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**109 CARTRIDGES  
— SUMMARISED**

**110 LOUDSPEAKERS  
— SUMMARISED**

**122 AMPLIFIERS AND  
31 TUNERS — SUMMARISED**

**76 CD PLAYERS  
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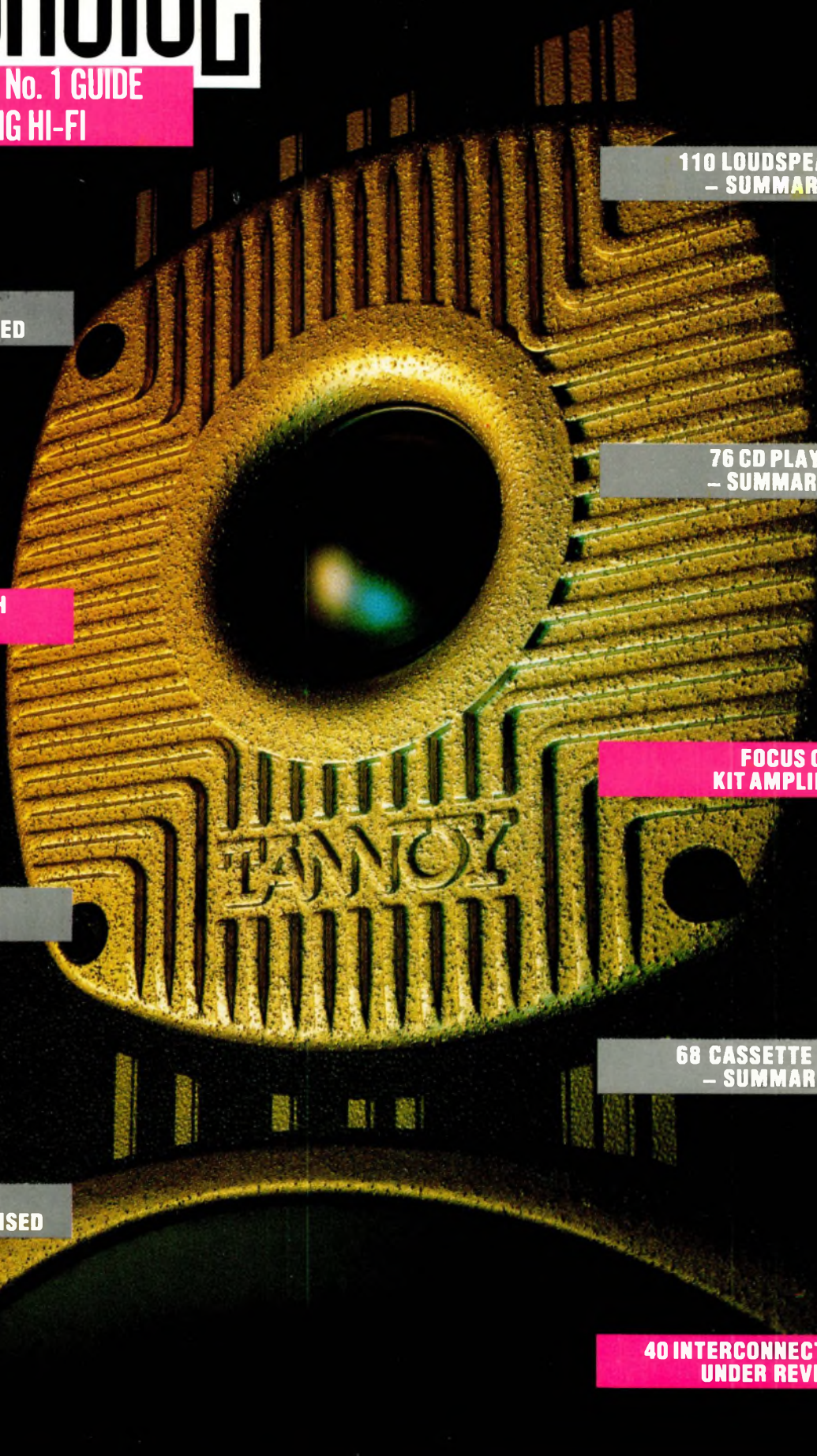
**FOCUS ON:  
KIT AMPLIFIERS**

**36 CD MIDI SYSTEMS  
— SUMMARISED**

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**45 TURNTABLES AND  
26 TONEARMS — SUMMARISED**

**40 INTERCONNECT CABLES  
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**40 LOUDSPEAKERS ON TEST**  
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# HI-FI CHOICE

ISSUE NUMBER 59: JUNE 1988



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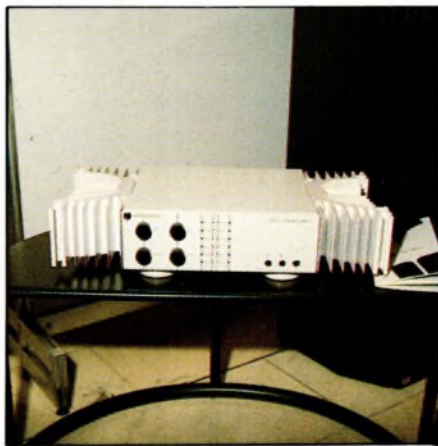
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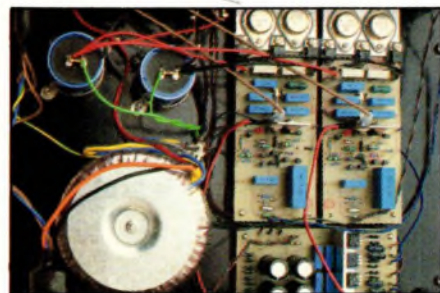
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# MENU

**T**he radical news for this month's *Choice* is a change in our loudspeaker reviewer. After something like a decade's continuous service, Martin Colloms is handing over this particular duty to Alvin Gold.

The basic reason is that our much accelerated monthly schedule has made it necessary to broaden our base of reviewers. The decision to stop doing *Loudspeakers* was in fact Martin's alone, and as editor of both his first (1978) and most recent projects I feel obliged to pay tribute to the international reputation he has created for the magazine in this field.

It is pertinent to point out that MC was designing commercially successful loudspeakers long before he started reviewing hi-fi equipment, and for myself I think it's rather neat to use one of the world's leading designers to do one's loudspeaker reviewing (especially since his Celestion *SL700* has started picking up awards out in Japan). But the changeover does at least counter the controversy that has arisen over and the difficulties inherent with Martin's parallel involvement in both design consultancy and reviewing.

I am sure that the change will be refreshing in itself, and for the subtly different perspectives that Alvin will be bringing to the task, along with his entertainingly wry sense of humour. Less the engineer than the writer, AG has brought in assistance from the Colloms Labs in order to maintain good continuity of measurement methodology, while the listening test findings tend to confirm rather than deny our subjective procedures too.

The other review category this month started out to cover cables in general, and then became signal interconnects when reviewer Paul Miller had counted each finger and toe twice. To paraphrase (said) PM (not yrs trly), cables are not mere accessories – they actually carry the music signal. Loudspeaker cables will follow soon, as will the in-car player report we had planned for this month – grovelling apologies.

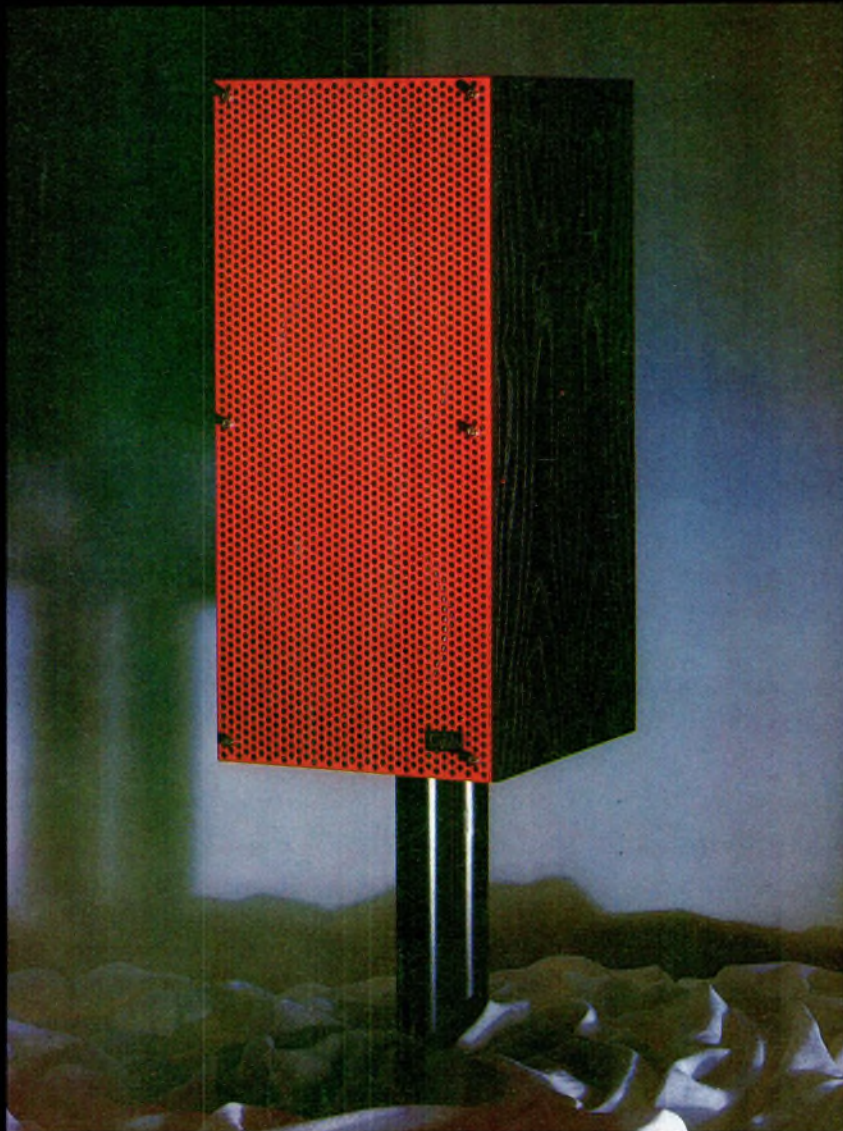
*Paul Messenger*

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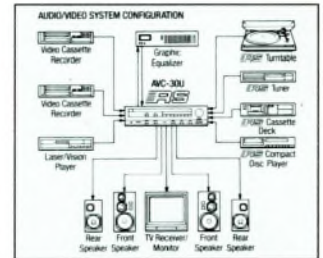
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## PRODUCTS

### BLACK BOX

A&R Cambridge say they have come up with an 'elegant and realistically priced method of further improving CD sound quality'. The quest for digital audio's sonic grail has now produced The Arcam *Delta Black Box* – a digital to analogue converter which will work with any CD player that has a digital output of the Philips/Sony type.

A&R managing director John Dawson says his £249 Black Box is about the only British or American product of its type on the market; several Japanese outboard D/A converters are much more expensive he pointed out.

JD described the need for a digital to analogue converter as arising from the 'poisonous atmosphere' inside most CD players. "The CD player has two basic functions," he said. "first it creates a digital signal from the disc, and then it converts that back to analogue. But there is much less interference in the signal if you separate these two functions. It's a bit like having pre- and power amplifiers – each does its job better by being in a different environment."

The Black Box bypasses all existing DACs in a CD player and delivers a 'cleaner sound' according to Arcam. "What you get is a 'de-hashing' – you hear more of the music," JD enthused.

### DYNAVECTOR DEVELOPMENTS

Japanese moving-coil cartridge pioneer Dynavector has kept a low profile of late, while weathering the CD-related storms that have caused a number of competitive brands to founder. Now they are increasing their UK activity, preparing to open a London studio, launching a new and revised product line-up and reporting that there is (analogue) life after digital – even on the Japanese home market.

The all-new cartridge is the



*Arcam Black Box: a division of CD labour.*

£360 high output *XX-1*, which features two particular 'tweaks' to the magnetic circuitry that are claimed to improve linearity and sound quality. Similar modifications are also included in the MkII versions of the *50X*, *16X4*, *23RS* and *17D2* cartridges, priced from £70-£200.

A 'flux damper' (a species of shorted coil that can provide quite strong electromagnetic damping) is now fitted around the yoke of all *MkII* cartridges; the version fitted to *XX-1* may be selected on or off *via* a little microswitch built into the cartridge body. And the magnet characteristics themselves have been 'softened', by shorting them with a controlled piece of soft iron, in order to improve magnetic field linearity, presumably at some cost in relative output.

The *XX-1* (reviewed in next month's *The Collection*) is in some ways more conventional than the low-output *Karats* with their short gemstone cantilevers. At 12g, however, it is on the heavy side – sensibly matched to a low compliance but also a possible potential source of counterweight incompatibility with some tonearms.

Despite armies of invading gremlins, Dynavector also attempted to demonstrate their own rather unusual 'HD Super Stereo System'. This is a multi-

speaker surround sound system of sorts, but with the important difference that it combines analogue and digital processing to vary the reverberation time of a signal according to frequency.

The demonstration was inadequate to pass any sort of judgement, save to say that it sounded sufficiently interesting and different to warrant further investigation, particularly for those with a penchant for creating round-the-room illusions.

### KENWOOD KONTINUED

The fast growing Trio-Kenwood brand is adding three more products to its 1988 lineup, in addition to those mentioned in last month's *Kenwood Technology* news item.

The *KT-660L* is a new £130 full-width tuner that supercedes the *550L*, with improvements to ergonomics, the incorporation of insulator feet and (for the technically minded) a 14dB gain in alternate channel selectivity (could be useful for Londoners plagued by pirate interference).

The £250 *LS-770G* and the £350 *LS-880G* are two new 3-way loudspeakers which their makers describe as "very fast, very accurate, but very musical". They also "avoid the usual pitfalls associated with Japanese 3-way

designs" – claims we hope to have the opportunity to verify in due course. In spite of the separate midrange drivers, the designs appear to lean heavily towards European philosophies in certain areas – witness the polypropylene cone bass units and separate arm crossovers.

### SECOND GENERATION

Acoustic Research are making a new CD player. Replacing the *CD-04*, *CD-06* will maintain the AR's unique slanting front, changing plastic to aluminium to improve aesthetics and build quality.

The player is being made in Britain, at the firm's Dunstable base, and uses part AR, part Philips technology with 16 bits and 4X oversampling.

Much of AR's contribution concentrates on the digital to analogue conversion, and they have added their own analogue board which they claim improves on the original circuitry.

Features on the *CD-06* include the usual track selection, search, scanning and repeat. Remote volume control is available or avoidable, and a six figure digital display keeps the user in touch. No definite price had been set at the time of writing, but £370 looks likely.

## SNAKE OIL

Following the success of their *F2* record cleaner, Hunt EDA have brought out a CD fluid called *P3*.

According to Keith Hunt, *P3* is made up from three inert solvents. "You shake the bottle and apply *P3* with a radial cleaning tool," he informed *Choice*. He was less candid about the ingredients, but when pushed admitted that it was "snake oil, mouse milk and a pinch of bullshit!"

Also on the horizon from Hunt are some concrete and lead loudspeaker stands made by Ray Harper, which Mr. Hunt wants to dub *Tune Stones*. These stands use three contact points with the floor to be self levelling; price and finish have yet to be decided.

## ON THE ROAD

The latest in small black gadgets using micro technology is the *Pocket Discman*, by Sony.

The company who pioneered both CD and the *Walkman* concept have married the two to produce what 1970's man would have thought was a razor.

This *Discman* measures four inches square and is designed primarily to play the new 3 inch CD singles. But it will also play conventional (5 inch) CDs if you don't mind them sticking out of the side of the machine!

The *Discman* is described as portable rather than personal and could be used as an alternative to awful hotel room radio while travelling, say. The full size discs will stop the machine if they are touched accidentally, and this is not really the sort of thing you'd take to a sandy beach. Already on sale in Japan, Sony plan July UK availability, anticipating a retail price below £300.

*Sony Discman and five-inch disc - not very beach or lemonade friendly.*



*P3: eye of newt... leg of toad...*

## SLATE WEIGHT

Rock music fans might well appreciate the new loudspeaker stands from Slate Audio, fabricated in North Welsh slate and based on the theory that mass is important in creating an inert body.

Peter Soper, principal of Slate Audio, says that by making lightweight stands many manufacturers are ignoring basic physics (*as does PS in making heavy stands - Ed.*). "The one thing a lightweight stand can not do very well is resist side to side movements... there is insufficient mass." (*There should be no net sideways movement in a properly designed loudspeaker - Ed.*)

The stands use a large base area to concentrate mass in the lower half. A single slate column then couples to the speaker mounting. The base of the stand is spiked at the four corners 'to damp out the four corners', while the speaker sits on three studs which give 'rock-free mounting'.

Peter Soper chose slate for its combination of rigidity and density. But this metamorphic rock which is three times as heavy as water is also aesthetically pleasing, he points out. The stands are available in three heights of 13, 18 and 23 inches. All models cost £295, weights varying from very heavy to very very heavy.

## BUSINESS

### TAPE WARS

Last month no less than three major tape brands summoned the Press from labouring in search of the lost literal, to tempting tables laden with chlorestorol and other substances with a similarly happy ending. Each in its own way showed how far tape has moved from a specialist, technical product into a marketing led commodity, handled a little like baked bean or cigarette brands.

First off, Fuji are celebrating the arrival of a new MD and several other personnel changes with new packaging, a year's endorsement from the full set of teeth which fronts DJ Simon Bates, plus the promotional incentive of giveaway BT Phonecards. Nothing new on the actual tape front, however.

TDK do have a new tape, an advanced ferric Type I which features 'NP' (nonporous) magnetic particles with a claimed MOL approaching metals, but dubbed AR in honour of its anti-resonant cassette shell. However, the company is already handsomely number one in the audio cassette market, with a share of around 40%, so a 'niche marketing' strategy is being adopted for AR, and for a version of the popular Type II SA besides.

Appropriately launched in a dimly lit Stringfellows, with assistance on video from the evidently suited Johnathan Ross, the important things about these new products are that they are purportedly a Limited Edition (no limits being specified apart from lasting until about the end of the year); and that the case in which they come is as important as the contents, and worth maybe 20% on the price.

Calculatedly targetted at the Walkman-packing designer generation, the powder compact/cigarette case shapes have rounded edges for perfect pocket preservation - plus one flat edge for perpendicular stability. Both tapes are available in black with gold and white graphics, but AR also comes in translucent and solid white with baby-pink hubs, apparently with sexist rather than racist discrimination in mind.

Getting through the shrink wrap is not for the impatient, but the case itself works well enough. Reactions to the aesthetics varied from 'tacky' to 'neat' - which is as it should be if the niche is to be found and the premium price achieved.

Last but certainly of most interest to the hi-fi enthusiast,



*His and Hers tapes: easy on the pocket and not too dear either.*

Maxell are relaunching their important Type II *XLII* tape, with improvements in both the magnetic coating and the new 'oval window' shell, giving MOL improvements of about 1dB along with lower inherent noise over its predecessor.

There is also a new type *XL* videotape, with a coating formulated specifically to optimise Hi-Fi Video stereo soundtracks with their unusual depth modulation FM-coded signal. Maxell claim a carrier-to-noise ratio 2.5dB better than previous products, and significant improvements in jitter and dropout performance.

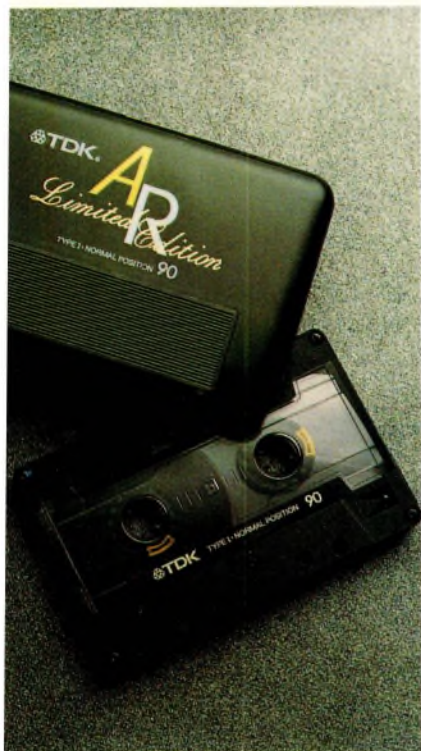
But just as interesting as the new Maxell tapes was a brief discussion by their advertising agency on the concept of 'brand engineering'. The sort of applied sociology that goes into creating or re-positioning the public perception of a particular brand certainly has as much influence on the tape market as any new technical improvement.

### WIND OF CHANGE

Gale Loudspeakers are now being marketed by Hayden Labs - importers of Dual and Denon equipment.

The six loudspeakers in the range, from the \$140 *210* to the \$1,000 *402*, allow Hayden to finally offer a 'complete system'. The company has not previously marketed any loudspeaker brands to match its Denon CD players, cassette decks, tuners and amplifiers, or the popular Dual turntables.





have now shifted their manufacturing and distribution base to Wales, forsaking their cramped Clerkenwell Road premises for the daffodils and fresh air of Powys. The new address is Roksan Engineering Ltd, 21 Ddole Road, Llandrindod Wells, Powys, LD1 6DF. Tel: (0597) 4911 . . . Definitive Audio (née Melos) of Brighton are moving from their council condemned base in Trafalgar Street to the more suburban surroundings of Islingword Street. New proprietor Robert Dowse says the shop will be taking on the mantle of an audio consultancy, with home demonstrations through Sussex. The range carried will be largely as the old shop, though the Rock is to be dropped and Pirate stands added. The new address is 30, Islingword Street, Brighton, BN2 2UR. Telephone (0273) 672796.

## GOING JAPANESE

Celestion's *SL700* loudspeaker (to be reviewed in *Choice* next month) has won two major Japanese hi-fi awards since its launch last September. The stylish £1,220 model comes with its own stands and is finished in matt grey Nextel. It was chosen from 500 other products to win The Component of the Year Award for new products introduced onto the Japanese

## MOVING ON . . .

. . . Harbeth Acoustics have moved to new premises as part of an expansion programme. The loudspeaker manufacturer's new address is 3 Enterprise Park, Lindfield Park, Lindfield, Haywards Heath, West Sussex RH16 2LX. Telephone: (04447) 4371 . . . Roksan Engineering

*Celestion's prizewinner in Japan.*



*Mike Batt presents Alastair Robertson-Aikman the Source Component of the Year Award for his SME IV tonearm.*

market in 1987. And the *700* also won the Hi-Fi Grand Prix Award as being the speaker most suited to hi-end audio visual systems.

Celestion's Japanese distributor, Y Narikawa Ltd, has also picked up a MITI (Ministry of International Trade and Industry) Award for contributions to imported trade in Japan.

The awards have considerably boosted Celestion's sales expectations for the *SL 700*. Original plans were for 500 pairs this year, but this figure has now been increased to a possible 3000.

According to Celestion no other European or American brand received a prize in these awards.

## FBA WINNERS

The Federation of British Audio's annual Awards were presented when the hi-fi trade gathered for a charity evening in London last month. The awards, arguably the industry's most prestigious, were decided by readers of audio magazines who voted for their favourite components and dealer.

The source component category was won by the SME *IV* pickup arm; runners up were the Meridian *207* CD player and the Creek *CAS3140* tuner. Mission's *Cyrus One* was the favourite amplifier, with Musical Fidelity's integrated *B200* and Naim's *NAC62* pre-amplifier coming second and third respectively. Naim's *NASBL* loudspeaker topped this category, followed by the Linn *Nexus LS250* and Monitor Audio *R852 MD*. The Accessory category was won by the Hunt EDA *F2* Record Cleaning Treatment. Meridian's *269* remote control and Exposure's Loudspeaker Cable were runners-up here.

The product that has been on-the-market-for-more-than-five-years award went to Rega for

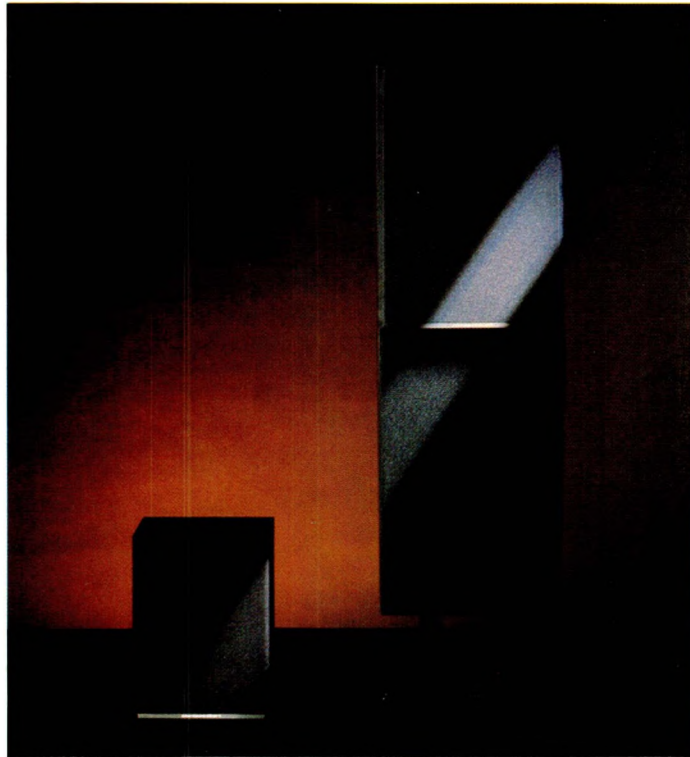
the *Planar 3* record deck. The FBA's Hi-Fi Dealer of the Year is Beverley Reynolds, who runs the AudioFile in Bishops Stortford, Herts, while the last category – Industry Personality of the Year – was won by Terry Bennett, Chairman of Goodmans and TGI Chief.

