioneer S-7000 £478	Average+ Average+	Excellent beer-budget system that really works, with the exception of wobbly sounding cassette	One piece + (optional) CD and speakers	R	54
Pioneer System 10 £678	Average Average—	Loudspeakers sound cluttered, and cassette unstable and thin, but tuner and CD are fine	All separates, twin cassette		54
Pioneer System 30 £978	Average+ Average+	Odd remote system means two handsets. CD and radio work well, but turntable and cassette weak. Expensive	Remote, separates, twin auto reverse, multi-disc CD	R	54
Sanyo W40CD £380	Average Average	Low cost, no options package with attractive displays, cassette had high wow and flutter, but the rest worked OK	Semi auto T/T, auto record start, twin cassette	R	54
Sanyo W36 £550	Average Average	For a change, this outfit comes with excellent loudspeakers and CD player. The main weakness seems to be the amplifier but the turntable was OK, if not fab!	Two H/phone, 5 band graphic, twin deck cass.	BB	Systems
Sharp SA-CD800H £800	Average Average—	A superficially high grade, high spec system, the SA-CD800H actually sounds clean but a little 'synthetic'	One-piece, 6-disc CD, no T/T		54
Sony Compact 310 £450	Average+ Average+	Low cost but well built and finished and better sounding than most at the price	Remote, auto T/T, twin cassette	BB	54
Sony Compact 510 £599	Average+ Average+	Very good control layout. Shabby loudspeakers not up to otherwise uniformly good system	Remote, twin cassette	R	54
Sony Compact 610 £700	Average Average—	Inconsistent. Same turntable used in much cheaper Sonys gave 'iffy' record reproduction. Cassette likewise	Remote, 'shuffle' play CD, twin cassette		54
Sony FH1215CD £800	Average Average+	Probably the ultimate miniature system. The CD player is particularly good. Best to chuck the speakers away though	Miniature, transportable (AC only). Single auto-reverse cassette	R	54
Sony Compact 710 £999	Good Good	Typically well built and presented but complicated to use except via remote. Record deck poor but remainder good, including speakers	Full remote, auto T/T, twin auto reverse cassette	R	54
Sony Compact Series 90 £1500	Good Good+	The best of a not too wonderful bunch, the excellent compact disc player and pretty good speakers make for reasonable sound quality, though the tuner wasn't of quite the same standard	Twin deck, auto reverse, timer, extra tape socket	BB	Systems
Technics X800CD £400	Average+ Good (cass poor)	Very unstable sounding cassette lets system down badly. Tuner a bit dull, but remainder OK	No T/T, twin cassette		54
Technics X820 £580	Average Average	Tuner and CD player work well but the speakers sound ragged	Remote, auto record starts		54
Technics X840 £730	Good Good	Expensive, but well made, good sounding system. Turntable, tuner & CD player similar to X820	Full remote separates system	R	54
Technics X880 £900	Average+ Average+	Complex, high spec unit with good performance except for the indifferent speakers, which are completely out of keeping	Remote, auto source selection, programmable T/T		54
Toshiba V17CD £399	Average Average+	Loudspeakers are the weak link, with cassette and turntable also indifferent. Tuner and CD worked well though, so reasonable value for money	Twin cassette, semi-auto T/T	R	54



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.

ANEOCHIC: 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 combination of each machine with the tape. The lowest level of bias is

required for ferric cassettes, a slightly higher one for ferrichrome, an even higher one for chrome or pseudochrome, and the highest for metal.

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 distin-

guish the loudspeaker unit itself, be it bass, mid-range, 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 70 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 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 musical pitch (the higher the frequency the higher the pitch).

HF: High frequency.

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

HARMONIC DISTORTION: The addition of unwanted harmonics to 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.

PRE-AMPLIFIER: 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 *crossstalk*.