After the Awards ceremony, attention turned to the other main function of the evening – raising money for the Nordoff-Robbins Music Therapy Centre which caters for handicapped children. Several items were raffled for money, the last of which, a folding bicycle (made by a company part owned by Naim boss Julian Vereker) raised £1,200 for the centre. The successful bidder was Charlie Brennan of Linn Products, who outbid his own boss Ivor Tiefenbrun to avoid the embarrassing prospect of the latter getting up on the stage in full kilt and sporran regalia! At the time of going to press the FBA did not know how much money was raised by the evening, but estimated the figure would be more than £6,000.

## JAMES MOIR

It is our sad task to report the recent death of James Moir, sometime *Choice* author (of two volumes on *Music Centres*) and one of the UK's leading acoustic engineering consultants. Heavily involved in the early days of cinema sound, then later on in the early years of hi-fi magazines, he became a prominent member of professional bodies such as the AES (Audio Engineering Society) and IEE (Institution of Electrical Engineers). A rigorous scepticism in the Scottish engineering tradition alongside a characteristically dry sense of humour made him a redoubtable opponent in debate, and an engaging companion in discussion. Our condolences to members of the family.

F R O M F I R S T T O L A S T



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## AND THE SHOW GOES ON . . .

*Paul Crooke endures sore feet and a dirty telephoto for the sake of a taste of real food and hi-fi.*

Paris in the springtime has to be one of the most romantic indulgences within the divided states of the EEC. It is therefore ironic that it should also be the setting for one of those least romantic of events – a hi-fi show. Still, it is impossible for a self-confessed Francophile to turn down the opportunity of visiting his favourite Western capital, even if it does mean spending most of the daylight hours treading noise-drenched corridors and wandering amongst glittering Far Eastern LEDs and LCDs.

Having spent a year living in Paris as a language scholar doing the rounds of the various hi-fi venues during the extended weekend 7-12 April may have been a little easier for me than for my fellow reporters from this particularly Francophobic nation.

To 'do' the whole show actually involved visiting two different events – the *Journées de la Haute Fidélité* spread between the hotels Sofitel and Nikko in the fifteenth *Arrondissement*, and the *Salon International Son et Vidéo* held in one of the huge halls in the exhibition complex at the Porte de Versailles, again in the *quanzième*.

The latter was very reminiscent of the grand old days of the Olympia Radio Shows in London, which I understand are due to be revived in the not too distant future. Huge, brightly lit stands pound out junk music without any regard to sound quality or the musical sensitivities of their neighbours. In contrast, the *Journées* were more like Heathrow Penta or the old Harrogate shows – but without the latter's appalling food (chop suey and chips) and anoraks. ~

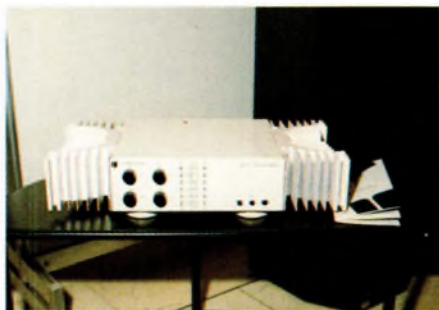
Starting on April 9th, the *Journées* are slightly fewer than the *Salon*, but equally insane as neither have trade-only days – days when you don't need a long distance zoom lens to photograph yet another purportedly yet apparently indistinguishable black box. This report is, therefore, brought to you by someone with bruised feet and greasy French paw marks on a valuable Pentax zoom. I should also mention the personal bravery involved in wrestling enough *documentation* (said with a French accent) out of the grasping hands of our Gallic cousins (who are still afflicted by that now demodé passion for

leallet gathering at hi-fi shows) to be able to bring back some news of the goodies on offer.

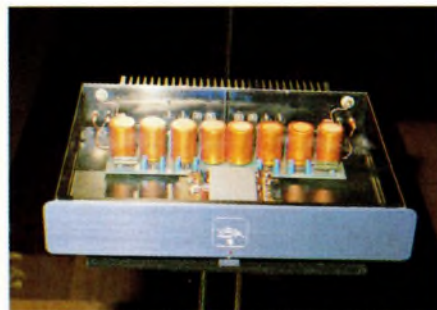
### SALON INTERNATIONAL SON ET VIDEO

Entering the vast hall – a large single space containing no less than 425 exhibitors from twenty different countries – one is immediately impressed by the superb stands of the big names, Japanese companies such as Akai, Denon, Sony, Toshiba, and Yamaha as well as the Europeans like Bang & Olufsen and Amstrad. All had masses of equipment spread over huge expanses of brightly lit floor area, populated by the most delectable examples of Gallic charm sporting well tailored suits in the manufacturer's colours.

It has to be said that when the French decide to do it, they do it in a style that others don't even dream about. One daren't even consider the cost of the stands, taking into account the various mini cinemas showing some stunning videos, the half-dozen uniformed professional models each, and the mountains of leallets poured daily into thousands of greedy plastic carrier bags.



*Attractively finned Audioanalyse power amp distributed by TMS.*



*YBA's new 3 power brings down entry price of French audiophile exotica.*



*A Gallic approach to single speaker demonstration.*



French Microphase speakers



Carver's 'Apogee lookalike' loudspeaker.

Sony were showing the world's smallest CD player: the *D-88* Pocket Discman measures only 95 x 33 x 99mm, weighs 400grams, and plays not only the tiny new 8cm CD 'singles', but by shifting the position of the drive motor standard size CDs too. Another new bijou Sony device is the *SWIS* multiband radio – the same size as a cassette case but offering synthesised digital tuning over FM, LW, MW and SW bands. The other little gem on the stand was the *TC-D-10* portable DAT recorder, rivalling the Technics and Casio equivalents also at the show.

All the new personal stereos come in a most florid range of colours, are equipped with a variety of radio receivers, and even include remote control models for those too lazy to move their wrists. Most of the big names also showed car CD players, including some capable of holding at least six hours of music in a boot-mounted multi-play deck.

Most of the hi-fi separates were items familiar in the UK, but due to reduced copyright paranoia in tape-levy France, many of the Japanese brands were also showing DAT decks. Anticipating A/V integration, Philips and one or two others were offering surround sound processors in the Yamaha *DSP-1* mould. Amongst the curiosities, a new range of Grundig equipment included a turntable which could well be sourced from J. A. Michell, finished in sumptuous gold and black. Luxman had their beautiful valve power amps on show as well as the huge solid state designs now rarely seen in the UK.

Soon tired of the glitz of the *Salon*, I decided to head for the potentially more interesting *Journées* in the hope of salvaging what remained of my sanity. Walking past the bank of satellite dishes on the way out, I reflected that the *Salon* probably still represented the world of hi-fi for a lot of French consumers. Although not as in touch with some of the latest hi-fi trends now commonplace in the UK, they are nonetheless more aware of the potential of audio/visual systems, one reason perhaps being the greater emphasis on video and the potential for multi-channel television from neighbouring European states. Still,

enough for sociology: on to resting the eyes and taxing the ears.

### JOURNÉES DE LA HAUTE FIDÉLITÉ

Started eleven years ago, one of Paris' top hi-fi dealers, Jean-Marie Hubert, decided to try and move the best hi-fi components outside what was then known as the *Festival du Son*, to avoid the noise and furoré of the old Palais des Congrès. It has grown considerably since occupying a few rooms at the Hotel Meridien, to a show with over 200 brands spread across two hotels. Jean-Marie has since closed his shop and is now the full-time president of France's *Syndicat Nationale de la Haute Fidelité* (a sort of FBA and BADA combined), and the *Journées* is seen as the main annual gathering for French audiophiles. All the big 'high end' distributors and manufacturers are represented, running proper demonstrations Penta style, using some of the best equipment available today.

The main body of the show is in the Sofitel hotel, standing in one of the less attractive areas of Paris not far from the *Peripherique* motorway (a cross between the North Circular and the M25 . . . ough!). Featuring a large number of British and American products, those waving the UK flag ranged from A&R Cambridge, Albany, and Ariston etc. down to Tannoy, Target and Vacuum Tube Logic – in fact too many to mention, which does a power of good to the old patriotic spirit.

US high-end products abounded, especially with Philippe Demarret's distribution of Audio Research, Magnepan, Mark Levinson, Sound Lab and Well Tempered (including the turntable yet to be imported to the UK). It was nice to see the impressive Rowland Research super amps now represented after their appearance in search of a French distributor last year; these are massive Class A designs similar to Krell, and with an equally impressive reputation for sound quality. Accuphase were there too, driving the Carver 'Apogee lookalike' ribbon speakers, which claim a nominal impedance of 4ohms and sensitivity of 85dB/W/1 metre!

Happily France was well represented too, including such familiar items as the

excellent YBA amplifiers, giving pride of place to the new *YBA3* pre/power combination, and on this occasion showing the prototypes that led up to the final production item. And the Microphase range, soon to reach the UK *via* Audio Freaks, are possibly the cutest speakers in France.

The Sofitel was stuffy, and confusingly reminiscent of some of the less good London shows, so it was something of a relief to jump on the free bus ('navette' as they call it; I thought I might be getting a free ride on the Seine!) to the Nikko, a very much smarter and no doubt more expensive hotel not far from the Eiffel tower. There were far fewer exhibitors, and the atmosphere was generally more civilised, especially as the Japanese run hotel is spotlessly clean.

Upstairs two very large rooms housed two of the largest French loudspeaker manufacturers, Elipson and Focal, the latter known in the UK for their excellent inverted dome tweeters. The demos were bizarre to say the least, consisting of about ten pairs of comparator switched speakers on the same stage at the same time.

The other big exhibitor on this floor was our Gallic friend Ricardo Franassovici of Absolute Sounds in the UK, who is the official distributor for Apogee, Air Tangent, Koetsu and Mandrake in France. The prodigal audiophile was performing his usual magic with the assistance of Krell amplification supplied by Presence Audio Conseil (the biggest and most exotic hi-fi store in Paris).

On the floor below, Threshold amplifiers and the Micro Seiki range were all playing through massive Altec Lansing speakers. Nearby dealer/distributor Hi-Fi Station 2001 (what will they do in 2002?) demonstrated a complete Goldmund system, the new *Mimesis* pre-amp and 'budget' power amp driving the well established *Dialogue* loudspeakers.

Their civilised demonstrations alternated with neighbours Audio Quartet, who distribute a range of products including Musical Fidelity throughout Europe, and showed several brand new acquisitions including the latest Martin Logan *Sequel* electrostatic hybrid, the Meitner amplifiers (including a very sexy remote control pre-amp) and the platterless turntables. The full range of California Audio Lab CD players now includes the new two-box *Tempest II*. All this was mechanically damped by Sicomin, and kept warm by an MF A370!

All in all this impressive pair of events indicate that the French hi-fi scene is looking forward again after what has been a very lean past decade. The style with which most companies presented their products left a lasting impression, as did the freedom of imagination in designing such things as loudspeakers. But most sensible of all surely is the way they organise the days to allow you to get away at just the right time for some good French cuisine!

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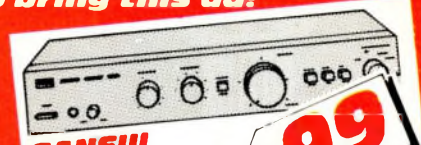
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City Limits Magazine Dave Attwood

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...offers some of the best deals around'...

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**SANYO**  
**JA220**  
Amplifier

**£39**

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- Plenty of inputs •Tone controls
- Silver finish •420 x 80 x 220



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Per Pair

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# ASPIRATIONS

*With silk carpets underfoot and pleasant sounds on the ears Tufan Hashemi can relax in a style to which many people would like to become accustomed.*

## PERSIAN

# Delight

Welcome to the Bayswater home of Tufan Hashemi, 29-year-old financial director of Roksan Engineering. Tufan lives alone in this Porchester Gardens third-floor flat which he describes as 'the hi-fi man's home', the main living room being devoted entirely to music listening.

The flat is a mixture of styles with an obvious slant towards Tufan's Persian heritage; he was born in Iran but schooled and educated in Britain from the age of nine. Sixty-year-old silk rugs from the once-famous Kashan region colourfully break up the pale carpet, their Islamic and Persian styles bordered by 'nail writing' – a script dating back two and a half thousand years. A samovar sits in the kitchen ready for any tea-drinking connoisseurs and low-

profile lacquer boxes concealing compartments of various oriental sweets are scattered about.

Back in the main room the sofas and chairs too with their half-moon backs and plush gold piping, seem eminently suited for reclining with tales of Arabian nights. But there is also European influence in the three tables and fireplace hewn from richly-veined black Italian marble and original lamp figurines from the 1920s. An oil painting by his grandfather, of a small girl at prayer, is hung over the fireplace and is very European in style, though both girl and setting are Persian. The other end of the room borders on the 'hi-tech' and is divided into an eating area with table and chairs.

Tufan watches television in a small anteroom which also houses his record collection. The latter is extensive enough for one to ask for Mahler's *Fourth*, say, and be offered his *Sixth*, which I thought was fairly impressive (and moreso when it is played).

Records are carried into the listening room, where the hi-fi can be operated without the listener having to leave his seat. "I like to work here making telephone calls and listening to the system all within easy reach," Tufan says. He cites 'user friendliness' as one of his and Roksan's main ideals, and dismisses some high-end systems for being entirely aimed at the hi-fi buff who loves to spend ninety per cent of his time setting up, and then plays only one record.

He was at London University with Roksan's other principal, Touraj Moshaddam who is the engineering talent behind

*Tufan on his sofa, from where he can operate his system – just out of shot on the left.*







# TURNING THE TABLES IN '88 ...



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*Xerxes et al.*, and John Loughlin another engineering graduate who was the firm's third founding member.

"We were all going to do different things," he remembers, "I finished my MBA (Master's degree in Business Administration) and was working for a city stockbroking firm, John was going into research, and Touraj was about to take a job in Germany. But we all loved listening to music and Touraj had come up with a deck that didn't sound too bad. It was made of two slabs of wood with cardboard tacked around the side, but we took it to the London Westmoreland hi-fi show in October 1985 where it got a good reaction. Things developed from there, and we began serious production in June the next year."

At the time of writing Tufan was involved in coordinating a major move for the company, from the existing Clerkenwell Road premises in London to a larger factory in Wales where they will have five times more space. He will continue to maintain this London base, however, for his other business interests.

The first stage in the music reproduction process here is the Ortofon *MC3000* which with its *13000* transformer pack is well paired to an SME *V* tonearm for Roksan's rosewood *Xerxes* deck. The analogue signal then runs into a Bryston *11B* pre-amplifier. The Bryston brand has recently been re-introduced to the UK market by Roksan, but in fact the *11B* auditioned was

swiftly replaced by the near-identical *12B* (photographed), which is one of two pre-amps that are being imported. This slim and easy to use package has a 20dB mute button which will cut down the sound if you want to answer the telephone (but won't let you forget that you have left the record running). It also features a headphone socket. A Nakamichi *CR7E* cassette deck "to make tapes for my car" sits under the Bryston on a medium sized Roksan table. The *Xerxes* also sits on its three-legged Roksan table.

Some fairly simple DNM solid core interconnect cable then runs to the Omtec *RDN* mono active crossover system before driving the loudspeakers with four Omtec power amplifiers – yes this is an 'active' system. Just for the record, Roksan also import Omtec from Giessen in Germany. All these electronics are more or less hidden from listeners in the main room, on tables behind a corner. One therefore tends to associate the hi-fi with just the decks and pre-amp, keeping it unobtrusive. The Bryston is apparently capable of powering the next stage of amplification at up to a quarter of a mile away (given good enough cable), which is an obvious selling point for anyone who likes to spread themselves out a bit! Omtec *CA25* power amplifiers feed the still-novel tweeters of Roksan's *Darius* loudspeakers, these being mounted on sub-baffles and suspended at four points by loose springs to decouple them mechanically from the main bass



*Above: the old and the new – this Grafonola is worlds apart from the black-box Omtecs which, as yet have none of its nostalgic appeal. Below: ready and waiting – the exoskeleton Darius.*

enclosure. The bass units of the *Darius* (can one call them that?) are powered by two Omtec *CA60* power amps and the whole speaker system, in its characteristically deep cabinet, is caged by integral stands which attach to the box from all sides.

# The love of music taken to Infinity

Two decades ago, a small group of music-obsessed physicists and engineers working on advanced aerospace problems discovered they shared an absolute dissatisfaction with existing speaker technology. They decided to put their knowledge of electronics, audio and music to the task: Could they expand existing technological boundaries to create the kind of speaker *they* could live with?

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Tufan's room is also used as a listening room by Roksan, since they are currently so short of space. And he is constantly changing his system every few months, searching for perfection while trying out possible import lines and any Roksan developments. During my visit I had a chance to hear a prototype subwoofer system. Each subwoofer sits beneath its *Darius* loudspeaker, mostly within the frame and spiked to the floor, maintaining a similar tilt and extending forward slightly. It's the firm's first stab at such a design and the boxes were not in presentation form, so have not been photographed.

The subwoofers were separately powered from the crossovers by a Robertson 4010 amplifier and were demonstrated by switching them on and off. Subwoofers are usually the male rabbits of hi-fi, thumping away like a dry alternative to a foot spa, but these were refreshingly discreet sonically. Rather they act as an extension, providing something that is not obviously missing (if I may be totally confusing). But the sound is warmer, the frequency range wider, and, more important, the subwoofers are 'in phase' to use correct parlance.

The system sounds very sweet and easy. Tufan has two favourite positions, either on his sofa at the controls, or in between the speakers, where he says he never notices that they are so near on either side. It is quite easy not to notice the loudspeakers from the other end of the room, where they are partly hidden by armchairs, and they displayed a quite good three-dimensional depth image, sometimes creating the impression that the sound was coming from further away, in the dining area



perhaps, while there were moments when the acoustics of the orchestra came naturally rolling up. It was refreshing and surprising not to hear the 'wall of sound' which can be common even in high end systems. I also felt that the subwoofers made a significant contribution even on a plain vocal track, so they may become a must for *Darius* fans when in production (expected November).

This system costs the sort of money which would send most people scuttling for a mortgage — prior to these Tory-property-mania days at least. And it is odd to realise that the deck, Roksan's keystone,

is about the cheapest element in the set-up. Tufan is very proud of the system and its approach, and says that in two or three years Roksan will have opened up a new market in the hi-fi industry. Hi-fi, he says, has been mistargeted at 'hi-fi buffs'. "The people who like Roksan are not necessarily into hi-fi; they are into music," he told me. "and they want something that is easy to use and good to listen to."

Tufan's room may become more settled when the company takes up its new Celtic setting and he ceases testing prototypes. But the hi-fi in the hi-fi man's home is never static for long.

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# READERS WRITE CHOICE ANSWERS

## TUNING A LA MODE

My present system is made up of a Rega Planar 2/Nagaoka MP11 turntable, Technics SLP11 CD player, Denon FMA 737 amplifier and Wharfedale 302 loudspeakers. However, I want to replace the Denon amplifier with a receiver, so as to have a tuner in the system. I have a budget of £150-£200 and wonder if you could recommend any particular model.

Secondly is there any performance difference between amps with inbuilt tuners and those without?

J. GIRI,  
GUILDFORD, SURREY.

*Receivers have become rather unfashionable in these days of minimalist 'straight line' amplifiers, so there are now only a very few models available that fit your budget, made by such as JVC, NAD, Technics, Sansui and Yamaha. We haven't investigated the species in the last five years, so cannot give any current recommendation. On past form, however, the amplifier section of a receiver rarely matches that of a specialist separate amplifier.*

*Certainly, there is no really good technical reason why a receiver cannot match separate amplifiers and tuners for quality, except perhaps at the very top of the market. Indeed the single case and shared power supply should provide better value for money. But the fact remains that the separates are invariably designed with sound quality as a major objective, and incorporate the latest developments to that end.*

*Unless you're particularly dissatisfied with your current amplifier, it would seem most sensible to buy a separate tuner to go with it. There is a good selection of well regarded models available at under £150, including Denons which may match best cosmetically. The ones we have tested are listed in the Directory at the back of each issue.*

*If you want to replace your amplifier as well, then have a look at the matching tuners and amps from companies such as*

*Creek, Rotel and NAD who produce 'Best Buy' examples of both for prices close to your budget.*

## CONFLICTING OPINIONS

Help! I've just had all my initial ideas about the gear I wanted dashed. I intended to buy a Marantz SD35 cassette deck, Pioneer F55-1L tuner and Cambridge P40 amplifier to add to my antique Philips 202 turntable and 22RH speakers. I want to start building a moderate priced system capable of being expanded to include CD, and eventually replace the original equipment with something more up to date.

However, on getting to the store I discovered that the P40 is devoid of tone controls. And as most of my records are old, scratched and much loved this is a fairly basic requirement. My dealer suggested the Rotel RC850/RB850 pre/power combination which looks OK, but I'm interested in the Audiolab 8000A which of course he doesn't stock. My choice of cassette deck met with some derision, the dealer suggesting Denon's DR-M07 as a superior machine, Tunerwise he recommended Rotel's RT-830L. It was confusing to say the least so any objective advice would be gratefully received.

C. J. WILD,  
EPPERSTONE, NOTTINGHAM.

*The most effective way to make the most of worn but cherished records is to use a good quality turntable, arm and cartridge combination. It seems to be a common misconception that it's possible only to play immaculate discs on well designed turntables, when in reality the music-to-noise ratio improves with the quality of the player. What does become more obvious is the quality of recording, mastering and pressing. We have heard several early 60's LPs which look atrocious but sound remarkable - often better than current equivalents. Don't take our word for it, take a few records down to your dealer and give them a spin on something*

*like a Linn Axis, Rega Planar 3, Systemdek IIX or Manticore Mantra - you may be pleasantly surprised. If this proves the case then maybe you should reassess your requirements, perhaps opting for a less expensive amp such as the Rotel RA820A II (£125) which features tone controls, although its suitability will depend on the efficiency of your speakers. We would rate the Audiolab and Pioneer higher than the alternatives you mention, but agree with your dealer regarding the cassette deck.*

## THE LINN/REGA CONTROVERSY CONTINUES

Some parts of my system are now approaching 15 years of age and the time has arrived to consider upgrading.

Having auditioned a number of amplifiers I have decided to go for the Cyrus Two (or the revised edition if it lives up to expectations). The next phase will be to upgrade the arm on my Linn LP12; this is approximately eight years old and is fitted with the Basik LVV arm. Having recently seen a review extolling the virtues of the Rega RB300, in comparison with the Basik Plus amongst others, I was considering purchasing one.

On approaching one of the dealers in your Dealer Directory section, I was disappointed when told that such a move could not be recommended and I would do better to sell my old Linn and purchase a new one. Perhaps the enhancements to the LP12 since 1980 account for the difference in opinion here but I am, understandably, somewhat confused and would welcome clarification.

R. BULMAN,  
BRISTOL, AVON.

*It's true that although the RB300 is an excellent arm it doesn't work as happily on the Sonddek as it does on most other decks, or at least not as sympathetically as the Ittok. Opinions vary but we do on balance believe the RB300 is inherently better, while acknowledging the fine system compatibility of Linn turntables*

*and tonearms. We can only suggest you try to audition the trade-offs for yourself.*

*As far as the LP12 is concerned, we understand that nearly all Linn mods are retro-fittable. You should be able to get your deck upgraded to near current specifications at rather less than the price of a new player, though there have probably been sufficient production improvements (tolerancing etc.) over the years to make a new turntable a viable option nonetheless.*

## FULL CIRCLE

I have recently purchased the following: AR EB101 turntable, Sony TA-A300 amplifier and Mordaunt-Short MS-10 loudspeakers. The turntable is fitted with a Glanz MG70R cartridge, and I would like to know whether this is suitable for my player, and what its retail price is.

If I were to replace it with something in the £20-£50 range what would you recommend? Whilst I have no serious problems at the moment I confess to not knowing the capabilities of Glanz cartridges and currently I am using a tracking force of 1 gram, is this correct?

ALAN PICKFORD,  
MANCHESTER.

*Your letter would seem to indicate substantial magazine dependency and it is rather unusual for us to receive a request for the price and capabilities of product that the writer already owns. Does this mean that if we were to tell you that this cartridge (which incidentally was last on sale four years ago, but was never reviewed by Choice) failed to get our wholehearted recommendation, you would hurl it into the trash can? We hope not. If as you say, there are no serious problems, why change? However, you are using rather a light tracking weight, as the MG70R has a recommended downforce of 1.75 grams.*

*Glanz' current distributor, Presence Audio, reckoned that its*

original price was in the £10-£15 area and that it didn't have a removable stylus, so you could have a pretty worn out cartridge on your hands. Possibly therefore a replacement might not go amiss. One sensibly priced, well regarded model is A&Rs C77 (£20), but Goldring's G1010 (£34) may give a more lively sound. Always remember that it is you who has to live with it, so choose with your own ears from the selection chosen by ours.

### BACKGROUND HISS?

At present I have a rather old music centre which I am considering scrapping. My problem and the reason for this letter, is what I should replace it with. My musical tastes are quite wide but I haven't got a large record collection, mainly because I find the background hiss on vinyl annoying. Therefore I'm attracted to the compact disc medium and have selected, on the basis of your review, the Sony CDP710 CD player as the starting point for a new system. However, I need an amplifier and some speakers to match it with and this is where my problem begins. I require an unbiased opinion to help me select these components, given a budget of £300. Could you also recommend some appropriate stands and cables for the system.  
K. RICH,  
PILL, BRISTOL.

*Before recommending some suitable ancillaries for the CDP710 we would suggest you have a listen to your records on a good quality record player such as a Systemdek IIX, Linn Axis or Manticore Mantra. Surface noise is much better suppressed by well designed and properly set up turntables, and you could be surprised at just how good vinyl can sound.*

*Some amplifiers worth listening to are the QED A240CD (£169), Cambridge P40 (£200) and the latest Mission Cyrus One, (which we haven't yet assessed, but should be worth checking out if it's anything like its predecessor). As far as speakers are concerned, the best solution is to take a look at the reviews in this issue.*

*Favourites from past reviews include the JPW AP2 (£145), Tannoy Mercury 2 (£150) and Mission 70 II (109). Whatever you go for, make sure you listen to the system as a whole before purchasing – the overall tonal balance will depend on the combined characters of each component, and one combination may appeal to you more than another.*

*Finally, the all important other bits – Heybrook Point Five stands (£50) (May issue) came out well and are the right size for most of the above speakers.*

### WITHOUT REMOTE CONTROL

Having decided to enter the world of hi-fi I have been making enquiries at local dealers about suitable equipment, but have been left confused by their comments and would appreciate some impartial advice.

I would like to buy a midi system with a turntable and cassette player in the £500 region and have drawn up the following requirements:

- The best sound for the price.
- Optional speaker availability – I would be prepared to pay more for better quality equipment.
- Robust, simple to operate and relatively gimmick free (I am both clumsy and dim).
- The facility to record both from records and other tapes.
- CD player option.
- Good service and spares back-up.
- Without remote control (unless it can be shown to be of any tangible benefit other than to promote obesity).

The equipment should be suitable for a room of approximately 15 x 12 x 8 ft high with normal furnishings. Any advice you can offer would be very much appreciated.

V. SANSOM,  
CHATTERIS, CAMBS.

*To be honest, from your list of requirements, it doesn't sound like you want a midi system at all, and we doubt whether any exist within your budget that satisfy points a) and c). Accepting that you may prefer to go for a midi system for aesthetic reasons, we would suggest you go for a separates combination*

*instead.*

*These could be stacked 'midi style' with the exception of the turntable which would prefer a lightweight and rigid support. A line-up that should satisfy your requirements is: Ariston Q-deck turntable (£140), Rotel RA820A II amp (£125), Sony APM10ES speakers (£106) and Sony TC-W250 dual cassette deck (£149). We would challenge anyone to come up with a similarly priced midi system to beat this combination in sound quality and it's not too ugly either! If you have the funds, a pair of rigid speaker stands would be well worth purchasing and companies like Appolo and Target make some reasonably priced models.*

### WHERE TO START

After much debate I've decided to buy myself a hi-fi system. Having read and re-read editions of your excellent magazine I've come to the conclusion that I really don't know where to start. I would therefore be grateful for any advice you can offer.

I have a budget of around £1000 and a rather large record collection. The three items I wish to purchase are turntable, tuner and amplifier – I already have some speakers. Which of the following would make the best system and if the need arises, can they be upgraded? Amplifiers: Musical Fidelity B200, Audiolab 8000A, Rotel RA870BX and Mission Cyrus Two. Tuner: Arcam Delta. Turntable: AR EB101, Linn Axis and Systemdek IIX.

M. HINTON,  
CALNE, WILTSHIRE.

A good place to start is with your ears in a local dealer's dem room. Make a few appointments for demonstrations to find out which dealer is most helpful and in touch with your requirements, then listen to two, maybe three appropriately priced systems including the equipment you suggest and any other that the dealer considers worthwhile.

If you're going to spend up to £1,000 on a system it's worth doing some aural research in the first place. We would suggest that you go for a slightly more up-market front end than those you

list – the Townshend Rock, Helius Scorpion arm and Goldring Eroica L cartridge, for instance, or the Linn LP12/Basik/K9, these decks offering good scope for upgrading vis arm and cartridge.

*All the amps you list received very similar ratings on review, but they don't sound the same. The Cyrus is the only upgradeable one – using the PSX power supply. Listen to them in the context of both your speakers and the prospective front end, as their performance may vary considerably.*

### TOOLING UP

I have a Linn LVX tone arm with detachable headshell and want to change the cartridge. To do this first I need a small vice to hold the headshell – I understand that tightening up cartridge bolts whilst on the arm is not good for the arm bearings. Second, to attach those minute wires one needs electrical tweezers I believe. Your corps of reviewers must change cartridges dozens of times a day and use these tools, so can you tell me where I can get such things by post. We don't have any specialist toolshops in the locality.

A. H. SLADE,  
LUDLOW, SHROPSHIRE.

*Fitting cartridge tags is admittedly a tricky job but we have found that reasonably fine household tweezers are adequate – do this job before you bolt on the cartridge as it's easier.*

*Holding the headshell whilst tightening the bolts is less simple – cartridges are usually tested on fixed headshell arms, the tightening is done with the arm removed from the turntable. A jewellers' or modelmakers' vice would probably be helpful.*

*Although we don't know of any stockists offhand, a good toolshop should be able to help. A flick through the central London Yellow Pages (at the library) and a couple of calls should locate one. Alternatively, carefully remove the arm cable plug (first loosening the grub screw) from the arm base and remove the arm, then tighten the bolts with the headshell in place by holding the armtube in your hand.*



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By offering a rigid and vibration-controlling platform, tables and isolation stands can greatly improve the sound of your hi-fi system. However, hi-fi furniture is all too often starkly functional, resembling a purely mathematical product from a welder's shop – it may work for your system but it doesn't always harmonise with your living-room environment. So *Choice* is giving away a complete set of designer hi-fi furniture from the Daniel Lamb Collection which will set off any sound system with its elegant tubular black steel structure and massive marble slabs. Each unit's support columns are finished with a 24 carat gold plated dome, and the marble shelves in point contact with the

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This month's questions are:

1. What is the most obvious difference between the original Celestion DL6 loudspeaker and the Series Two?
2. What type of insulation is used in Audioquest's Livewire Quartz cable?
3. What prefix denotes 'a thousandth of a millionth of'?
4. What does LC-OFC refer to in terms of cable technology?
5. Name three loudspeakers of American origin tested in this issue?

### 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 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 prizes or their relatives are not eligible to enter the competition.
- 4) The competition is not open to readers living outside the United Kingdom.
- 5) The prizes will be awarded for the first two sets 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, August 19th 1988. The winner will be notified by post and the results will be announced in the November 1988 issue.

NAME \_\_\_\_\_

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**NB** Please send this completed entry form along with Part Two (July issue) to:  
HI-FI CHOICE COMPETITION, 14 RATHBONE PLACE, LONDON W1P 1DE.



## SECOND PRIZE

The runner-up will receive a pair of *Red Line* loudspeaker stands (£258.95) described as "the realisation of a four-year project to produce the perfect loudspeaker stand." The *RL1* consists of a triangular top plate on a sturdy steel column with another triangular base which couples to the floor *via* three steel cones. To enter this competition all you have to do is answer the five questions in this and next month's edition of *Hi-Fi Choice* and send the completed entry forms together to us. The prizes will be awarded to the first two correct set of entries to be opened.

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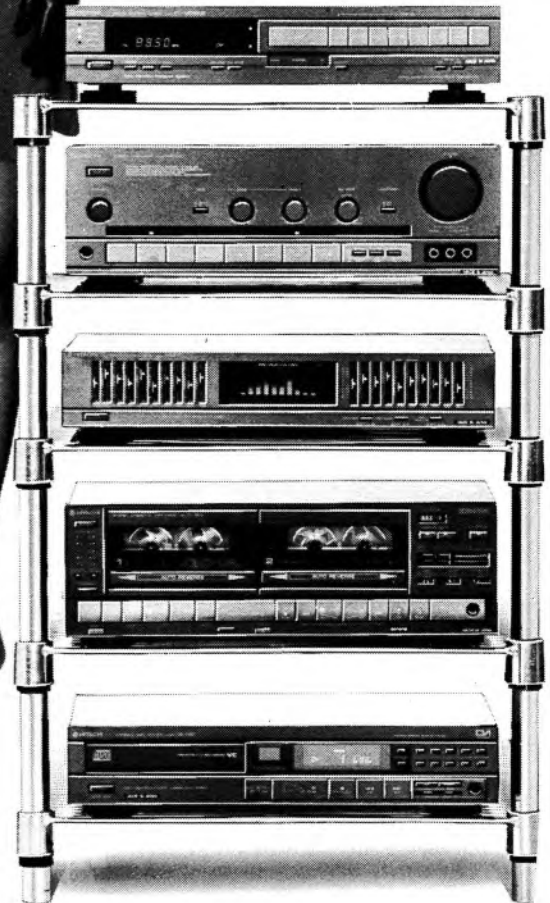
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## FOCUS

*Do kit amplifiers stand up against their commercially manufactured competitors? Martin Colloms gives some Audiokits models the same rigorous treatment he dishes out in our regular amplifier reviews.*

### FOCUS ON

# Kit Amplifiers

**K**it building used to be a popular part of the hi-fi hobby in the 1950s and 1960s, but it has declined substantially since, following the widespread availability of good quality budget priced equipment and the shift from purchase to value added taxation. US company Heathkit used to be a leading light in the field, offering a full range of stereo components including loudspeaker systems. In its final years, however, many ready built imported products were found to outperform the ageing kit designs, and at rather lower prices to boot.

Nevertheless, a small and dedicated group of kit builders have managed to keep the flag flying. Many of these match their enthusiasm for electronics with a strong hi-fi interest, and try to incorporate this factor in their home built audio. There are several electronics constructor magazines on the market, and these publish audio designs amongst a wide range of topics. Supply houses such as Maplin Electronics offer parts and kits, as well as their own designs.

One independent designer who runs a kit supply house is Graham Nalty. His appropriately named Audiokits company has featured strongly in constructor journals, while Nalty himself has made a personal study of good quality audio and the sound of the individual components used, staying in close touch with findings published in the hi-fi press. As such he claims a 'genuine' (enthusiast-oriented) hi-fi performance for his kits, which is not always the case with the competition.

*Hi-Fi Choice* decided to put Nalty's claims to the test, to see whether his kit-based *Apex* design could really stand up

under the searching *Choice* laboratory and auditioning programme, in direct comparison and competition with normal commercial, fully manufactured amplifiers.

We have tended to avoid kits in the past, because their availability is unorthodox and pre-purchase auditioning parlous, never mind any question of guarantees. But it is a route that offers its own appeal and satisfaction, the key question being how competitive this alternative is in sheer value for money terms. Success here should clear the way for interested *Choice* readers to build their own, with rather less worry than heretofore. And in addition to this 'trial by comparison', we were also able to assess the effect of individual selected audio components on the overall sound quality of the amplifier.

Nalty supplied us with two sets of apparently identical pre- and power amps. Build and circuitry were in fact the same,

apart from the substitution of a few very costly, 'better sounding' capacitors and resistors in the duplicate samples. Here was a golden opportunity to see whether such substitution really had any effect. And if so, to what degree. These apparently minor component changes accounted for a whopping price increase of £216 for the pre-amp and £115 for the power amp respectively; Audiokits also make these special parts available to upgrade owners' existing equipment where appropriate.

The kits are relatively straightforward to build, provided the assembler has some reasonable skill with a miniature soldering iron, and can also follow a list of logical instructions. However, I must admit we cheated: all four units were delivered already assembled and ready to go. A look inside showed that build quality was competent and tidy, even if the physical design was not quite up to professional factory manufactured standards. Aspects such as electrical safety had received correct attention, and the final effect is best described as durable, legible and workmanlike.

### SOUND QUALITY

Making no concessions to their origins, the Audiokit models were thrown in at the deep end as part of a large batch of fully manufactured models during a recent *Choice* group test. Graham Nalty can rest easy – the kits stood up to the comparison creditably!

The *N* pre-amplifier rated a solid 'good'.



*Back to front, the gold-plated socketry of the Apex 'S' series pre-amp.*



averaging the results for moving-coil and line inputs. The latter using CD sources was considered moderately superior to the analogue disc connection. Decent commercial designs in the £250 to £500 price class achieve a similar sort of rating to this Audiokit.

Musical dynamics were well represented *via* moving-coil. The bass was competent and the treble suffered only mildly from 'sibilance' and 'grain'. Stereo depth was fairly good, while tonal accuracy and focus were amongst its strongest points. Focus improved further using CD. Transparency was superior and stereo depth achieved a very good rating.

The *N* power amplifier also kicked off with a solid 'good' rating, comparable to the better examples of commercial designs in the £200-£300 range. Again midrange dynamics sounded very competent, while the bass showed well above average definition and power delivery. Well focused,

stable stereo images were obtained with a decent degree of depth, but the result was let down somewhat by a suggestion of laziness and 'sszz' in the upper treble, even though the performance was pretty good in the lower treble.

### THE 'S' SERIES

Auditioning the 'S' series proved even more rewarding, and these lookalike specials do sound different from their 'ordinary' brethren. The pre-amp's score for both moving-coil and CD inputs advanced considerably, ending up well into the 'very good' class, alongside well respected commercial audiophile designs such as models from Audiolab, Cambridge Audio and P.S. Audio. The bass in fact showed little change, but there were considerable improvements in midrange and treble, in terms of both tonal purity and accuracy. The effect was to make the 'N' version appear coarser and 'stringy' sounding.

*'Sidewalking' – the Everyday Electronics Apex combo losing its balance.*

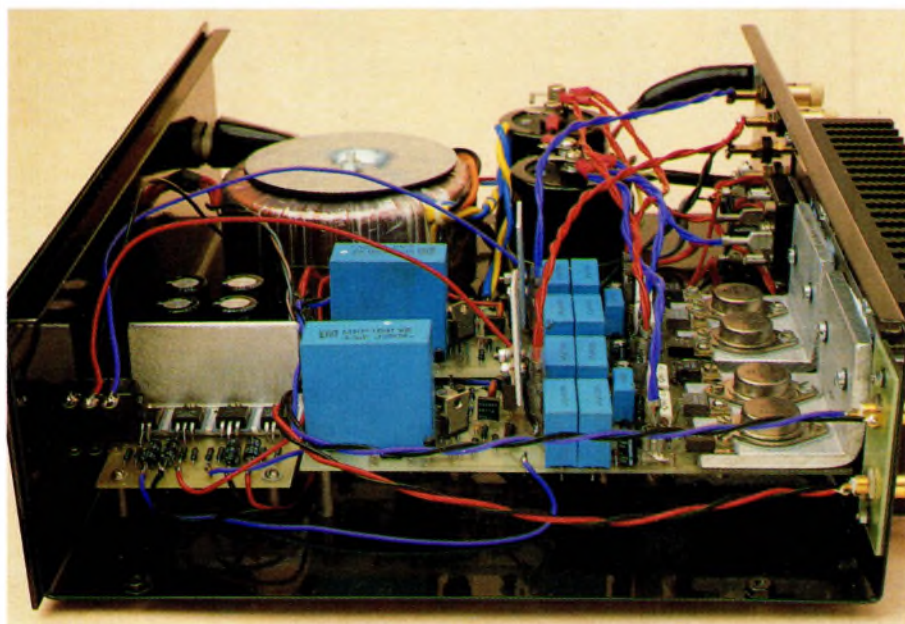
- Detail, transparency, dynamics and stereo focus were all superior and were to be had essentially for a sprinkling of passive 'audiophile' parts!

The power amplifier subjective change from *N* to *S* was not quite so dramatic, though it still moved up a complete grade from 'good' to 'good plus'. Here dynamics were improved, and gains in clarity, definition, stereo focus, transient speed and depth were all noted. These listening tests confirmed both the basic sonic integrity of the Apex designs, and the value of using special audiophile grade electronic components in critical locations of more advanced products.

### DESIGN AND BUILD

Whereas the standard pre-amp is built using good quality commercial grade components, the *S* version is well filled with the industry's finest, including some of the fabulously expensive *Ultima* series units from Wondercap. Six key capacitors in the signal path are also 425V rating *Ultimas*, while the last two are 10 $\mu$ F high grade. All resistors are selected Holco metal film types, alongside exotic Vishay bulk foil in a few critical high current locations. Many other polypropylene film capacitors are used in the power supply side of things.

The active circuitry employs discrete transistor op-amps – single-ended and good performance applications using some of the most extensive power supply regulators I have ever seen. No fewer than eight regulations are fitted in the power supply



*'A sprinkling of Vishays', the guts on an 'S' series.*

**SOME LIKE IT HOT**



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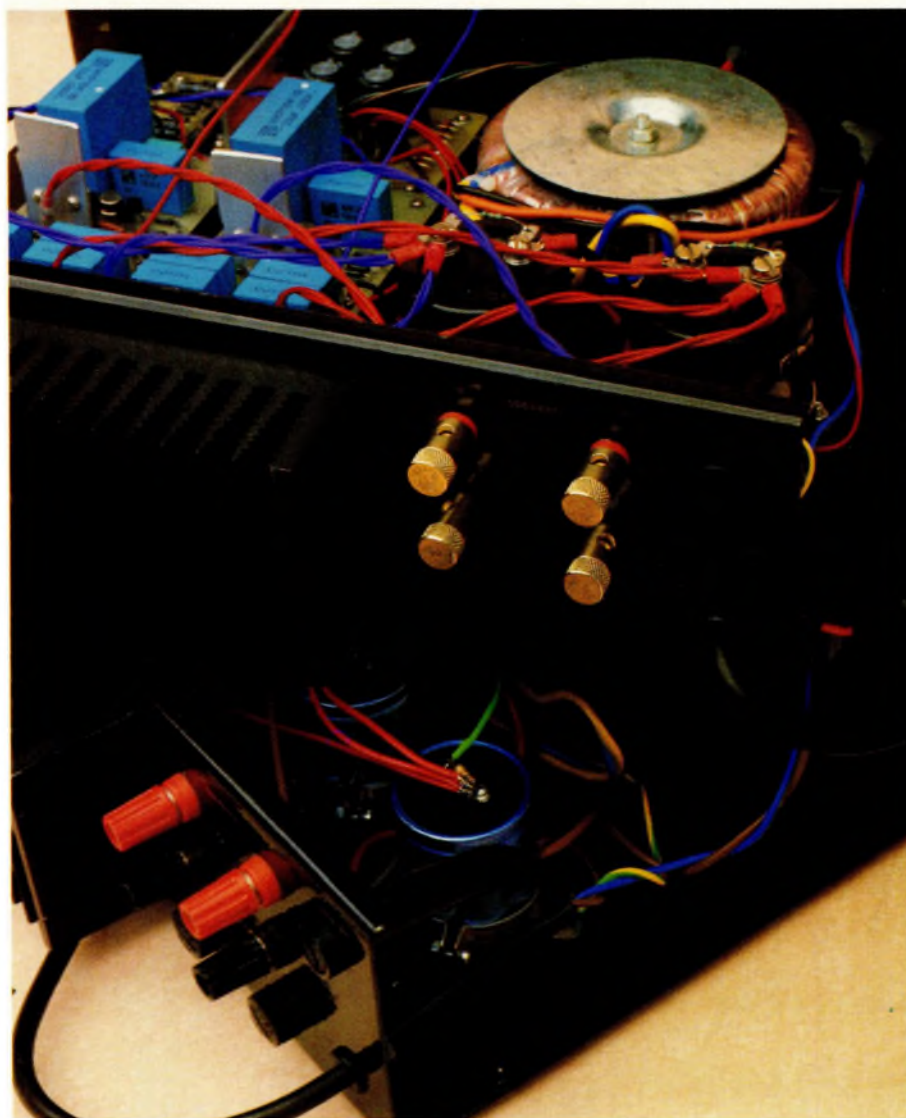
section, backed up by six subsidiary regulators placed adjacent to their respective circuitry. Gold plated phono sockets complete the picture.

The *S* power amplifier matches the pre-amp in terms of its gold plated inputs and the Michell output terminals. A straightforward discrete circuit is used with the single high quality differential input chip, feeding a high current complementary bipolar Class AB output stage, direct coupled to the load. Separate chip regulators supply the earlier more sensitive stages of the amplifier. Again Holco resistors are generally used, with a sprinkling of Vishays at critical points. Many good polypropylene capacitors are incorporated, and selected cable is chosen to wire the whole thing up. The build is not as professional as for a mass production item, but it was nonetheless pretty good. A kit builder could be justifiably proud of his efforts.

### LAB RESULTS

Lab tested, the *Apex S* delivered a fine set of frequency responses, with superb RIAA equalisation matching between channels. The moving-coil input response held to  $+0, -0.3\text{dB}$  over the most critical range, while a trace of bass lift was seen *via* 'aux', just  $0.5\text{dB}$  up at  $20\text{Hz}$ . The overall bandwidth was nicely tailored. Spot checks taken throughout the lab test programme showed virtually identical measured performance from the *N* model.

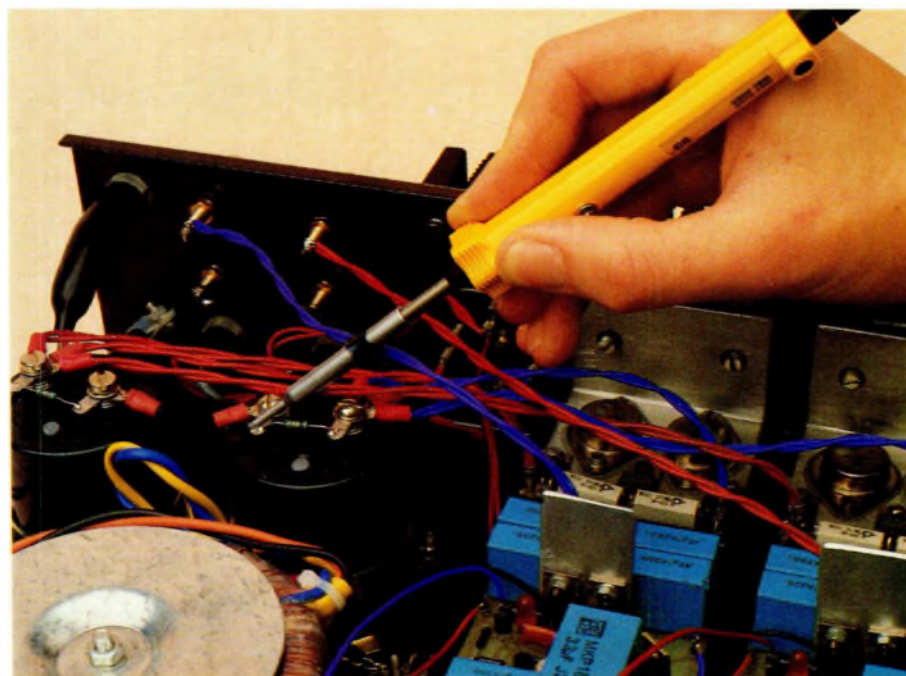
The disc input standard intermodulation test results were weak, the difference signal at only  $-15\text{dB}$  being clearly seen on the graph. Distortion was moderate under other test conditions, approaching 1% and mainly consisting of 2nd harmonic. Noise levels were good, but the disc input high frequency overload margin (associated with the noted IM result) could be improved. Channel separation was average whilst channel balance and volume tracking were excellent. Sensible values have



been chosen for input sensitivities and load impedances.

The power amplifier 8ohm output was a solid  $45\text{W}$ ,  $16.8\text{dBW}$ , with an excellent power bandwidth. 4ohm delivery was good too while very good load tolerance is shown by the  $2 \times 160\text{W}$  peak program power delivered into 2ohms; peak current reached

*Back-to-back, the Michell terminals and big black 'caps' which account for some of the price differences between the two power amps.*



*Hot metal - a job for the confident and steady handed enthusiast.*

Left: The Wonder Cap Ultima series capacitors inside the more expensive pre-amp.