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 the 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 motion 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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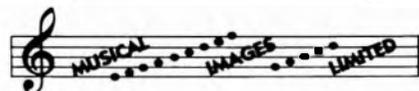
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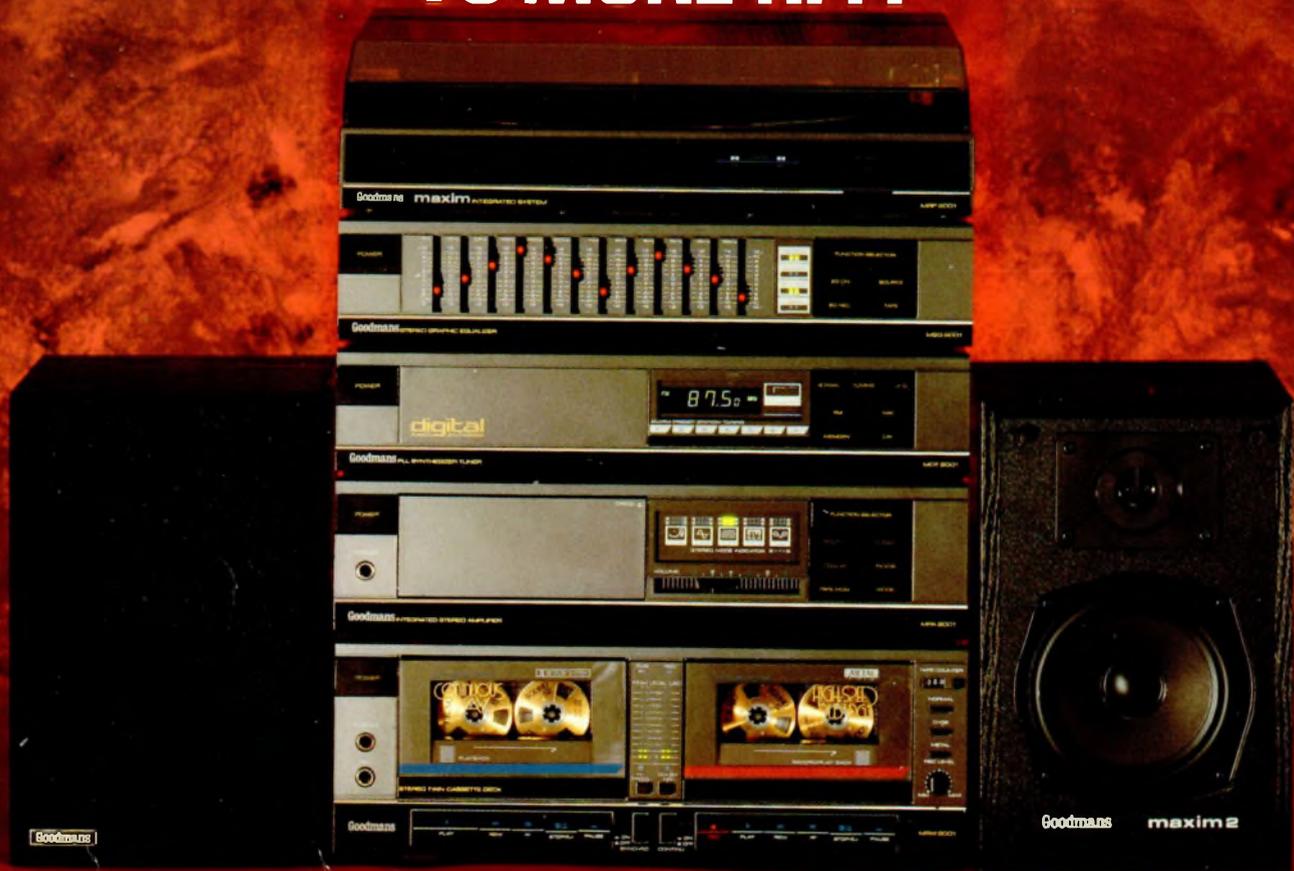
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