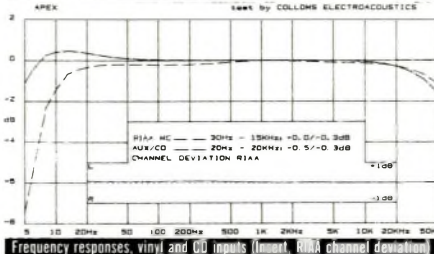
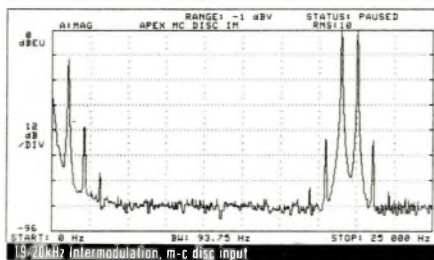
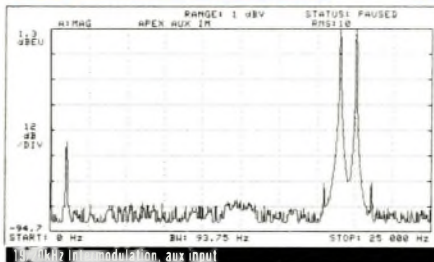
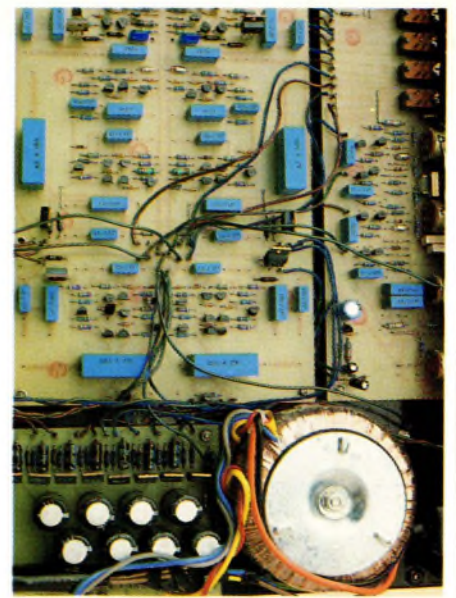
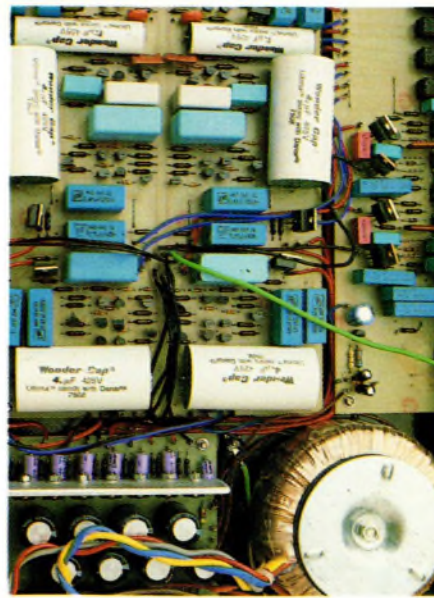
Right: The more discreet boards of the standard Apex pre-amp

Below: Totally wired – the N series power amplifier.

+20, -17.5A – a fine result for the class. Distortion results were more than satisfactory, and the rise in distortion at higher frequencies was not considered too serious, though it might allow room for further improvement. The DC offset was set rather high as received, at 100mV left and 25mV right, so the kit builder should keep an eye on this factor, making fine adjustment if required. The output impedance was rather higher than usual, although still a satisfactory 0.16ohms. Some mild bandlimiting was apparent on the frequency response, with -0.5dB registering at 19.5Hz and 16.3Hz, -3dB at below 9Hz and at 44.5kHz. Protection, handled by a quick blow fuse in the output line, and the sensitivity was high enough for the direct connection of a CD Player via a passive potentiometer.

**COMMENT**

While my opinion regarding a number of established hi-fi kits and construction units verges on the unprintable, I was favourably impressed with the design, build and performance of the Audiokit Apex models. Moreover, there is clear sonic justification for the more exotic S versions. The general performance versus price standard of all the models would place them in the Recommended class, with the S pre-amp the obvious value leader. The test results showed up a few problems such as high frequency distortion and a limit on the disc output overload margin, but these are likely to be of limited significance in the light of the good subjective performance.



**TEST RESULTS**

**Power output:**

Rated power into 8ohms, maker's spec	40W (= 16dBW)		
Power output	20Hz	1kHz	20kHz
One channel, 8ohm load	16.7dBW	16.8dBW	16.7dBW
Both channels, 4ohm load	14.6dBW	15.1dBW	15dBW
One channel, 2ohms, pulsed	-dBW	16dBW	-dBW
Instantaneous peak current		+20A	-17.5A

**Distortion:**

Total harmonic distortion, at rated power, aux/CD in.	20Hz	1kHz	20kHz
	-5.7dB	-5.7dB	-5.6dB
Intermodulation, 19/20kHz, rated power, aux input			-5.4dB
Intermodulation, 19/20kHz, at 0dBW, disc (mc)			-15dB

**Noise:**

Disc (mc) input (IHF, CCIR weighted)	-64dB
Aux/CD input (IHF, CCIR weighted)	-86dB
Residual, unweighted (volume control at min)	-89dB
DC output offset	left 100mV, right 25mV
DC offset, pre-amp	left/n/a mV, right/n/a mV

**Input overload:**

Input overload	20Hz	1kHz	20kHz
Disc (mc) input (IHF)	21dB	18.7dB	10.6dB
Aux/CD input (IHF)	>23dB	>23dB	>23dB

**Stereo separation:**

Disc input (mm)	74dB	60dB	37dB
Aux/CD input	>96dB	70dB	52dB
Output impedance (damp)	0.176ohm	0.144ohm	0.223ohm
Channel balance, disc, at 1kHz			0.04dB

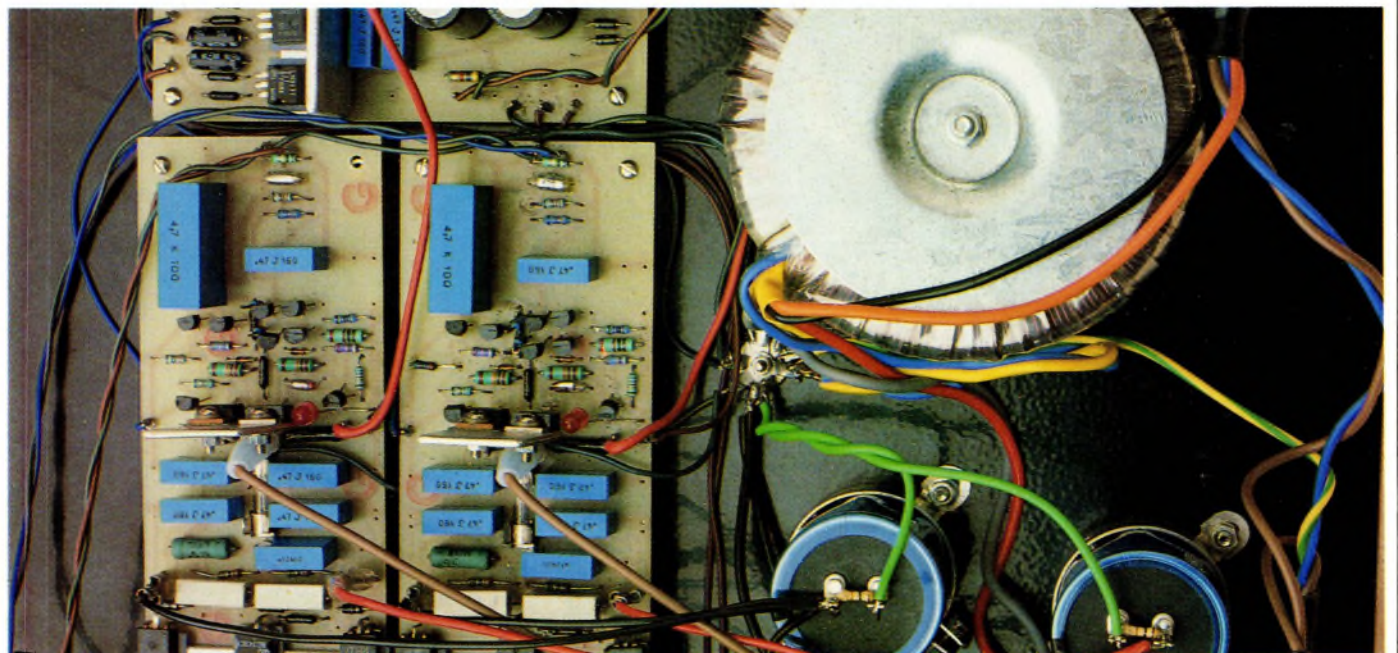
**Volume/balance tracking:**

Aux/CD input	0dB	-20dB	-60dB
	0.7dB	0.15dB	0.3dB

**Impedance:**

Disc (mc) input	socket type	sensitivity	loading
		0.385mV	—kohms —pF
Aux/CD input		53mV	17kohms 360pF
Disc equalisation error, 30Hz-15kHz			+0dB, -0.3dB

Typical price inc VAT (pre- + power) £390-£721 (see text)



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## Denon TU-550 Tuner

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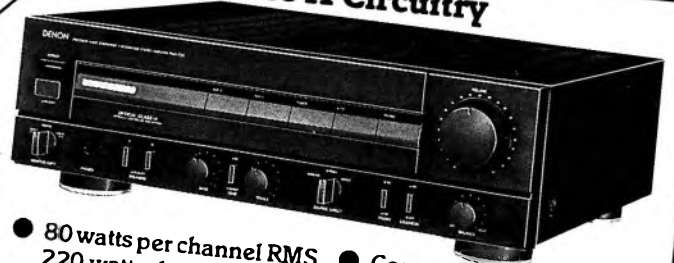


- 2-step IF bandwidth selection
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- Precise, high sensitivity digitally synthesized tuning for quality sound
- Auto-scan tuning
- Low-impedance output of approximately 600 ohms
- Quick manual tuning
- Manual step tuning
- Last-channel memory
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**NEW**

## Denon PMA-720 Amplifier

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- 80 watts per channel RMS, 220 watts dynamic power
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- "Pure Current Supply" decreases dynamic IM distortion by 60 dB
- Compatible with low impedance speakers
- 7 sets of audio inputs for connecting other audio equipment
- Electronic switches and ideal chassis construction eliminate external noise

## Denon DR-M24HX Cassette Deck

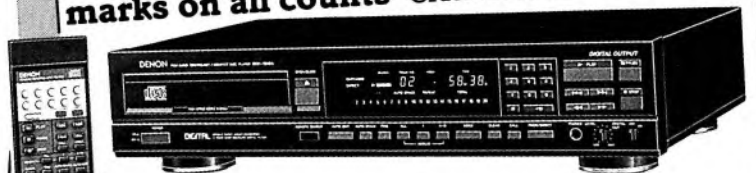
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- Dual capstan drive for stable transport
- Computer-controlled silent mechanism
- Non-slip reel drive for stable tape tension
- Low-cogging DC reel motor
- 3-head system with SF combination heads
- Recording amplifier with New CCDC (constant current drive circuit)
- Dolby HX Pro Headroom extension
- Dolby B/C noise reduction
- Manual bias adjustment
- REC level adjustment
- MPX filter switch
- Hi-tech digital display

## Denon DCD-1500 II Compact Disc Player

"I would give the new machine very high marks on all counts" GRAMOPHONE MARCH 1988



- Double super linear converter
- Vibration-resistant chassis and pickup mechanism
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# CELESTION. BECAUSE SOUND PRINCIPLES DON'T CHANGE.

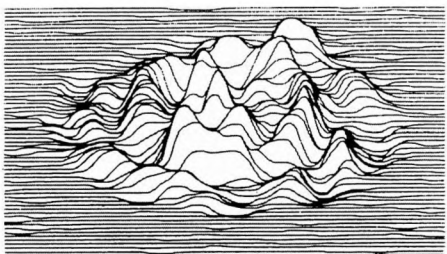
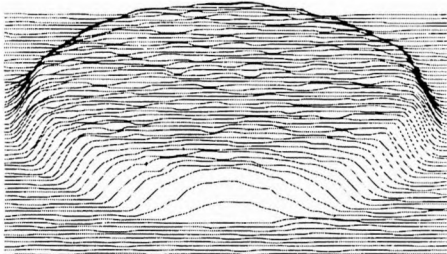
We have one aim at Celestion—to reach the pinnacle of sound reproduction through our range of hi-fi speakers.

Now with the introduction of our new DL Series Two and our state-of-the-art SL700 models to a range which includes the SL6S, award winning and innovative SL600 and System 6000—we're achieving new heights.

To produce loudspeakers of unparalleled accuracy and performance, we're constantly investing in both human and technical resources.

## **Laser technology produces unique sound solutions**

Until we developed our incredible laser interferometer system, curing any problems in the diaphragm (the source of the sound) was difficult because we couldn't monitor how it was actually working.



This remarkable laser equipment produces a sequence of 3D images which can be replayed by computer to create the impression of movement, allowing us to avoid all the pitfalls which are common in conventional loudspeaker design.

The result is less distortion and improved power handling capability in our drive units, which imparts a smooth naturalness to sounds.

## **Bass units with optimal two part surrounds**

Again using our laser system we've developed an advanced driver surround construction which improves bass response dramatically.

An inner section provides ideal termination for minimal mid-range colouration, while the outer section is optimised to give the best possible bass performance.

## **Hard dome tweeter technology**

Our use of top quality aluminium and titanium metals, which are exceptionally lightweight and strong, has resulted in



tweeter domes which give greater accuracy and, therefore, better sound quality to the treble range.

## **Simple crossovers**

Utilising simple, low and high pass crossovers means that the minimum number of components are used to integrate our units, and give seamless transition from bass to treble. Confirmation of the Celestion belief that 'simple is best'.

## **Meticulous attention to detail**

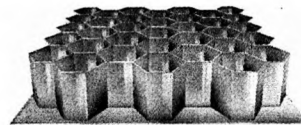
We make all our loudspeaker systems in Ipswich from components selected for their sound quality to meet the exacting standards that mean Celestion.

## **Research benefits all our range**

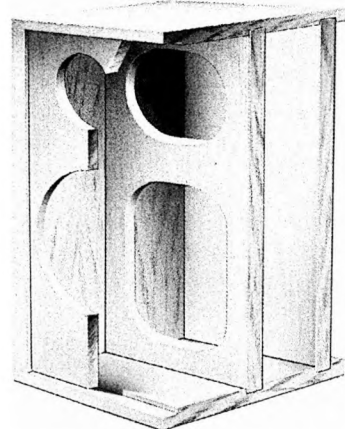
Concepts in our top end models are applied to less expensive units, i.e. gold plated binding posts, to reduce distortion at each component level and maximise listening quality.

## **The ultimate in cabinets**

Our constant search for new, improved cabinet materials, resulted in the use of Aerolam, an extremely strong and rigid material borrowed from aerospace technology.



Using different techniques; either Aerolam, for the ultimate in lightweight, stiff panel construction, or a figure of eight brace for extra rigidity (or a combination of both), we've reduced cabinet colouration to a hitherto unknown degree.



## **The way we stand affects our performance**

Celestion speaker stands are always designed as an integral part of the system and those for our latest SL700 and DL Series Two range are no exception. Both combine Celestion experience with innovative extras, to produce yet more performances from Celestion speakers that outperform every other in their class.

**Celestion. Because sound principles don't change.**

For more information on the Celestion range of hi-fi speakers please contact:

Celestion International Ltd.,  
Ipswich IP3 8JP, England.  
Tel: 0473 723131



# CELESTION



# MARKET RESPONSE

*Our exclusive market survey summarises dealers' opinions on the current state of the loudspeaker market, looking at important buying factors such as reliability and product consistency.*

Six months on, this is the first product repeat for *Market Response*. As such it is possible to make direct comparison to the results we obtained then, but our sampling approach is random and it is not always the same dealers who reply, so certain changes due to different dealers stocking different products are inevitable. We in fact received replies from 51 dealers on this occasion, with answers covering 63 makes of loudspeaker currently on the British market.

The aim of the feature is to provide readers with a distillation of the views of many dealers, as well as providing a guide on current best sellers and hopefully some advice on reliability and product consistency. The survey complements the main review topic each month but concentrates largely on different criteria. A review takes and looks at a given product and concludes upon it, relying mainly on just one sample. *Market Response* has more to do with dealers' experiences of manufacturers and their products over the last six months or so. And we also asked dealers to nominate their best selling speaker cables and stands.

Although many told us that the loudspeaker market is very buoyant at the moment, summer is on the way, and one dealer is selling 15 to 20 personal stereos, yet only one or two pairs of loudspeakers a week! It's not just the budget end of the market which is fast moving either. Karen Hole, of RPM (The Clapham Clinic), said she was selling more Naim SBLs than Goodmans Maxim 2s. "People want quality and are quite happy to shell out two grand on a system," she explained. There's the new Clapham for you.

## RELIABILITY

In terms of engineering loudspeakers are the simplest elements in the hi-fi system, and are therefore extremely reliable. Sound Decision Ltd told us they'd not had a faulty pair back in the last 12 months. Obviously though, the more pairs of loudspeakers a

dealer sells the more he is likely to find faulty models. From our survey we calculate that only 1.52% of models arrive from the manufacturer as faulty – December last we arrived at a 1.5% fault rate, which shows consistency at least! And many dealers commented that any damage was usually done in transit – crushed box edges and scratches on vinyl cabinet coverings. One said that certain delivery companies were very good, mentioning TNT as the best, but added that some of the other firms just threw the loudspeakers about. And one Irish dealer said his sendback rate was worse because loudspeakers were generally too heavy to send by air and therefore had to be freighted by sea. Although the damage was often only slight, it was still sufficient for the speaker to have to be sent back.

Where quality control was astray, dealers usually complained of finish, saying that speaker grilles might have a hole in them or that the vinyl coverings did not meet properly leaving the mediate exposed. The wooden frames for grilles fared better than plastic ones, which sometimes fell apart because they were poorly glued.

One dealer opens the boxes of all Goodmans Maxim speakers because there is often a problem with the veneer. "Customers expect you to have checked the expensive speakers; but they have the opposite attitude to the cheaper models," he explained, "they think there is something wrong if you've had to open the box." Chris Lyons, of Lyon Audio, told us that people would be willing to pay a few pounds more for a better packed speaker, but added that manufacturers were usually too keen on meeting a psychologically important price point not to cut corners on something like packing.

When you have bought your speaker and got it home, the most common damage you can do is blow up (burn out) the drive units. This shouldn't happen under normal conditions and if you have matched the speakers'

capability to the power of the amplifier. Nevertheless people do throw parties, and parties get wild. And then your best friend staggers over to the system and screws the volume clockwise in an effort to broadcast your taste in music to the big world outside; puts the amp into hard clip and . . . fizz! Yes we've all been there.

Bearing in mind that very few loudspeakers are returned to the dealer, we have nevertheless calculated a reliability table. The most reliable manufacturer came out as Mordaunt-Short, with comments such as "we just never see them again," they scored 64 points for reliability. Next came Linn Products with 27 points, followed by B&W with 19 and Acoustic Research with 17. Monitor Audio, who came top in our December issue survey, and who are stocked by around 20 of the dealers here, scored seven points, while Rogers, another December notable (with 15 dealers here), scored 11 points.

Where unreliability is concerned Mission came off worst with 23 minus points, then Tannoy followed by Wharfedale with 22 and 17 minus points respectively. (Perhaps these are the brands chosen by party throwers – *Ed.*) Exceptions abound, however, as some dealers also gave these firms plus points for reliability while there were a few marks against Mordaunt-Short and B&W for tweeters going.

If and when your loudspeaker system does blow up or goes wrong we calculate you can get it back in an average of ten or so days (incidentally, again the same figure as calculated in our December issue). Most dealers carry out repairs themselves, usually simply by replacing a drive unit. Some manufacturers are faster than others at getting repair parts to dealers, and Mission gets the most mentions for speed, followed by B&W, Mordaunt-Short and Acoustic Research. The slowcoaches were given as Tannoy and Wharfedale. It was pointed out that if a speaker is known to be less reliable, dealers are more likely to stock spare parts for that

model, so there is some consolation for regular speaker zappers.

## CONSISTENCY

Do some brands of loudspeaker change from one week to another? The answer seems to be rarely, and 16 dealers, by not replying to this section of our form, obviously felt never. But the trade did have some preferences: we added up the points to find B&W (24) coming top, closely followed by Linn and Mordaunt-Short (23 each) Snell (19), then Heybrook (16). Dealers were even more reluctant to mention inconsistency but Mission scored minus 17 points, Goodmans minus 16 and Monitor Audio minus 15 here.

## CABLE

Dealers generally hope to sell you speaker cable when you buy a pair of loudspeakers. Good cable will help the signal to reach the loudspeakers, and John Townrow of Fiveways Hi-Fi told us: "the most important thing is to get resistance down to a quarter of an ohm; the big step is from rubbish to 79-strand. After that you get into whether you believe in magic or not."

Several dealers told us they could demonstrate the differences in sound between the different types of cable they sold, and specialist cables are currently enjoying something of a boom, with new brands coming onto the market every few months. However, the general public, while obviously accepting Townrow's view, has not diversified much out of 79-strand yet.

We asked dealers to nominate their best-selling cable and got an almost unanimous vote for QED 79-strand, though a couple mentioned that a non-branded 79-strand cable would do the trick just as well. After this 'bulk-buy' sector of the market things branch out, and it seems customers become much more selective. But we heard a few mentions for Naim *NAC04* cable, Monitor *PC* and DNM *Solid Core*.

**STANDS**

One of the best tweaks one can make to a cooking pair of loudspeakers is to set them up on rigid stands. The differences in sound are obvious, substantial and easily demonstrable. Over three-quarters of the dealers we spoke to said they would hope to sell a customer a pair of stands when they sold him some loudspeakers, except perhaps where a customer wants speakers to sit on a bookshelf, say. Chris Lyons told us he often sold a £105 pair of stands with sub-£150/pair loudspeakers. But would it be better to spend the money on better quality speakers and then get cheaper stands? "That's where we are getting into the never never," he said.

We heard from several dealers that rigidity was the most important factor, and that it was therefore better to buy stands that cannot be taken apart. For similar reasons it's better to buy higher mass stands with shot and sand already added, rather than doing so later oneself. Generally dealers felt it didn't matter whether a manufacturer's stands were used with their own speakers, although there were a few dissenters here.

From our survey we calculate that Target stands are the most popular with Appolo and Linn taking joint second place. The Sound Factory brand is also popular.

**THE MARKETPLACE**

It is difficult to specify the exact size of the UK hi-fi loudspeaker market, estimates ranging from £10-£20 million per annum, simply because it is hard to know where to draw the line between hi-fi and audio.

There are similar value/volume difficulties in specifying the market shares of the different manufacturers. Wharfedale, for example, probably have the widest distribution in terms of numbers of dealers, but tend to

concentrate on budget products, so their large sales volume may not be any greater than another's value output. More succinctly, you can buy eight pairs of *Diamonds* for the price of a pair of *104/2s*.

Disregarding the consequences of recent takeovers and mergers (Tannoy, Goodmans, Mordaunt-Short), in the UK at least no single brand dominates. In the best capitalist tradition there are about ten companies holding between five and ten per cent, presenting an astonishing range of choice for the consumer and ensuring that prices remain fiercely competitive.

The core market has been fairly static for some years as enthusiast attention focused on the turntable, leading to depressed sales of higher priced models. Nevertheless demand for these does exist, as some have found, and to some extent the others can be blamed for failing to come up with suitably credible products to justify the higher price points.

CD has perked things up a little at the mass market end, because CD-upgraders often look next to their loudspeakers when contemplating further improvement. And prices have only risen a modest 10-15 per cent in the last five years, partly due to the psychological difficulty in breaking the £100 price point for the industry's staple product, the 2-way bookshelf model.

**THE BEST SELLERS**

We gave dealers three price brackets in which to list their best selling loudspeakers, and asked for their top three models in each category. The results are calculated on a simple points basis - five for the top seller, four for the second and three for the third - and then added up.

**Budget, below £149**

- 1) Heybrook *Point Five* 51
- 1) Wharfedale *Diamond III* 51
- 2) Goodmans *Maxim 2* 43

- 3) Acoustic Research *AR18 BX* 38
- 4) B&W *DM 100i* 32
- 5) Mordaunt-Short *MS25ti* 32

Of these the Wharfedale and Mordaunt-Short both featured in our best sellers list last December.

**Mid-Price, £150-£300**

- 1) Heybrook *HB1* 85
- 2) Linn *Index Plus* 84
- 3) Mission *707* 30
- 4) Monitor Audio *R252* 29
- 5) Rogers *LS6* 28

Again Heybrook and Linn lead the field in this bracket. The Rogers *LS6* and Monitor Audio *252* were also best sellers in December.

**Top Price, over £300**

- 1) Monitor Audio *R852MD* 71
- 2) Linn *Nexus* 52
- 3) Epos *ES14* 31
- 4) Rogers *LS7t* 26

We did not include a fifth best seller here because the Linn *Isobarik*, Linn *Sara*, Mordaunt-Short *55ti* and Snell *Type K* speakers all scored 19 points. This is a particularly good score for Snell, since they are only stocked by about a third as many dealers as Linn or Mordaunt-Short. The Monitor Audio *R852* remains top best-seller from December, but of the other front runners only the Rogers *LS7* has made it into the table this time.

The results of this market survey are only as representative as the comments from 47 dealers around the country can be. We do not pretend this is a complete or absolutely accurate picture; the survey is a poll and relies on a mostly random approach to give results that are at least coherent with the current market situation.

Our thanks to the following dealers for their assistance:

- Aerco Ltd, Woking, Surrey.
- A. Fanthorpe Ltd, Hull, Humberside.
- Analog Audio, North Finchley, London N12.
- Andrew Thomson, Kircaldy, Fife.
- Aston Audio Ltd, Alderley Edge, Cheshire.
- Audio Counsel, Oldham, Gt. Manchester.

- Blackmore Vale TV, Gillingham, Dorset.
- Brentwood Music Centre, Essex.
- Bridge Hi-Fi, Walsall, W. Midlands.
- Bryants Hi-Fi, Aldershot, Hampshire.
- Cambridge Hi-Fi.
- Chichester Hi-Fi, W. Sussex.
- Cloney Audio, Blackrock, Co. Dublin.
- Elite Hi-Fi, Harrogate, N. Yorks.
- Eric Wiley, Castleford, W. Yorks.
- Fiveways Hi-Fidelity, Edgbaston, Birmingham.
- Gilson Audio Ltd, Middlesborough, Cleveland.
- Grahams Hi-Fi Ltd, Pentonville Road, London N1.
- Griffin Audio Ltd, Bristol St, Birmingham.
- Harrow Audio, Middlesex.
- Horns Ltd, Oxford.
- Image Hi-Fi, Headingley, Leeds.
- John Marley Hi-Fi, Canterbury, Kent.
- J.R.C. Torquay, Devon.
- K. J. Westone, London W1.
- Lafayette Hi-Fi, Dublin, S. Ireland.
- Lyon Audio, Stanway, Essex.
- Moorgate Acoustics Ltd, Rotherham, Yorkshire.
- Nick Dakin Hi-Fi Specialists Ltd, Nottingham.
- O'Brien Hi-Fi, Wimbledon, London.
- Peter Russell's Hi-Fi Attic, Plymouth, Devon.
- Pro Musica, Colchester, Essex.
- Radlett Audio, Radlett, Hertfordshire.
- Robert Ritchie Hi-Fi, Montrose, Angus.
- Rogers Hi-Fi, Guildford, Surrey.
- R.P.M. Clapham, London.
- Sound Decision Ltd, Sale, Cheshire.
- Standens of Tonbridge, Kent.
- Super-Fi, Nottingham, Sheffield, Leeds, Lincoln and Hull.
- Suttons, Bournemouth and Salisbury, Wilts.
- Swift of Wilmslow, Cheshire.
- The Audio File, Bishops Stortford, Herts.
- The Cornflake Shop, Windmill St, London W1.
- The Sound Organisation Ltd, York.
- Tru-Fi Sound and Vision, Aldershot, Hants.
- Truro Hi-Fi (ETS Ltd), Cornwall.
- University Audio, Cambridge.
- Uxbridge Audio, Middlesex.
- Westwood & Mason, Oxford.
- Witney Audio, Oxford.
- Zeus Audio, Donaghmore and Belfast, N. Ireland.

**NB Any dealer who feels aggrieved that he is not on this list, and would like to be consulted in future, either regularly or intermittently, please write to us at 14 Rathbone Place, London W1P 1DE, or telephone 01 580 2684.**



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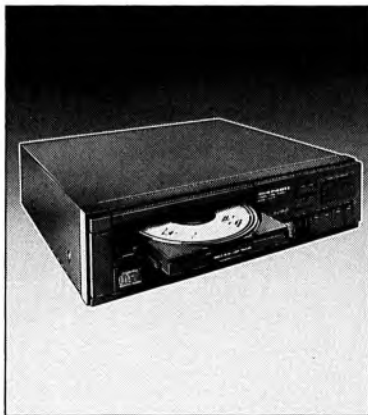


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# CHOOSING AND USING . . . LOUSPEAKERS

*A pair of loudspeakers is as personal as a pair of shoes. A little care spent in choosing and correctly using will pay long term dividends.*

If you're planning to spend one or even several hundred pounds on a new pair of loudspeakers, it does make sense to take at least as much care over the decision as one would in buying a pair of shoes. If you get the shoes wrong your feet will protest, so if you get the loudspeakers wrong your ears will rebel, and you will find yourself not using the system as much.

The first step on the road is to try and specify one's own personal and particular requirements, he writes glibly, opening several cans of worms. It is possible to do this on a basic, simplistic level, checking the price, size and intended location. But there are real benefits for those prepared to take a little more trouble. With a little care, the assistance of the data in this book, and (hopefully) the co-operation of a skilled retailer, the end result can be that much more worthwhile.

## SETTING THE BUDGET

Those buying just loudspeakers will have a pretty good idea of the money they have available, which as ever is the fundamental bottom line of any purchasing decision. But there is – and always has been – controversy over the proportion of a budget that should be devoted to loudspeakers, *vis à vis* that spent on the other components.

Ten years ago conventional wisdom recommended devoting as much as possible to the loudspeaker, as it was regarded as the weakest link in the chain. An alternative philosophy, pointing out that the loudspeaker could do nothing to compensate for an inadequate source, switched attention towards turntables and amplifiers.

When setting the loudspeaker budget, it is vital to allow sufficient funds for a decent stand or support, and good quality connecting wire. From £150, for example, one should probably allocate £100 for the speaker itself, £40 or so for

stands, and maybe a tenner for the cables.

## PERSONAL PREFERENCES

Where one listener may be barely conscious of the subtleties of stereo imagery, another will take particular pleasure in pin-pointing musicians within a recorded acoustic. Likewise, those who listen predominantly to electronic rather than acoustic instruments are liable to sacrifice coloration in favour of dynamic impact.

While a magazine can assist in presenting these alternatives, it is only through skilled demonstration that an individual can be confronted with the different but equally valid options to make an educated choice for himself.

At the time of writing I am temporarily living with a £1000 system which suits me very well, but which certainly represents one extreme. It consists of a £600 turntable with £200 amplifier and £80 loudspeakers on £100 stands. At the other (rather less) extreme, another could enjoyably combine a £500 remote control multi-source midi-system with £500 worth of high performance, low coloration loudspeakers and stands. But unless one actually has the opportunity to hear the difference between these two very distinct approaches, how can one possibly have any basis for making a choice?

## SITING IS IMPORTANT

The site chosen for loudspeakers is often as influential as the choice of loudspeakers themselves. Over the years I have used open stand locations, both with conventional box speakers and panel types, and also stand-mounted wall-backed designs. Each has its own strengths and weaknesses and imposes its own characteristics on the sound, so again personal preference enters into the equation. Some will suit one room layout better than another, and choice must frequently take

as much account of the visual as the sonic aesthetics.

Having chosen the siting, one may then choose the loudspeakers and stands to suit. Alternatively, choose the speakers you like in the shop, and then move them around at home until they sound to your taste.

The end result comes from a complex interaction between the loudspeaker, its support, its site, the acoustics of the room, and the general characteristics of the driving system. That is rarely entirely predictable. For those intending to spend a fair amount of money, it is not unreasonable to expect the luxury of a home demonstration, and/or the option to return and change a pair which do not suit after a day or two.

## BIG ONES OR LITTLE ONES

For any given budget there is an obvious choice between large or small loudspeakers. One instinctive reaction is to favour the big one, particularly if it has lots of drive units, but others will plump for a miniature or compact on aesthetic grounds. In fact the differences and trade-offs are much more subtle and far-reaching.

Fundamentally, the larger the box the more extended the bass is for the same specific loudness. Ultimately a good big 'un is going to beat a good littl'un on loudness and bass extension, hands down. But it is also going to cost a great deal more. The large enclosed volume remains the route to extended bass, and this in turn adds 'weight' and 'scale' to the sound. But it can also reveal the low frequency inadequacies of the sources, be they the equipment or the recordings themselves.

Big speakers suffer from several innate disadvantages. Large box enclosures are expensive to build and ship, and represent an undesirably large surface area of unwanted radiation, which can colour the sound and blur stereo precision.

Extra drive units do increase power handling, but bring problems of crossover complexity and unit integration.

Little speakers can prove more fragile if used for the occasional party, and are certainly not at their best when trying to recreate the power and drama of rock music or a full concert hall acoustic. Their appearance is bound to be more discrete, but they will nearly always need a special stand to produce the best results.

## MODUS OPERANDI

Given the excessive number of different models competing for attention, manufacturers are inclined to make much of the uniqueness of their particular brew. As a result the industry has become riddled with buzz words to describe any single type of engineering solution, and this leads to the sort of stereotyping which entirely misses the point of loudspeaker engineering.

Examples are legion, from the extreme bass/midrange cones of the early 'seventies through to the latest metal dome tweeters which are currently springing up everywhere. The result is that people talk of a 'metal dome sound' as something desirable (or not) *per se*, whereas in fact there will be a whole range of different metal dome sounds, in all probability some distinctly more 'equal' than others.

The underlying axiom is that great loudspeakers are not created by adopting a quick technological 'fix'. Indeed, history has often shown that the 'radical innovation' is a mere flash in the pan, with benefits in one area more than offset by unforeseen penalties elsewhere.

Technology has steadily improved the performance of loudspeakers over the years, and some innovations have proved decidedly worthwhile. But the whole is much greater than the apparent sum of the parts, and the buyer would do well to bear this in mind.

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### and the essential difference between ourselves and the "also-rans"

When recorded music is listened to today, it represents the ultimate in a chain of processes that places a good reproducing equipment virtually in the class of a precision instrument. Certainly that used in the making of playing of records, the transmission of FM broadcasts and of course Compact Disc technology, is vastly elaborate. Similarly with speaker design. Not that there is any need to understand these processes in detail in order to enjoy music. Many music lovers may not want to. However, they do want to be able to depend on their supplier from whom they buy.

This is precisely the service which **SUBJECTIVE AUDIO** is organised to render in the fullest possible way.

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With this firmly in mind, we are pleased to report that many visitors have selected TDL speakers for their long term enjoyment. Their decisions having been influenced by the extraordinary level of performance, even before they are informed of the startlingly low prices.

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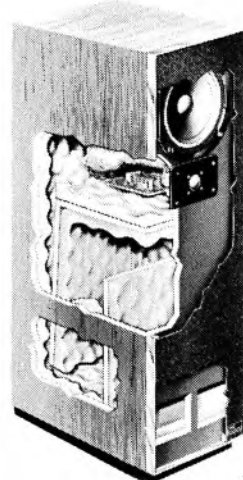
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## And a few words about TDL . . .



When approached to be their major London dealer (we are still their only London dealer), we were somewhat surprised; because we work from unusual premises and choose not to have conventional shop facilities. Despite (and perhaps because of) our unconventional approach, TDL were enthusiastic and loaned us their complete range of speakers to evaluate

Whether by design or error, when the units were sent to us, we didn't get their price list and therefore had to judge the equipment without reference to cost.

All of the staff were extremely impressed by the performance and it was impossible to find any weak point in the range. This is without precedent here, as we are very selective and apart from Magneplanar, we only take certain examples from any supplier's range.

TDL are to be congratulated by providing consistently high performance at all price levels. In particular, the Studio 2 has a remarkably integrated sound for a 2-unit speaker with a bass end performance which is tight, well controlled & clean. This is an outstanding achievement when you realise that the Studio speakers, the Monitors & the References are all transmission line bass loaded.

Mr John Wright (the Designer & Principal of TDL) may be well known to many of you from his work with IMF – a company who came to prominence in the 70's and were well known for providing not only excellent value for money, but a quality of finish which was quite extraordinary for an English product. As befits a Company of integrity, owners of IMF speakers can get full service from TDL.

Home demonstrations for TDL are readily available, as indeed are testimonials from happy customers. Just ring for details.

It would not be an exaggeration to say that the range of TDL speakers are the finest complete range of speakers that we have encountered in the last 4 years and we warmly congratulate them on their outstanding technical achievement, sonic performance and value for money.

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# ACOUSTIC ENERGY AE1

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RECOMMENDED



In a world populated by 'me too' clones, the Acoustic Energy *AE1* is completely different. Patents covering the bass unit and a development programme stretching back over several years are the sort of ingredients you might suppose could only realistically come from one of the industry's majors. You'd be wrong. *AE* is in fact a start-up outfit, and the *AE1* a highly ambitious first product.

The *AE1* is designed to be 'quick' so as to track complex waveforms accurately, and handle a lot of power with freedom from dynamic compression – these problems having been identified as endemic with traditional loudspeakers. The tweeter is the only familiar looking component, being based on the now widely used Elac metal dome, but it is built with a much lighter voice-coil assembly than the standard article. The bass driver is quite different. It has a very sophisticated dual layer alloy cone and dust cap. The magnet is massive and power handling high. The 13-element crossover, using a combination of air- and iron-dust-cored high power inductors, marries the two drivers with 3rd-order slope on the bass/mid unit and 4th-order on the tweeter.

The enclosure is compact and extremely solid, with 22mm Medite walls lined internally with a plaster like compound to eliminate parallel surfaces and the standing waves associated with them. Wiring is intended to be based on six individually insulated 0.4mm solid cores of silver plated OFC stock, all connections being soldered; our test models, however, used *Supra* multistrand. The enclosure is vented with two deep front panel

vents, fully 'gas flowed' to reduce turbulence, putatively at both ends though on the outside only on the test pair. The box is covered in a new and very hard textured grey acrylic finish; other colours will be made available at extra cost.

## LAB REPORT

The 3rd-order Butterworth crossover provides reasonable integration on- and off-axis, but there were some phase cancellation effects around the crossover point measured at 15° above the main axis, and a narrow but deep 5kHz suckout on the normal axis. The frequency extremes are down a little in level, in the case of the tweeter because the unit becomes quite directional at HF. The room-averaged response, which by definition is drawn mostly from energy measured off-axis, illustrates this well, showing that the *AE1* is a bit of a 'hot spot' design. The slight bass shyness is in level rather than extension, and facilitates positioning fairly close to a wall for reinforcement purposes.

Bass extension is surprisingly good for such a small design, and without much apparent sacrifice to efficiency either, sensitivity measuring a very reasonable 88dB/W. Power handling seems almost boundless, and the impedance characteristic is benign. The sound is so amazingly smooth that much higher volumes than normal become tolerable – even desirable – so a big amplifier might pay extra dividends. Pair matching is essentially perfect. Is there no tripping this damn speaker up? Well yes – the grilles badly upset the sound, so remove 'em.

## SOUND QUALITY

The *AE1* is simply the clearest and most lucid exponent of recorded music that I have come across in a long time. I scarcely ever detected any shortfall in bass depth, although a loss of detail and tunefulness in the lowest octave enriches the subjective balance slightly. The *AE1* came closer to being able to reproduce the resonance and timbre – even the dynamics – of *forte* piano playing than almost any loudspeaker in my recent memory. The sense of clarity and seamlessness is immensely impressive. This is without doubt a wholly remarkable loudspeaker, and a stunning endorsement of the well developed metal cone bass units.

Despite all the superlatives, I still felt a slight 'edge of the seat' sensation – a kind of almost subliminal fussiness. The panel picked up on this too, and made a number of comments about the mid and (especially) the treble in consequence. The criticisms were mild though, and the speaker scored well overall.

## CONCLUSIONS

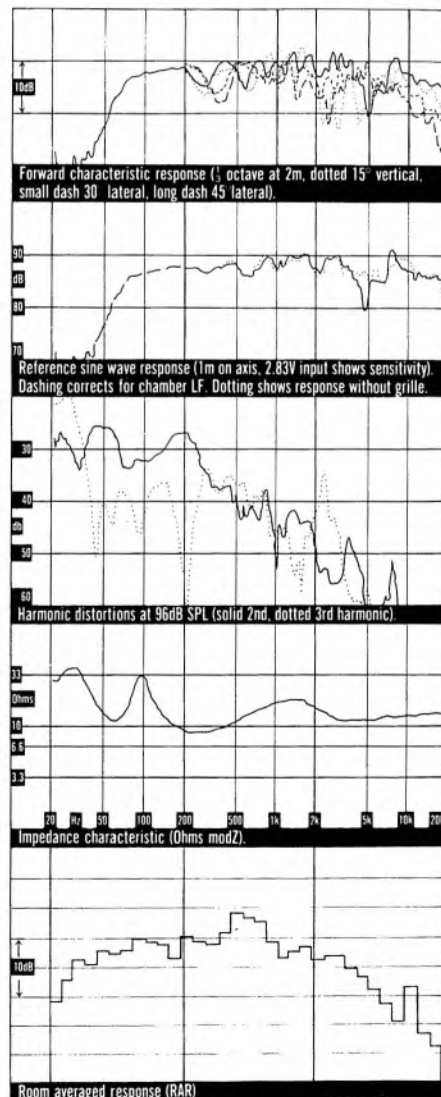
Value for money considerations don't apply

here, and despite my enthusiasm, Acoustic Energy are new, with an unproven track record. It's never easy to make a high tech speaker consistently (as Celestion will testify), and the difficulties must be multiplied for a small company. But the *AE1* is a remarkable tribute to the energy and enthusiasm of its developers, and is on current showing the state of the art miniature, bar none.

## TEST RESULTS

Size (height x width x depth)	29.5 x 18 x 25cm
Recommended amplifier power	30–200 watts
Recommended placement	open space or near wall, high stands
Frequency response ( $\pm 3dB$ , 2m)	60Hz – 19kHz
Low frequency rolloff ( $-6dB/1m$ )	60Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	88dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	good
Typical price per pair inc VAT	£700*

\*pedestal stands will be made available at approx £150



## AR 22BX

ACOUSTIC RESEARCH LTD, HIGH ST, HOUGHTON REGIS, BEDS LU5 5QJ. TEL: (0582) 867777



AR's 22 was a recommended model in *Choice: Loudspeakers*, 1986. Remarkably similar to the Best Buy '18, it shared the same drivers and similar cabinet dimensions but had a more elaborate crossover network (though in our opinion the cheaper '18 was slightly better balanced). In 1987 all these various AR models received the BX treatment, and the company shuffled the ingredient pack so that the 22BX became a slightly larger mid-size two-way bookshelf model costing around £200.

The polypropylene bass/mid driver is now used '18-style, sans crossover circuitry, though a new network now feeds the slightly modified 26mm tweeter. The sealed box cabinet has additional internal bracing and uses 19mm chipboard with a vinyl 'wood' veneer of reasonable quality. Internal damping consists merely of a polyester wad, while the woven polyester grille has been carefully mounted to avoid sonic interference.

The 22BX is best sited close to a rear wall, on stands about 50cm high or (if you must) a bookshelf. AR supplied special single pillar stands of substantial construction and appropriate height; these are made and marketed by Monotrak Engineering.

Finish was good, and construction sound enough if a little on the cheap and cheerful side, with internal wiring held by clips. The bass/mid unit is 'direct coupled' to the amplifier, relying on the natural roll-off of the drive unit, while a second order network feeds the tweeter.

## LAB REPORT

The high sensitivity of 89.5dB/W is well

suited to budget amplifiers, providing good levels from as little as 15W, plus decent maximum loudness from a suggested 75W maximum. The impedance characteristic looks gentle enough, averaging around 8ohms and providing a simple amplifier load. The system resonance of 73Hz provides a -6dB bass roll-off at 55Hz and useful in-room output down to 45Hz - figures which show a slight improvement over the earlier 22, reflecting the slightly larger enclosure.

The response trace is clearly optimised for wall mounting, being +3dB above 250Hz when measured in free space. The on-axis curves are pretty smooth overall, but the off-axis plots are much less even through the crossover region; the grille had little effect. The in-room averaged response showed quite good bass extension for this type of loudspeaker, but a mild prominence is centred on 1kHz with a slight loss of energy above the midrange.

Distortion was poorer than average, with a consistent 1% 2nd harmonic through the midband and significant rises at low frequencies at higher levels. Pair matching was within a close  $\pm 0.5$ dB.

## SOUND QUALITY

The FM listening panel warmed to the sound of the 22BX, giving a solidly above average rating which is very creditable for the price. Though slightly forward and 'projected', the sound was nicely 'out of the box', lively and informative, with fair separation of detail and some 'air'. There was mild criticism of the treble 'fierceness' and some mid unevenness. The sound could have been tidier, but the lively, 'bouncy' qualities more than compensated.

The MC listeners were less enthusiastic, rating the 22BX a little below average, finding the balance difficult to come to terms with either wall-mounted or in free space, though the former was preferred. The bass showed reasonable beat and drive, clarity and detail projection was good, but piano had a 'middy' tendency, lacking real body and power, and criticism was directed at a 'vicious' character on vocals and strings.

## CONCLUSIONS

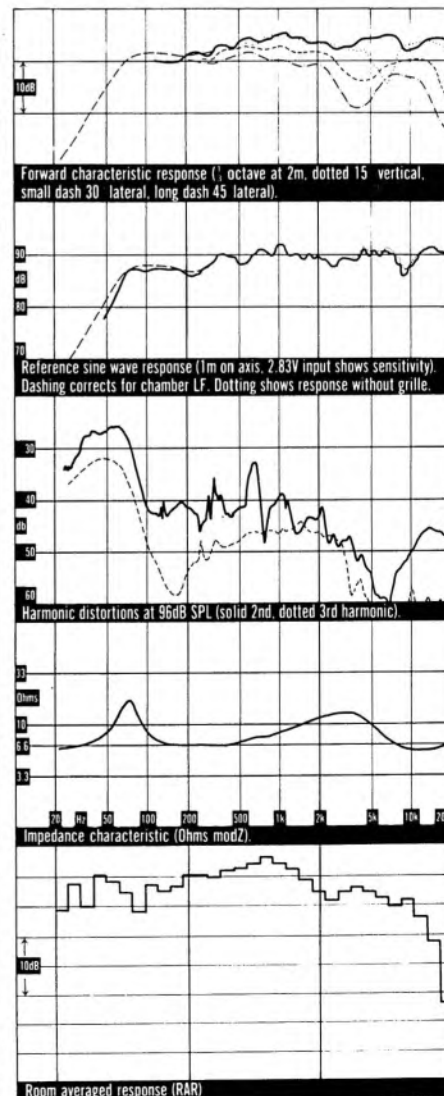
The 22BX shows some improvement over the 22 in some areas, but not consistently so - the earlier treble 'sting' has been tamed if not eliminated, but off-axis response is now less even. Nevertheless, it is basically soundly engineered and gave very respectable sound quality for the price, albeit not consistently from one listener to another, so firm recommendation is still appropriate.

## TEST RESULTS

Size (height x width x depth)	47 x 29 x 22cms
Recommended amplifier power	15 - 75W
Recommended placement	shelf on 50cm stand near wall
Frequency response ( $\pm 3$ dB, 2m)	68Hz - 20kHz
Low frequency rolloff (-6dB, 1m)	55Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	89.5dB/W
Approximate max sound level (pair at 2m)	104dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	below average
Typical price per pair inc. VAT	£200

Reprinted from issue No. 53

Reviewed by Martin Colloms and Paul Messenger



# ARCAM TWO

A&R CAMBRIDGE LTD, DENNY INDUSTRIAL ESTATE, WATERBEACH, CAMBRIDGE CB5 9PB. TEL: (0223) 861550



Originally famous for their amplifiers and tuners, A&R have also found success with their range of cartridges and the Arcam series of loudspeakers. (They are also trying their hand with cables, and will happily supply *LiveWire* to go with Arcams.)

This latest version of Arcam *Two* is similar to its eponymous predecessor in overall format, but with numerous detail changes. It is a compact 14 litre two-way with a number of luxury refinements in the construction. Reflex loaded to provide good sensitivity and bass extension, the bass alignment nevertheless needs some wall reinforcement. Though the various ingredients all look very promising, build quality was regrettably marred by a dry joint in one of the crossovers, due to inadequate soldering of heavy gauge wire. Finished in real black ash veneer, the side panels and (braced) baffle are 19mm MDF, with internal bituminous damping pads, plus foam and polyester fibre infill. A quality foam grille avoids any acoustic compromise.

The bass/mid driver is on the small side, with a 125mm Kobex cone on a steel frame, crossing over to a 19mm plastic dome tweeter. The 2nd-order 4-element crossover uses generous components with high power handling capacity, plus substantial wiring. Too late for our tests, the Arcam *Two Plus* is now delivered ready for bi-wire operation. A matching Medite pillar stand costs an extra £40.

## LAB REPORT

Sensitivity is an above average 88dB/W, giving good levels from as little as 20W/channel

amplifiers and well matching the Arcam amplifier; 75W would seem a sensible maximum, giving pretty good loudness for the size. The sensitivity has not been achieved by drawing extra amplifier current, the *Two* being an easy load, while the reflex loading and wall site alignment help provide quite respectable bass extension ( $-6\text{dB}/55\text{Hz}$ ).

The response trace confirms the need for wall proximity, and even so the balance might be a touch 'lean'. There is some general unevenness, with a particular problem at 550-650Hz. However, the mid/treble integration is good, crossover integration excellent, and the off-axis consistency very good, though it is as well to avoid listening from above the main axis. The in-room response was less promising, confirming the 600Hz cone breakup and showing some midband energy prominence, plus some bass unevenness and reflex boom with rapid roll-off below 50Hz.

Distortion was a little high, typically 1-2 per cent at 96dB, though better at lower levels; once again the 600Hz problem is emphasised. Pair matching was excellent  $\pm 0.25\text{dB}$ !

## SOUND QUALITY

The Arcam *Two* scored a straight average rating in both listening tests, which is a respectable result for such a compact design, indicating wide acceptance with different systems and listener tastes, albeit with a slight bias towards CD as source. The *PM* panel praised a generally lively, 'ballsy' character with good 'speed' but mild treble 'brashness' and midband coloration. Upper bass was a trifle rich, helping to fool the ear into overlooking the inevitable lack of extension and 'weight'.

The *MC* panel corroborated the slight bass 'heaviness', but confirmed the preference for wall siting. Specific praise or criticism was in short supply, replaced by a (faintly grudging) acceptance of consistent, well integrated allround competence - generally good, but lacking 'magic'.

## CONCLUSIONS

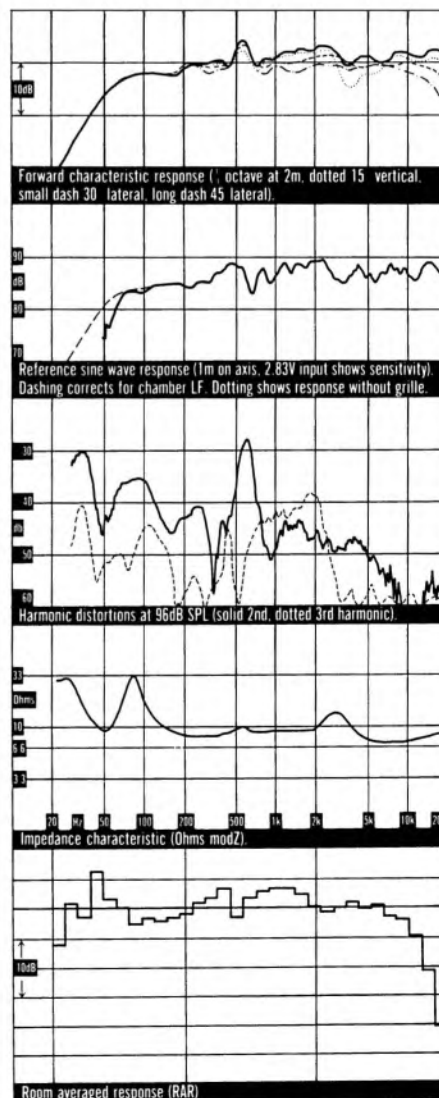
A&R Cambridge have a particular knack for creating well balanced 'most things to most men' products, and the current Arcam *Two* fits squarely in this category. Unlikely to disappoint, it is unlikely to attract cult allegiance either. But it is certainly worth considering, especially with the prospects of further improved sound through the bi-wire option (not tested).

## TEST RESULTS

Size (height x width x depth)	38 x 23 x 28cms
Recommended amplifier power	20 - 75W
Recommended placement	near rear wall on shelf or 40cm stands
Frequency response ( $\pm 3\text{dB}$ , 2m)	80Hz - 20kHz
Low frequency rolloff ( $-6\text{dB}/1\text{m}$ )	55Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	88dB/W
Approximate max sound level (pair at 2m)	102dB
Impedance characteristic (ease of drive)	V good
Forward response uniformity	good+
Typical price per pair inc VAT	£250

Reprinted from issue No. 53

Reviewed by Martin Colloms and Paul Messenger



# ARCAM ONE PLUS

A&R CAMBRIDGE LTD., DENNY INDUSTRIAL ESTATE, WATERBEACH, CAMBRIDGE CB5 9PB. TEL: (0223) 861550.



There have been a number of evolutionary rather than revolutionary improvements since the last time this loudspeaker was assessed, which are designed to add significantly to the refinement of this highly regarded model.

The enclosure is as before: a medium/large chipboard box with 19mm wall thickness and a shelf brace that stiffens all four vertical panels, baffle included. Most panels are damped by bituminous pads very securely stapled in place, and a combination of foam and polyester wadding attenuates internal standing waves. A very long and solidly constructed port faces the rear, and the medium complexity crossover with high power components is sited behind a layer of foam.

The 200mm plastic cone bass driver is sourced from Elac to an A&R blueprint. This remains as before, but there are changes to the tweeter, which comes from Peerless. It's still a doped textile dome unit, but a different and (A&R claim) better sounding model which has some custom modification. The crossover and wiring have been 'Jimmied' (after J. M. Hughes) or 'Denised' (as in Denis Morecroft) by switching from thick stranded cable to a thinner solid core cable of about 1.25mm diameter, and by subtle alterations to the crossover layout to improve earth paths. A side effect is that bi-wiring is now feasible.

Only one pair of output sockets are fitted, but those with sufficient competence and keenness can make the necessary changes themselves without (I'm assured by John Dawson, leader of AR) prejudicing the

guarantee. The key word here of course is competence. You must know what you're doing, because if you bodge the job badly, you might be excommunicated.

Finish of the (genuine!) wood panels is good, but the black painted baffle is not well presented or finished – a pity since the speaker may well be aesthetically preferred without its reticulated foam covers, if only because these can sag for lack of sufficient velcro fastening points.

## LAB REPORT

First class pair matching is a tribute to the quality control, and the grille made no material difference to the measured performance. Sensitivity is quite high, but power handling and the maximum attainable uncompressed sound pressure level are broadly in line with the modest 75 watt maximum recommended input levels.

Bass response shaping is clean and smooth, but the midband is unevenly forward and the treble a little lumpy. The off-axis responses were satisfactory, or at least in line with expectations, and the in-room response confirms the story so far, as well as indicating that there may be over-sufficient bass for some rooms. Both 2nd and 3rd harmonic distortion are at low levels, and the *Arcam One* is quite an easy load to drive.

## SOUND QUALITY

The panel was irredemiably split on this model. At one extreme, a listener described this model as "a bit thin, and (showing) some loss of tonal differentiation... bland at times... (with a) feathery HF and lack of mid detail." Another, on the other hand, talked of a "nice, consistent reproduction of space and ambience – open, clear, detailed." On an arithmetic basis, scoring came out a little above average.

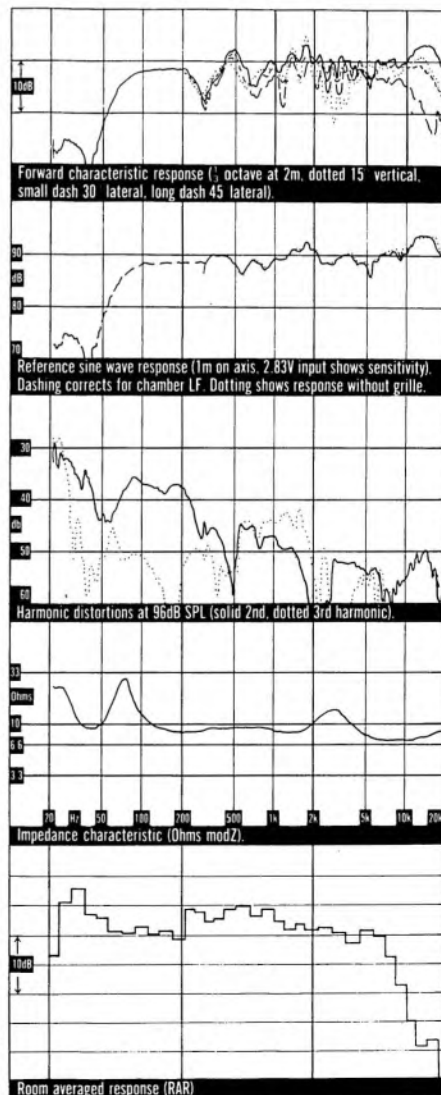
I have liked the *Arcam One* in the past, but coming back to it in the light of experience with more recent loudspeakers I find the midrange rather recessed and indistinct, with the result that it was frequently quite hard to hear what was going on, even though the cosmetics of the sound were indeed good. The bass sounded full and warm without being loose, but there wasn't a great deal of keenness or drive either, which is certainly due to the midband diffidence of an admittedly very civilised sounding design. Treble quality was well short the current state of the art. I found it a bit thin and whistly, though the *One* is hardly on its own in this respect.

## CONCLUSIONS

This speaker is beginning to sound a little old fashioned, being architecturally solid but a little slow and unwieldy. Recommendation is inappropriate in view of the panel disagreement, so there's even more onus than usual on readers to exercise their own judgement.

## TEST RESULTS

Size (height x width x depth)	37.8 x 22.3 x 28.1cm
Recommended amplifier power	20 – 70 watts
Recommended placement	open space, on stands
Frequency response ( $\pm 3\text{dB}$ , 2m)	65Hz – 20kHz
Low frequency rolloff ( $-6\text{dB}/1\text{m}$ )	60Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	88.5dB/W
Impedance characteristic (ease of drive)	good
Forward response uniformity	good
Typical price per pair inc VAT	£359
<i>Spiked stands available – £59 a pair</i>	





# ARISTON QLN1 Mk 2

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

RECOMMENDED



The original Swedish made *QLN* enjoyed a brief spell of fashionability of being fashionable several years ago, when marketed by distributor Absolute Sounds, alongside Krell, Apogee, Audio Research *et al.* But there were problems, notably in sourcing the drive units, and the design disappeared. Now it has resurfaced under the aegis of the increasingly ambitious Scottish company Ariston Audio, who are manufacturing the model for worldwide sale under their own name. Outwardly the loudspeaker looks little different from its progenitor, but in reality virtually every component has been changed to some degree. It's dropped in price too...

The only truly obvious change is to the bass unit, which now sports a bright yellow fibreglass cone. The tweeter is a soft dome plastic unit from Vifa, the two coupled *via* a complex 16-element network batted down to the inside base (unfortunately not far from the bass unit's magnet; the more conventional inside rear panel position might have been better). The *QLNs* are now purpose designed for bi-wiring *via* a block of brass input terminals on the rear.

The distinctive shape of the enclosure serves some very practical ends. The almost complete absence of parallel internal surfaces effectively distributes internal standing waves. But just to make sure, the walls are lined with foam and the remaining space filled with loose sound absorbent material. The enclosure itself is enormously complex to make, and is built from Ariston's proprietary 'Q board' chip/visco-elastic laminate, which has very effective self-damping properties.

From the acoustic point of view the result is one of the 'deadest' enclosures in current production.

Alternative finishes available are walnut, teak or black ash; the samples submitted, in plain stippled black, are to a very high standard. Matching 24inch pedestal stands which fasten through to the threaded bushes on the base of the loudspeakers are available, but were not supplied. The tall Celestion stands purpose made for the *SL-700* turned out to be particularly suitable substitutes sonically, if not aesthetically.

## LAB REPORT

The *QLN* is more efficient than it once was, and capable of handling much greater power levels without bursting too. However, it's still highly inefficient by normal standards, and you really need a good 100 watts or so just to take it round the block. Impedance levels roam widely too, placing qualitative as well as quantitative demands on the amplification.

The two halves of this pair matched to a very high standard. Furthermore there was no perceptible measured effect on response from removing the grilles. This is the expected advantage of using reticulated foam, and is some recompense for the inevitable aesthetic compromises.

The amplitude responses are generally very well engineered, showing excellent bass extension for such a diminutive box. But the upper bass is definitely excessive, giving a 'warm' overall balance. The lateral off-axis responses are excellent, one reason for this being the clever faceting of the front surface. But the reason for the 24inch stand recommendation is seen in the 15° above axis plot, where the composure of the speaker collapses entirely. Keep them high.

## SOUND QUALITY

The born again *QLN* scored well into the top handful. Although inevitably bass-limited by size, it has a remarkably 'solid' delivery, yet is equally capable of sounding gentle and tuneful when the occasion demands. "It doesn't shirk its responsibilities at *forte* or above" said one listener. "Bass extension is obviously compromised, but it's well behaved," commented another.

Stereo imagery was good too, in lateral and depth planes alike, giving really good recordings an impressively tangible air. One consistently noted quality was the lifelike vocal rendition, while the overall sound seemed slightly manipulated but never strayed far from being utterly musical.

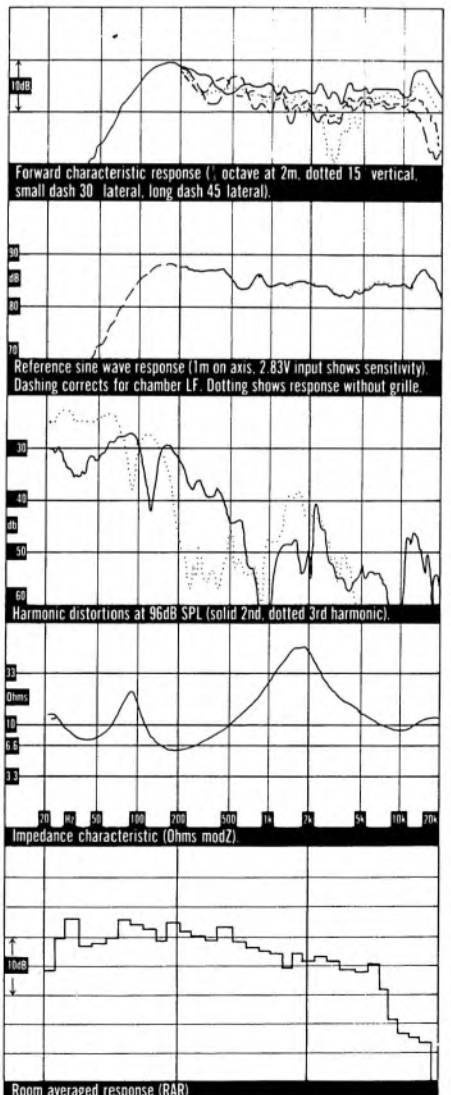
## CONCLUSIONS

It's a fraud – but a remarkably likeable one. What bass extension the laws of physics deny, the *QLN* convincingly fakes. Elsewhere

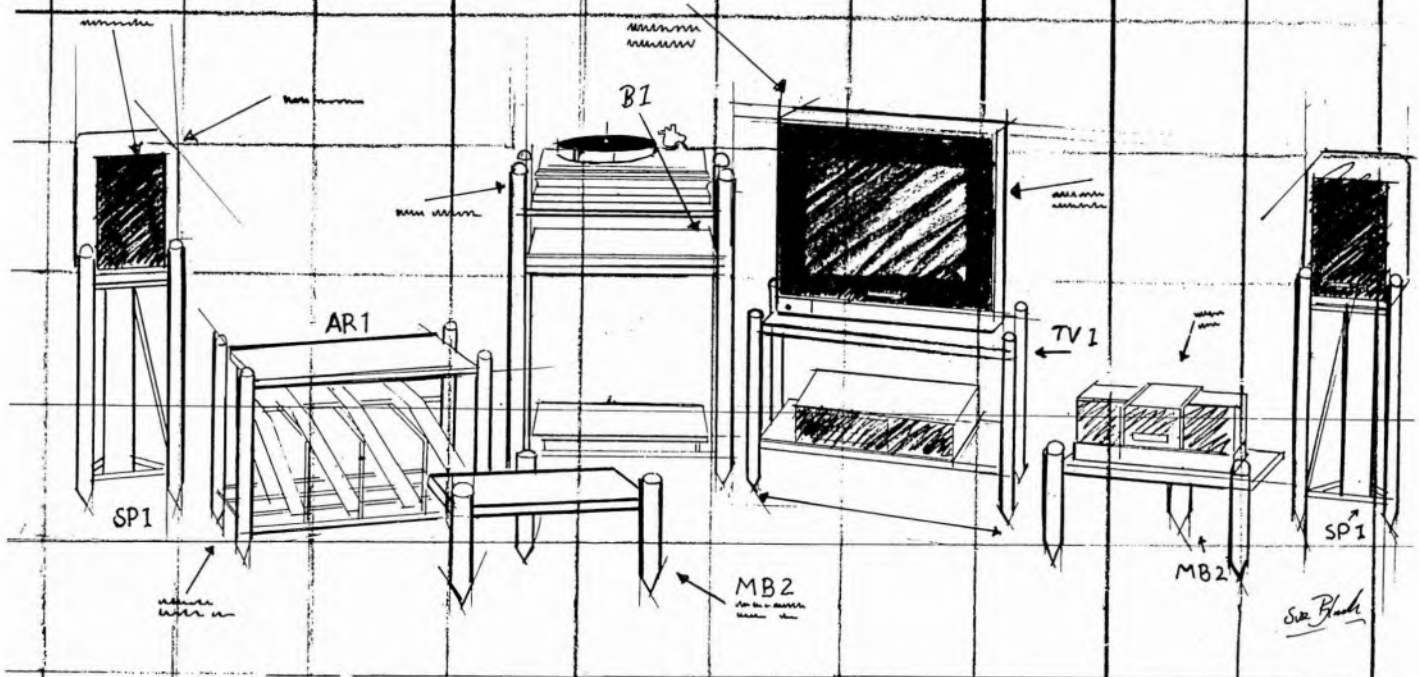
sweet and well behaved, with good imagery and dynamics, it is very slightly over-glamourised. If you're looking for a maximum information design, forget it – but the *QLN* may just be persuasive enough to change your priorities; Recommended, with caution.

## TEST RESULTS

Size (height x width x depth)	35 x 25 x 26.5cm
Recommended amplifier power	50 – 150 watts
Recommended placement	free space, 24inch stands
Frequency response ( $\pm 3dB$ , 2m)	75Hz – 20kHz
Low frequency rolloff ( $-6dB/1m$ )	65Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	84.5dB/W
Impedance characteristic (ease of drive)	average
Forward response uniformity	average
Typical price per pair inc VAT	£350



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**157, Curle Street, Glasgow**

# B&W DM100i

B&W LOUDSPEAKERS LTD., MARLBOROUGH RD., CHURCHILL IND. EST., LANCING, W. SUSSEX. TEL: (0903) 750750.

RECOMMENDED



Smaller brother to the *DM110i*, the *100i* appears to be built to very much the same standards, with similar though scaled down hardware. However, the flared pulp cone bass driver is impregnated with a doping compound, a treatment not used in the bigger model.

Again in contrast to the port-loaded *110i*, this smaller speaker has a sealed enclosure, and is decently immune from air leaks. The box is very simple, being small enough to escape without the need for additional bracing, or even much acoustic sound absorbent material. The walls are relatively thin but the chipboard grade is good, and the speaker is not notably resonant according to the time honoured knuckle test.

The bass/mid unit is well made with a die-cast chassis and well specified motor assembly. The tweeter is the usual in-house 25mm soft dome, upgraded in this incarnation to make it a little less fragile. The two are married by a 6-element crossover, with standard quality internal wiring and external connections. A fuse with holder is fitted and accessible from the rear.

Finish is attractive, the simulated walnut covering being particularly good of its type. However the baffle grille is poorly designed on sonic grounds, and much better removed for playing music.

Whilst on the phone to B&W to check specs and prices, I did ask (more in hope than expectation you understand) why these were described in the accompanying puff as 'digital monitors'. Quick as a flash came the obviously well prepared reply: 'I'll get the fac-

tory to give you a call'. Gee.

## LAB REPORT

Gentle LF response tailoring (see room averaged response plot) suggests that the *100i* could well benefit from rear wall proximity to achieve a little bass reinforcement, although B&W officially class this as a free air speaker. Most of the plots also show considerable losses in the extreme HF, which suggests that the tweeter is rather more directional than some, and which might partly explain the disparity of views expressed during the panel tests.

Pair matching is excellent, but the grilles added a couple of quite sharp dips to the basic response, thus demonstrating once again that cloth and frame covers rarely work. Inherent distortion levels are very low – B&W have really done their homework with the bass unit – and the speaker is a relatively simple load with a minimum steady state impedance of about 6ohms. Sensitivity is a quite high 88.5dB/W and power handling reasonable, though the *100i* is not designed for truly high level use, and bass extension is very limited.

## SOUND QUALITY

Limited bass delivery was apparent on audition too, which left some music sounding rather thin and exposed. What bass there was sounded rather dry, but that apart the *100i* acquitted itself extremely well. The system sounded essentially neutral and very well integrated, so that the sound character of individual instruments didn't alter as pitch changed. Ditto with level, and the *DM100i* could be driven quite hard without obvious distress or compression. Orchestral strings had precision and a lovely sheen. Piano had both attack and body, while the resonant sustain that gives a particular instrument its character was also well handled. Curiously the treble sounded rather smoother than it's opposite number in the *DM110i*.

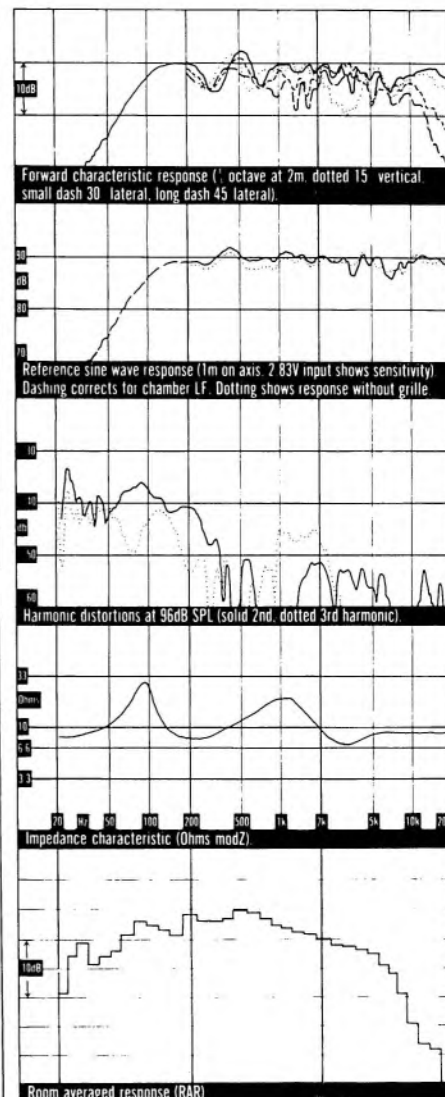
The panel were slightly more equivocal than the author, one describing 'limited depth' under comments related to stereo imagery. There was some reaction against the treble too, one writing it off as 'spitty and wiry'. Another remarked on a 'lack of ambience' and complained about bass quality. On the whole, however, the *DM110i* won considerable praise for its clarity and neutrality.

## CONCLUSIONS

There was some dissent amongst those who listened to this speaker, but on the whole it was liked for its lucid, open midband quality. Moreover, it is not expensive, so Recommendation is well deserved.

## TEST RESULTS

Size (height x width x depth)	37 x 22 x 22.6cm
Recommended amplifier power	20 – 60 watts
Recommended placement	free space or near wall, on stands
Frequency response ( $\pm 3dB$ , 2m)	80Hz – 20kHz
Low frequency rolloff ( $-6dB/1m$ )	90Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	88.5dB/W
Impedance characteristic (ease of drive)	good
Forward response uniformity	average
Typical price per pair inc VAT	£120



# B&W DM110i

B&W LOUDSPEAKERS LTD., MARLBOROUGH RD., CHURCHILL IND. EST., LANCING, W. SUSSEX. TEL: (0903) 750750.



B&W's *DM110* is one of the longest running mainstream models in current production. This latest 'improved' version, identified by the *i* suffix, is changed in detail from its predecessors, in order to modernise the aesthetics and improve reliability. The changes consist of improved cabinet finishes (the walnut especially – see below), a re-specified tweeter designed to handle more punishment without changes to the sound, and the addition of a 2A quick-blow fuse, accessible from the rear. Bypassing this fuse (and its holder) would undoubtedly improve the sound at least slightly, but I am compelled to point out that this will result in loss of guarantee status – and a kneecapping for yours truly for daring to suggest it.

The ingredients of the *110i* are classic for the *genre*. The 22litre enclosure is quite large for the price, and although panel thicknesses are not great, the density of the chip-board appears to be well above average; there's a substantial filling of foam sheeting too. The bass unit has an untreated paper cone with inverted roll surround, a soft dust-dome and a big, meaty magnet, all mounted on a really solid, high quality diecast basket. The tweeter is a version of the familiar looking 25mm soft dome (see above). The crossover is of average specification and construction.

B&W have gone to some trouble over the aesthetics. Whilst the budget clearly doesn't stretch to a real wood veneer, there is at least a richly figured imitation which is a good deal less bland than usual. The front panel is painted silver grey, and a longstanding tradi-

tion is maintained in the brightly coloured decorative ring of the bass driver – blue with this model. You can still make it look boring, however, by leaving the grille (black cloth over skeleton type plastic moulded frame) in place.

## LAB REPORT

The lab tests paint an impressive picture. The *DM110i* has a flat amplitude response within very tightly controlled limits –  $\pm 1.5$ dB all the way from 70Hz to 20kHz, measured anechoically at 1metre. Differences between the left and right hand speakers were negligible, but the front covers altered the measured response considerably, which confirms the observation that they are best used naked. The speakers, not the covers . . .

The lateral off-axis responses, measured at 2metres, showed the expected treble loss. However, a sharp gap is seen around 3kHz measured at 15° above the normal axis, highlighting the advisability of using tall stands to bring the tweeter up to around or slightly above ear level. Bass extension is about average for the enclosure size, and distortion levels are highly satisfactory. Impedance drops to around 5.5ohms near 3kHz, but this should hold few terrors for most modern amplifiers.

## SOUND QUALITY

No way can this loudspeaker be described as smooth or sweet. It has a slightly coarse and aggressive nature, is rather 'flattened' spatially and has a nasal 'honk' in the upper midband. Bass does not go very deep, but you can at least hear clearly what orchestral bass sections (for example) are doing, where all too many rivals merely grumble indistinctly to themselves. Elsewhere, and despite the occasionally uncouth qualities already outlined, the *110i* is quite sharp and detailed. There's much to engage the senses, and not too much is left to the imagination (which in a way is both a good and a bad thing). High sound levels are not comfortable, however, the sound rapidly becoming harsh and aggressive when the volume is wound up.

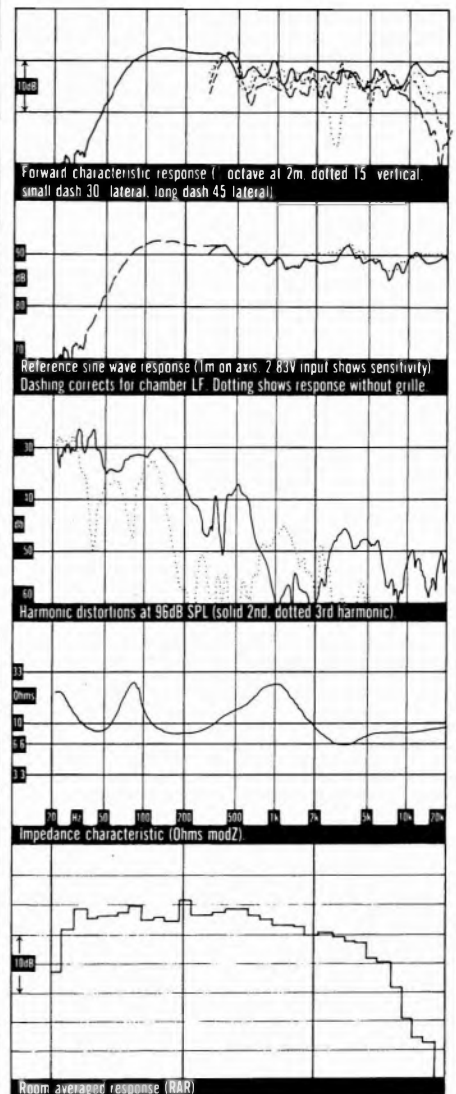
The panel rated the *DM110i* a little higher than I did (scores were just above average), but the nature of the comments was happily consistent. The *110* received widespread praise for 'solidity and clarity', with censure for its rather 'clinical, hard sound', 'graininess' and – in one instance – 'fatiguing' traits.

## CONCLUSIONS

This is a good enough design that passes muster. The slightly 'rough around the edges' impression is excusable on grounds of price, but this is now a very competitive area of the market, in which the *110i* no longer shines like its forebears.

## TEST RESULTS

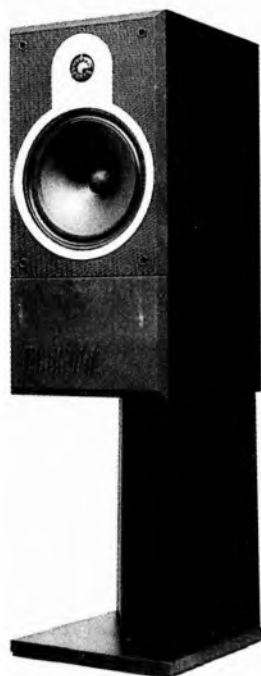
Size (height x width x depth)	48.7 x 26 x 27cm
Recommended amplifier power	20 – 60 watts
Recommended placement	open space, on high stands
Frequency response ( $\pm 3$ dB, 2m)	60Hz – 20kHz
Low frequency rolloff ( $-6$ dB/1m)	60Hz
Sensitivity (ref 2.83V/1W, 8ohms: 1m)	88dB
Impedance characteristic (ease of drive)	average
Forward response uniformity	excellent
Typical price per pair inc VAT	£159



# B&W DM1600

B&W LOUDSPEAKERS LTD., MARLBOROUGH RD., CHURCHILL IND. EST., LANCING, W. SUSSEX. TEL: (0903) 750750.

RECOMMENDED



The B&W DM1600 is a medium size two-way loudspeaker which incorporates 'all the benefits of our new Matrix technology'. All of the benefits maybe, but less of the hardware: the DM1600 doesn't use the original Matrix type honeycomb cabinetwork at all. It does, however, use a fairly extensive network of traditional chipboard bracing which stiffens every panel including base and top. There's also a brace between the sides, and a foam lining dampens internal reflections. Stands are supplied as part of the £400 package.

The DM1600 has other unconventional aspects too, notably a moulded lime-filled polypropylene baffle, for which desirable structural properties are claimed. B&W have also taken full advantage of its styling possibilities; the bit that faces the world has neatly chamfered edges and a finely textured frontage, while trim rings around the drivers neatly conceal the screws. In case you don't like the silver grey/dark grey baffle, entirely conventional cloth and frame grilles are supplied, though acoustically you're better off without - much better off.

The (optionally spiked) stands integrate well visually, and incidentally can be filled with sand to improve stability (and by inference sound quality). The remaining woodwork is authentic wood rather than plastic.

Stands notwithstanding, B&W claim to have aligned the speaker so that shelf mounting and near wall use are also acceptable. (About 30cm from the rear wall proved optimum under our test conditions.) 4th-order bass alignment incorporates port loading, the port itself venting to the rear.

The bass driver has a large voice coil, a good size magnet and an excellent diecast chassis. The cone is plastic with a small, stiff centre cap. The tweeter is a 26mm metal dome unit, painted black and fitted with a ring to control acoustic dispersion. The 4th-order Butterworth crossover network is of satisfactory build, with standard quality tagged wiring. Protection is provided by a device called APOC, a positive temperature coefficient resistor.

## LAB REPORT

Curiously, the 1600 was a little more wayward in measurement terms than some of the cheaper models in the range, the 110i in particular. Pair matching was only reasonable by B&W's normally very high standards, for example, while 2nd harmonic distortion levels were a little higher than expected too. More significantly perhaps, the 1metre amplitude response has a slightly 'dished' response shape favouring the upper bass (centred on 200Hz) and extreme treble. This trend doesn't prevent a very tight  $\pm 1.5$ dB envelope all the way from 70Hz to 20kHz, but in energy terms it may well be significant. However, the off-axis responses look better optimised than usual, and should ensure a wide effective listening window.

The impedance plot looks a little unusual, but the phase angles are moderate and the impedance never drops very low. Sensitivity measures 87.5dB/W, the -6dB LF rolloff point is around 60Hz and power handling is very good. This is potentially a big voiced loudspeaker suitable for largish rooms and/or quite high level use.

## SOUND QUALITY

These expectations were largely but not wholly confirmed on test. To the 1600's advantage, the bass in no way sounded excessive. If anything a little lightweight and boxy, it was qualitatively good nevertheless, with fine transient response and a clear sense of pitch (many loudspeakers waffle so badly at LF it's hard to determine pitch at all).

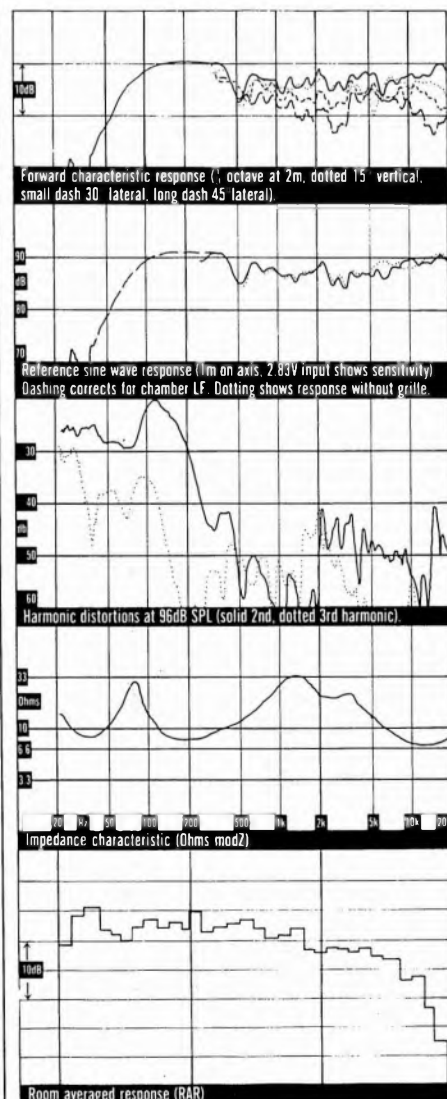
The sharp, clear midband received universal approbation, but the high frequency end is not this B&W's best point, the tweeter variously described as 'too brash', 'splatty and metallic', and 'sibilant'. However, this criticism was not sufficient to spoil a basically clear, open and articulate design, merely to take the edge off.

## CONCLUSIONS

A qualified success and Recommended with caution, the DM1600 doesn't have the most successful metal dome tweeter installation around. Nevertheless, the system has particularly strong dynamics, fine imaging, adequate instrumental separation and a slightly lightened but perfectly believable tonal balance.

## TEST RESULTS

Size (height x width x depth)	49 x 23.6 x 30cm
Recommended amplifier power	30-200 watts
Recommended placement	free space, open stands
Frequency response ( $\pm 3$ dB, 2m)	70Hz-20kHz
Low frequency roll-off (-6dB/1m)	60Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	87.5dB
Impedance characteristic (ease of drive)	average
Forward response uniformity	good
Typical price per pair inc VAT	£400 inc stands



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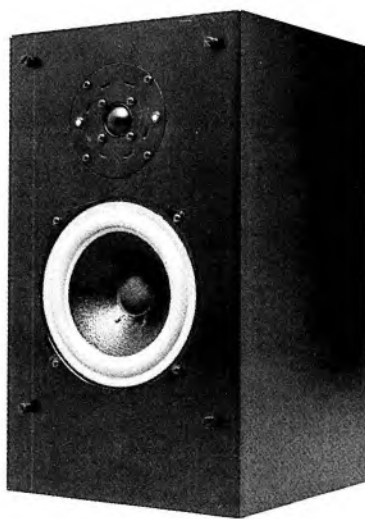
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# BLQ Q2

BRITISH LOUDSPEAKERS, 16 LINDEN AVENUE, BARTON GREEN, CLIFTON, NOTTINGHAM. TEL: (0602) 842457.



British Loudspeakers will be an unfamiliar name to most readers, even though this low profile company has been active for a number of years. Essex based, they presently sell two models through a number of specialist dealers; of which the Q2 is the larger (speaker, not dealer); I'll leave you to guess the name of the other. The Q2 is exactly built and obviously designed along 'keep it simple but do it right' lines - but have they?

The medium size, conventionally proportioned closed box has rather more effective sealing than some of its peers. The sides and back are effectively stiffened by a shelf brace fastened to the sides and rear. The mediate baffle is also stiffened, in this case *via* the bass unit magnet, which bears on the brace through a thin sheet of foam. All available space inside is tightly packed with sound absorbent foam.

The bass driver is a smallish 120mm doped fabric cone unit with a foam roll surround. The motor assembly seems quite powerful in relation to the (presumed) relatively low moving mass. The pressed steel chassis is not as open as some, however. The tweeter is a standard 25mm plastic dome model. The loudspeaker is hard-wired internally using thick, multistrand cable, with soldered connections. The crossover is minimalist in concept and suitable for high power operation.

Siting is best close to (but not hard up against) a rear wall. The speakers are supplied with a well made cloth and frame grille, and finished in a fine black paint job. Walnut veneer is available as an alternative.

## LAB REPORT

The grilles significantly influence the response in the 3-4kHz range, so are best removed for use. A major feature of the test results, with clearly audible consequences on audition, was the seriously uneven midband response. In the in-room averaged response plot this appears as an overall excess of output on each side of the crossover region. A similar picture emerges from the anechoic testing, albeit with greater detail which shows an enormous peak in output above 5kHz.

However, the picture is improved off-axis, and in fact the speaker sounds a little better when listening off-axis, either by facing the loudspeakers straight down the listening room (or even splayed slightly outwards), or by arranging for their acoustic axes to cross a little in front of the listener.

The impedance plot shows unusually small phase angles and impedance changes; the load represented by this BLQ is an almost resistive 8ohms. Sensitivity is about average, though very useable in view of the easy load. Power handling also rates no better than average, taking into account the audible loss of grip and focus as the speaker is driven hard.

## SOUND QUALITY

I found the midband unevenness very noticeable once recognised, which happened the first time I played anything remotely densely orchestrated and complex (in fact the 3rd movement of the Sinopoli/EMI *Mahler 6*). The central strings and woodwind acquired a muted, phasey, even rasping quality, and this was particularly apparent during more vigorous passages where the harmonic structure of the music was at its richest and the demands on the speaker most severe. Furthermore, the sound became audibly congested at high levels, which in effect defined a relatively modest volume ceiling.

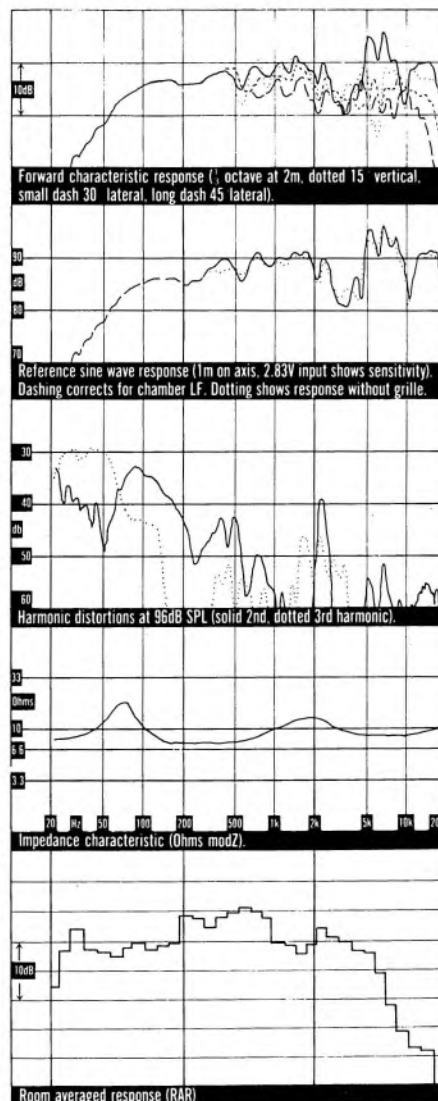
At other times, with less complex material and at more modest levels, the BLQ was all sweetness and light - well almost. And it has to be said that the panel were more tolerant of the limitations outlined above than yours truly, giving it an average overall score. Where music didn't stress the Q2's limits, it could certainly sound rich, full and quite potent.

## CONCLUSIONS

My inclination is to err on the cautious side of the panel's scoring, with what is overall a rather uneven loudspeaker, whose limitations are not necessarily immediately apparent. Further development in the design of the crossover would seem to be in order.

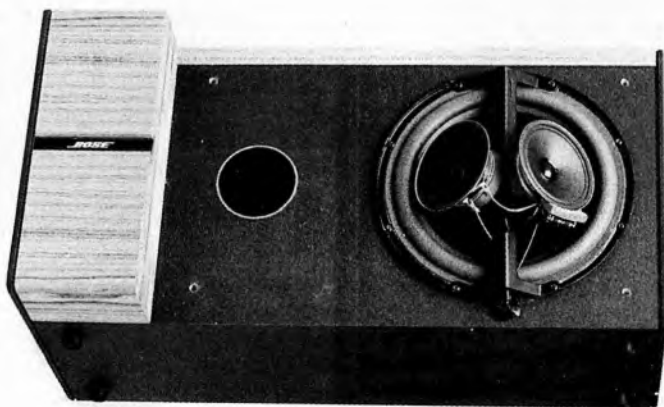
## TEST RESULTS

Size (height x width x depth)	43 x 25.1 x 24.5cm
Recommended amplifier power	20 - 80 watts
Recommended placement	semi-open, on stands
Frequency response ( $\pm 3dB$ , 2m)	110Hz - 20kHz
Low frequency rolloff (-6dB/1m)	70Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	87.5dB
Impedance characteristic (ease of drive)	excellent
Forward response uniformity	poor
Typical price per pair inc VAT	£275



# BOSE 6.2

BOSE UK LTD., TRINITY TRADING EST., MILTON REGIS, SITTINGBOURNE, KENT. TEL: (0795) 75341.



The *Point Two* series builds on the Bose obsession with homogeneous stereo in the domestic environment, and features laterally asymmetric, mirror image enclosures, and wide distribution drive unit configurations.

The *6.2* is a medium size loudspeaker, designed to be used horizontally on tall, open stands (suitable models are available from Bose as options, but were not sent for review). The speaker consists of a bass reflex enclosure vented to the front, the internal cavity being divided into two with an air path between them. Bose don't make clear what this is intended to do, but it seems probable that it is a way of lowering the Q of the port resonance.

On the face of it, the drive unit complement is an unholy mixture: a 200mm pulp cone bass driver with two tweeters mounted coaxially and pointing 90 degrees apart in the horizontal plane to give the required lateral coverage. The word tweeter is used loosely here; the units concerned are actually 75mm pulp cone drivers akin to what you'll find in portable radios; they would not normally be considered specialist high frequency drivers.

The externals are very well handled. The wood finish is real teak of excellent quality, and the smooth lines of the *6.2* look less out of place in normally furnished rooms than many high fidelity loudspeakers – at least it doesn't look like another up-ended orange crate. Some of the smaller details are open to question, however, not least the cheap skate spring input terminals, the rubber decoupling feet on the base where decoupling is (generally) not desirable, and the wood panel that faces across the bows of the drivers. This and the cage-like front cover structure project well forward of the drivers, and must act as sources for phase interference.

## LAB REPORT

The grilles do indeed have an influence on the output of the speaker, but mostly in a narrow band between 10-15kHz (and the

plain truth is that no-one would want to keep these speakers undressed on visual grounds alone). More important than the covers was that pair matching was all over the place above 1kHz, despite retaining an approximately consistent balance.

Simplifying only slightly, the major claim for the Bose is wide, uniform dispersion. There's some measured justification for the 'wide', but not the 'uniform'. The averaged room response looks pretty good, but that's precisely because it is averaged. On axis, there's a significant response dip around 3kHz, and a spiky treble thereafter which dies after an enormous resonant peak at 12.5kHz. The picture barely changes above axis, which makes a pleasant change, but at 30° and 45° laterally the dip widens and appears around 2kHz, whilst the treble ringing transmutes to 10kHz. The bass and mid are quite nicely integrated however.

Sensitivity is about average at 87.5dB, and bass extension is excellent for the size. 2nd harmonic distortion is highish, however, suggesting significant magnetic non-linearity. The Bose is at least a relatively benign load, belying the nominal 40hm impedance rating.

## SOUND QUALITY

The 'blind' listening panels proved particularly valuable in exploring the practical effects of the Bose 'stereo everywhere' principle for a number of fixed, seated listeners in different parts of an ordinary listening room – just the kind of situation such a speaker was designed to handle. In the event, the comments about stereo were explicit and remarkably consistent. Everyone noted a polarisation of images leading to exaggerated width and flattened depth perspectives. More important than this, however – and something I confirmed separately – is that images varied in position with frequency. A flautist would kind of float around in space with changing pitch.

Leaving stereo to one side, the mid and top were rather poorly integrated, and the bass

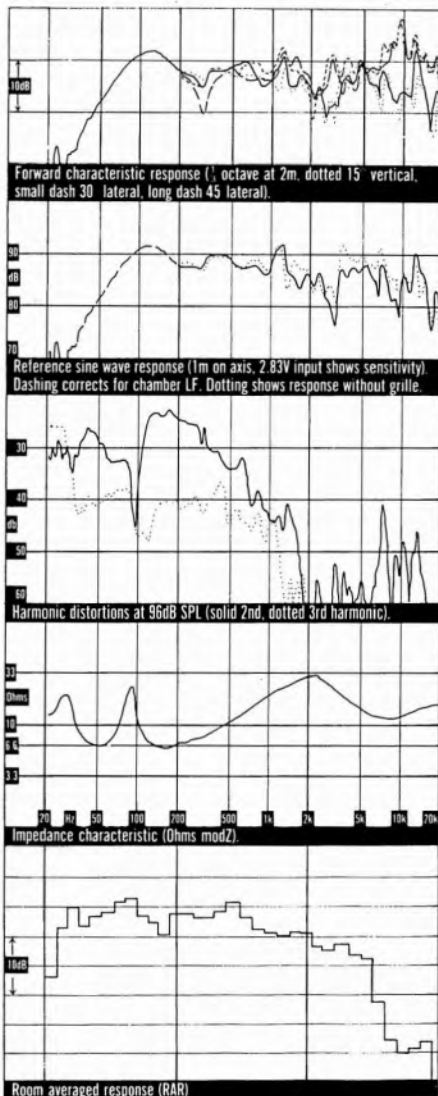
sounded, variously, 'grumbly' or 'loose and flabby'. And the midband was described as 'pinched', the practical upshot of which is that the speaker is not very informative.

## CONCLUSIONS

The Bose produces a nice, warm wash of music, but with little guts and thunder. Stereo imagery was amorphous and inconsistent from all listening angles – it just didn't work in the manner described. The bottom line is that the sound is pleasant, but bland.

## TEST RESULTS

Size (height x width x depth)	25.4 x 50.8 x 24.4cm
Recommended amplifier power	30 – 100 watts
Recommended placement	free space, on stands (optional)
Frequency response ( $\pm 3$ dB, 2m)	55Hz – 14kHz
Low frequency rolloff ( $-6$ dB/1m)	55Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	87.5dB
Impedance characteristic (ease of drive)	fair
Forward response uniformity	poor
Typical price per pair inc VAT	£570





# CELESTION DL6 SERIES 2

CELESTION INTERNATIONAL LTD., DITTON WORKS, FOXHALL ROAD, IPSWICH, SUFFOLK IP3 8JP. TEL: (0473) 723131.



Second up from bottom of the recently revised *DL* range, this *Series Two* example of Ipswichian mainstream loudspeaker technology is substantially altered from the original. The most obvious change is the substitution of a titanium dome tweeter for the original soft dome unit. The bass/mid has a more conventional 200mm unit with flared untreated pulp cone and inverted roll surround. However it is fitted with a substantial magnet and a high quality diecast chassis. The enclosure is substantially as before, but whereas the original version had a reflex port, the new model has a sealed box. The 7-element crossover appears to be adequately built.

Construction quality is to ordinary commercial standards, though some of the individual elements are above average standard – the tweeter and the brass input terminals being obvious examples. Finish is vinyl wrap, with a choice of walnut or black.

Internal wiring is about average in standard and uses tagged connectors. The quite large enclosure is entirely undamped or braced, and has only a very small quantity of polyester wadding in-fill to kill internal standing waves, resulting not surprisingly in a rather resonant structure. But it is at least good looking. The front edges are neatly chamfered, which reduces the impression of bulk and gives it a modern, 'clipped' appearance, as well as helping minimise diffraction effects. The grille cover is also cleverly designed, with the frame cut away to avoid acoustic obstruction. Celestion recommend using the *DL6* close to a wall, which will make them a little more welcome where

space is limited and unobtrusiveness at a premium.

## LAB REPORT

A measure of Celestion's achievements in the field of metal dome tweeter design is that the new *DL6/2* is only 1dB less sensitive (manufacturer's figure) than the original model. Their earlier metal domes, such as the original *SL6* fitment, were ferociously insensitive.

The *DL6* has an almost dead flat on-axis frequency response, and even at 30° off-axis laterally the response shape is retained almost intact. The *DL6* is relatively unfussy about orientation and gives a wider than usual useful listening 'window', within which the sound retains satisfactory tonal balance. The room averaged response, measured with the speaker near a rear wall, illustrates also how well this system integrates in the listening room.

The *DL6* can be driven quite hard and to quite high levels, but sensitivity measures just a little lower than average (despite the earlier comments *re* metal dome tweeters) so a powerful amplifier might be an advantage. Impedance never drops below about 7ohms and pair matching is superb, but the grilles have a significant influence on output in the lower treble region.

## SOUND QUALITY

Scoring slightly below average, the *DL6* came over to the panel as a rather bland, slightly anonymous sounding transducer. 'Fairly good but a bit thin and unsubtle', wrote one, who went on to describe the sound as lacking 'subtlety and air', and 'muddled'. Another wrote of the Celestion sound as 'spacious – but instruments are not as clear as they might be' and of a 'definite midband softness – any detail this speaker produces seems to be in the treble. The speaker sounds superficially sharp, but there's no real clarity in the middle or lower registers'. On the other hand, the *DL6* was regarded as essentially even and neutral.

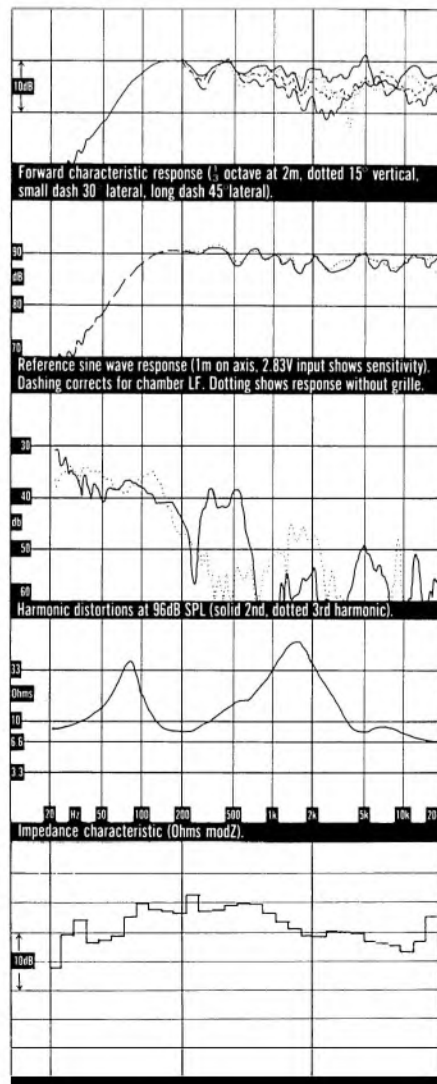
I have little to add to the panel comments. The treble is both sharp and true, whilst the midband especially seems a little soft and ill-defined. Nevertheless the *DL6* stacks up quite well at the price, and if it isn't as sharp or as clear as the best, it is at least smooth and easy on the ear.

## CONCLUSIONS

Euphony rules OK; this is a pleasing model with a full, rather slow bass and richly variegated tonal colouring. Although the treble is crisp and smooth, a 'muddy' midband ultimately lets the side down.

## TEST RESULTS

Size (height x width x depth)	45.4 x 24.5 x 26.2cm
Recommended amplifier power	30 – 100 watts
Recommended placement	near wall, on stands
Frequency response ( $\pm 3$ dB, 2m)	70Hz – 20kHz
Low frequency rolloff ( $-6$ dB/1m)	65Hz
Sensitivity (ref 2.83V/1W, 8ohms: 1m)	87dB/W
Impedance characteristic (ease of drive)	average
Forward response uniformity	good
Typical price per pair inc VAT	£149



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# CELESTION DL8 SERIES 2

CELESTION INTERNATIONAL LTD., DITTON WORKS, FOXHALL ROAD, IPSWICH, SUFFOLK IP3 8JP. TEL: (0473) 723131.

RECOMMENDED



Alone amongst the original *DL* series, the *DL8* always had a metal dome tweeter. The *Series II* mods may therefore seem less crucial than with the *DL6* (reviewed separately). But sometimes appearances do deceive...

The *DL8* is a biggish, 2-way design intended for use on stands around 15 inches tall and (in contrast to the smaller *DLs*) well clear of room boundaries. The older version used a pulp cone bass unit; it has been replaced here by a quite different plastic cone unit with diecast basket, flared diaphragm and soft centre cap. It also has a vented-pole magnet structure of good size, and an exactly specified surround termination developed with assistance from Celestion's in-house laser interferometry setup.

Although all *DL8s* have had metal dome tweeters, the *Series 2* unit is in fact quite different, being based on titanium rather than aluminium and offering a higher structural resonant frequency and greater sensitivity.

The enclosure looks similar to the original, but in fact features a full vertically oriented ring brace to stiffen the side panels. The woodwork is quite thick (19mm) and heavy, though close examination shows that the chip has a rather airy and porous structure. The crossover appears to be quite conventional, and like the rest of the unit is adequately but not extravagantly built. Standard quality wiring with tag connectors and a generous polyester filling complete the inside story.

On the outside, appearance is enhanced

by a charcoal grey baffle with rather arty, restrained panel graphics (for once), plus black wood effect flanks with neatly chamfered edges, doing their bit in the cause of better aerodynamics. The grilles are designed to limit audible intrusion, and the input terminals are solid brass. And why not?

## LAB REPORT

Pair matching is perfect within the limits of measurements, and for once the grilles had a very limited effect on the measurements. Apart from a small, very narrow dip near 7.5kHz, the *DL8* has a perfectly flat output and quite fair bass extension. Output uniformity stays pretty good even well off-axis.

The *DL8* represents a relatively simple load for amplifiers. Sensitivity is average, and it has an ability to swallow heroic quantities of watts without strain or breaking. Distortion levels are satisfactorily low.

## SOUND QUALITY

This is a fine loudspeaker, but not necessarily one that everyone will warm to. It is tonally rich and colourful, very well integrated (on the whole - see later), and free from obvious coloration or overhang. At the same time, it is also a little unprepossessing, largely due to a dry, slightly dull balance, and a rather undemonstrative way of handling dynamics. Yet handle them it does. Within a relatively modest operating ceiling (beyond which the system sounds muddled prior to really running out of steam), dynamics are beautifully layered. Expressive playing is just that - expressive; and subtleties are not smothered.

All of which makes this a speaker that errs on the side of music rather than hi-fi, which makes a welcome change. Where the Celestion does trip up a little is in its enclosure. Although not strictly audible in its own right, the *DL8* does impose a slightly hollow, 'boxy' overlay on the music. This slightly reduces the stereo image coherence, because it becomes hard to disassociate (mentally) the music from the two enclosures.

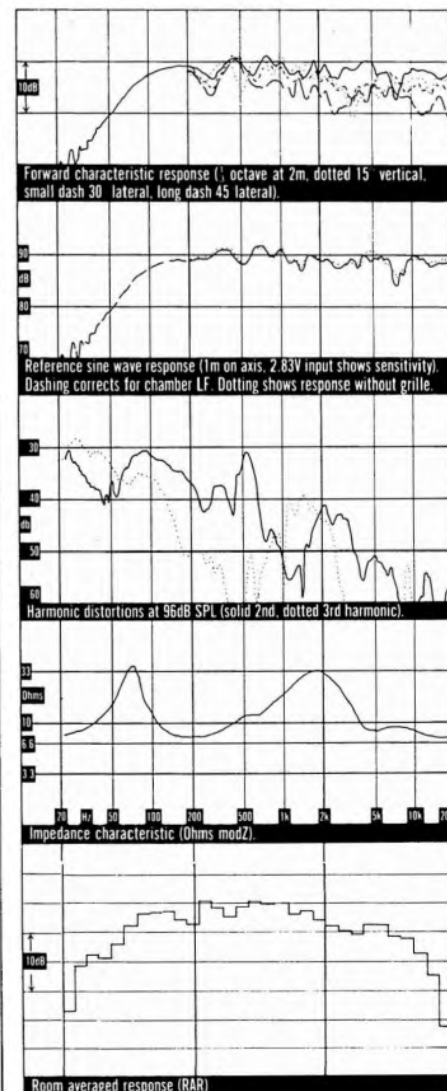
The *DL8* was quite well received by the listening panel, though the numerical scoring placed it no better than average. Comments made included: 'good at low levels; vocally sharp and clean; bass a little cavernous'. Another said 'flabby', though bass performance won more praise than criticism. High level congestion was also noted.

## CONCLUSIONS

The *DL8* is a loudspeaker of subtle virtues - a little heavy handed and a mite hollow maybe, but essentially articulate and well focused. Treble quality is very clean, whilst bass is deep and mostly well controlled. Recommended.

## TEST RESULTS

Size (height x width x depth)	50 x 27.5 x 27.8cm
Recommended amplifier power	30-150 watts
Recommended placement	open, stands
Frequency response ( $\pm 3$ dB, 2m)	65Hz - 20kHz
Low frequency rolloff (-6dB/1m)	60Hz
Sensitivity (ref 2.83V/1W, 8ohms, 1m)	87.5dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	excellent
Typical price per pair inc VAT	£199



# CHAMELEON 500

HELIUS DESIGNS, THE WHITE HOUSE, ALDINGTON, EVESHAM, WORCS. TEL: (0386) 830083.



Loudspeakers represent a diversification for Helius, who are best known for their contributions to the tonearm art of playing records. The 500 is the junior model in a range of three, but is still an expensive product by most standards, and therefore likely to be partnered with high quality ancillaries.

The loudspeaker itself is of moderate size, and is well suited to mounting in free space on stands with the Heybrook *HBS1*'s general proportions. The enclosure is a simple box with a vertical ring brace fitted inside which stiffens the sides, top and base. Wall thickness is modest, and although the wood itself is rather less porous and hollow than usual, the final product does sound a little hollow – a characteristic picked up without fail by all the panel members.

The inside story is mixed. There are strong indications of kitchen table workmanship, notably in the rather erratically reamed out hole for the bass driver; and the lack of a proper gasket which means that the sealed enclosure is not in practice very effectively sealed; and in the crossover where components were taped together and left floating in one of the wool blankets that line the unit. In one case, two adjacent air cored inductors were aligned in the same plane, which is not good from the mutual interference point of view. And the quality of soldering was suspect, one joint breaking entirely under light handling (for examination purposes only). The two speakers even used slightly different components, albeit with approximately the same electrical response.

The *Chameleon* is wired with what

appears to be QED *79 strand*, whilst the drive units are from Elac. The tweeter is a 1 inch plastic dome unit of comparatively orthodox design, but the bass unit is a little special. Built into a diecast basket of very open construction (meaning there is little acoustic impediment to the rear), the unit is equipped with a large and powerful magnet and a doped pulp cone with a large, stiff centre cap. Real treewood cabinet finish is good, but the baffle grille is best removed, as usual.

## LAB REPORT

This loudspeaker is, to coin a phrase, all over the place. The crossover region shows the greatest problems, with a chasmic 15dB deep dip around 4kHz on-axis (20dB on the other half of the pair showing pair matching is also poor). The response shape is knobbly elsewhere too. The situation hardly improves off-axis, though the speaker fortunately sounds marginally better above the tweeter line. The room averaged response peaks sharply in the mid frequency area.

On a rather more positive note, sensitivity is high, the impedance characteristic is favourable and distortion levels are extremely low, indicating good fundamental drive unit design.

## SOUND QUALITY

Good drivers or no, this speaker is unusable for serious listening on current form. It is impossibly coloured and so lacking in detail as to be beyond the pale. Stereo imagery is essentially non-existent "this speaker has a cuppy mid; it sounds muffled with no depth and a dull ELF" said one listener. Another described a "muted, dead quality" and "loss of detail . . . unevenness . . . and a splatty, dead HF", later mentioning a "soft bumpy bass . . ." A third wrote thus: "obviously coloured and relatively low-fi".

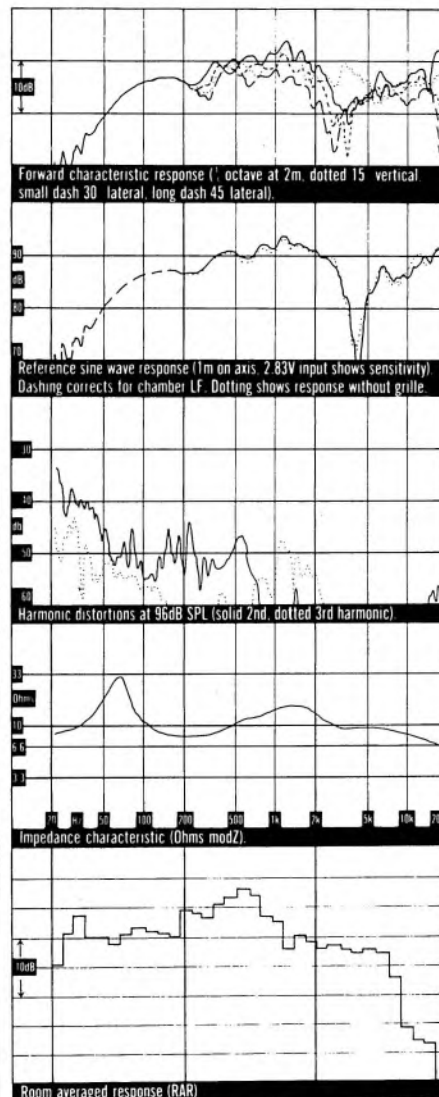
There were other problems too. The *Chameleon* has difficulties coping with high levels or complex textures, which cause obvious muddling and compression. Even a powerful amplifier capable of 'clamping' the speaker very hard (the Musical Fidelity *A370*) proved incapable of waking this one up. The problems are clearly fundamental, and not simply cured by listening from above the tweeter axis, as the curves might imply.

## CONCLUSIONS

As it stands, the *Chameleon 500* is unsuited for critical or informative listening. There were also clear construction related shortcomings in this deeply unimpressive loudspeaker.

## TEST RESULTS

Size (height x width x depth)	38 x 25.3 x 31.3cm
Recommended amplifier power	20 – 100 watts
Recommended placement	free space, on stands
Frequency response ( $\pm 3dB$ , 2m)	80Hz – 20kHz (see text)
Low frequency rolloff ( $-6dB/1m$ )	75Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	89.5dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	poor
Typical price per pair inc VAT	£349



# dbx SOUNDFIELD 1000

SOUNDTEC MARKETING, UNIT 9, BELFONTRADING EST., MUCKLOW HILL, HALESOWEN, W. MIDS. B62 8DR. TEL: (021) 550 7387.



The least expensive in a range of loudspeakers from dbx that feature something called Reality Imaging, the £450 *Soundfield 1000* reflects the concern of dbx (and, incidentally, other US manufacturers) with the idea of producing a homogeneous soundfield in a normal living room, so that the listener isn't locked into a sharply defined 'hot spot' for good stereo.

The notes supplied were not particularly helpful in explaining the Reality Imaging concept. Putting two and two together, however, the primary design goal appears to be wide lateral dispersion, promoted by such measures as two mutually perpendicular tweeters, and a tall, narrow enclosure to aid midband dispersion. A dedicated midrange driver supplementing bass and treble units also means less of the usual radiation pattern narrowing at the top of the bass/mid unit's passband. Bass alignment takes account of the proximity of an adjacent wall and floor.

The hardware itself is decidedly unexciting. The tall, unbraced enclosure panels, made from a rather flakey grade of chipboard, produce a distinctly hollow sounding enclosure. The bass and midband units are lightweight pulp cone units with smallish magnets, while the rather large midband driver is housed in its own very small sub-enclosure. The tweeter resembles an Audax unit, but is unidentified apart from the dbx logo. The units are married by a surprisingly complex crossover positioned close to the bass driver magnet. Acoustic wadding fills the cavity.

External joinery is not a strong point. The

finish is black vinyl with a vaguely wood like appearance (walnut or black). Instead of spikes (or at least the option of spikes), dbx fit little metal pads; there's no provision for coupling the speaker rigidly to the floor. Siting is not specified, but the importer suggests use near corners. After experimentation, most of the listening was done with the speakers about a metre in from the listening room corners along the back wall.

## LAB REPORT

Measured in the plane normal to the main driver array, the dbx has a flat bass and mid-range, becoming progressively more ragged at higher frequencies. A  $\pm 5$ dB envelope is only just sufficient to contain the response from 1-20kHz. The 15° vertical off-axis measurement shows some steep suckout notches near 2kHz and 4kHz, while the 30° lateral off-axis plot has a sharp rise in treble output above 5kHz, but was otherwise surprisingly smooth. The geometry is such that a centrally placed listener at normal listening distance will be on this 30° axis *unless* the speakers are put right out into the room corners. The 45° plot is if anything smoother still, which lends some credence to the homogeneous listening window claim, though it is not achieved without wild swings in balance simply due to tweeter directivity (and perhaps interaction between the two tweeters). The bass level, however, is more excessive still, and the main feature of the room average response plot.

Sensitivity is extremely high, and the lowest power amplifiers can drive this speaker to surprisingly high levels. But the dbx is a 4ohm load with a sub-3ohm minimum, which may put a ceiling on the available power from the amplifier. Distortion levels are satisfactory, pair matching good, and covers best left off.

## SOUND QUALITY

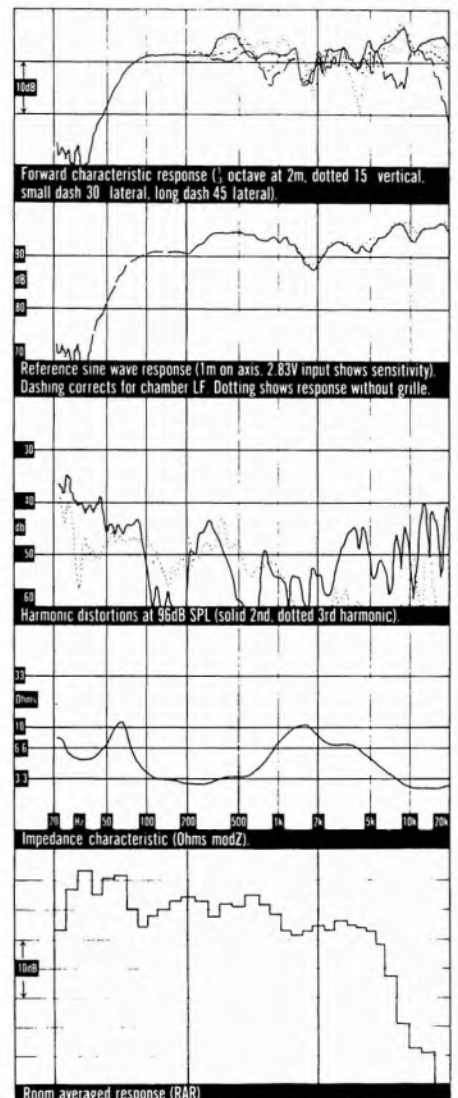
'Thin and heavy' was a typical reaction to the dbx. Not unpleasing in its way, it did display the classic 'tizz and boom' signature typical of many high fidelity loudspeakers of some years back. Perhaps more seriously, the one really worthwhile potential benefit of a dedicated midrange driver, to ensure that the midband is handled by a unit with good transient response and control, was unrealised. By common consent the midband had a soggy, defocused air, which undermines one of the justifications for the homogeneous stereo in the first place. It's no good having stereo everywhere in your listening room if the stereo you hear is all at sea. And this is how it was, performances typically appearing as a wash of sound, and solo instruments sounding over-large or in some other way anomalous.

## CONCLUSIONS

The dbx *1000* looks suspiciously like an act of cart before horse putting. Whilst offering image homogeneity of a kind, the results across a wide range of possible listening seats are uniformly amorphous. Sound quality (as well as direction) is bland and excessive at the frequency extremes, bass especially, even when pulled away from the corners.

## TEST RESULTS

Size (height x width x depth)	78.7 x 35.6 x 27.9cm
Recommended amplifier power	20 - 250 watts
Recommended placement	against rear wall, floor standing
Frequency response ( $\pm 3$ dB, 2m)	50Hz - 20kHz
Low frequency rolloff ( $-6$ dB/1m)	60Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	91dB
Impedance characteristic (ease of drive)	poor
Forward response uniformity	below average
Typical price per pair inc VAT	£450



# DIESIS SAPPHIRE

DIESIS LOUDSPEAKERS, GREYSMERE HOUSE, BEACON HILL RD., BEACON HILL, NR. HINDHEAD, SURREY TU26 6NR. TEL: 025 125 4567.



There are parallels between this model and one other also reviewed in this issue – the Ariston *QLN*. Both use the very distinctive SEAS 180mm bass unit with textured yellow fibreglass cone – the cone being just that for once, and not flared. The drive unit appears to be identical in the two applications, except that the Ariston's has a layer of doping, and the Diesis' is used bare. And the speakers have roughly similar enclosed volume too, corresponding closely to the commonsense definition of a bookshelf unit.

Elsewhere the Diesis joins the rapidly increasing number of loudspeakers to be fitted with a metal dome tweeter. Although unmarked, this appears to be a variant of the Elac 25mm dome. But Diesis have removed the usual mesh cover, so it really must be treated with great care; the diaphragm has little more structural strength than cooking foil, and once bent will never recover. The very simple crossover is at a highish 5kHz – the manufacturer evidently felt it desirable to keep as clear as possible of the quite sharp fundamental resonance of this particular tweeter, but consequently the character of most of the sound is of course determined by the bass/mid driver.

Only three crossover elements are used, the main LC section being allowed to float freely inside where it is surely vulnerable to transit damage. The rear-vented box was covered in a black wood finish (walnut, teak and mahogany are options) of very good appearance, with three grooves cut into the top and sides along the front edge in a manner reminiscent of the Linn *Sondek/Isobarik*

motif. Partly because it's small, the structure is relatively non-resonant. A long-hair wool filling takes care of standing waves; a clip-on grille is supplied.

## LAB REPORT

Two samples of this model were submitted. The first displayed poor bass/treble integration – to the extent that a fault was suspected. The replacements were better, but bass/top integration is still extremely poor, the axial output (1m) swinging wildly over a 10dB range around the 5kHz crossover point. Paradoxically, pair matching was near perfect and the grilles make no material difference, so the effect would appear to be a real one. It also appears to be unintentional, because it isn't visible in a plot submitted by Diesis themselves – this was apparently measured using a very fast paper speed in view of the maximum rate of change on the plot, and at an inappropriately close distance.

The *Sapphire* actually measured smoother off- than on-axis. The 30° lateral plot is quite well optimised, with a slow, progressive fall in output starting at 2kHz, while the 45° lateral and 15° above axis responses barely differ from this. Sensitivity is excellent, the impedance plot looks reasonable enough, and power handling is good – though this isn't necessarily the kind of loudspeaker you'd want to play too loud, or for too long.

## SOUND QUALITY

The *Sapphire* proved something of a curate's egg on audition. It clearly has some strong virtues, but these are largely outweighed by a thin and 'screamy' top end. The tweeter is obviously balanced at the wrong level entirely; the two drivers can clearly be heard as entirely discrete objects. My own listening notes describe the sound as 'thin, hard, congested and extremely nasal'.

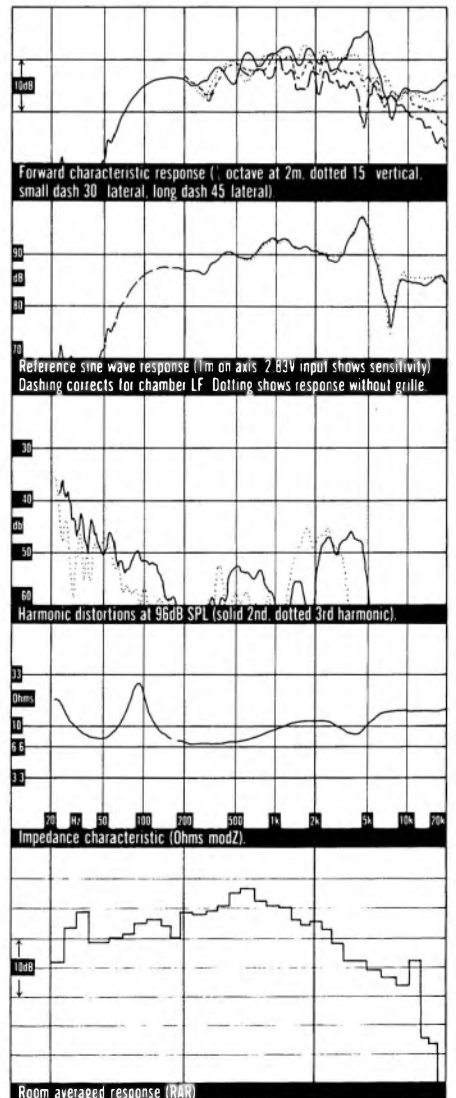
The panel were split, those listening off-axis generally returning the more favourable comments. There was also a tendency to prefer music with the least treble content. "A bit 'shouty'" was one of the comments; "hard and cold – some loss of depth" wrote another. The 'splashiness' of the tweeter was also mentioned – certainly this is one installation where the metal dome truly does sound metallic. But the system does sound a good deal sweeter and better integrated off-axis, even though this isn't a complete cure.

## CONCLUSIONS

If the top end could be tamed, and the crossover made to do its unifying role a little more efficiently, this Diesis would probably make a very effective transducer. There were indications of a very solid and open sound well up into the midband, but the integration is not there yet.

## TEST RESULTS

Size (height x width x depth)	35 x 20 x 24cm
Recommended amplifier power	20 – 200 watts
Recommended placement	open space, on high stands
Frequency response ( $\pm 3\text{dB}$ , 2m)	140Hz – 6kHz
Low frequency rolloff ( $-6\text{dB}/1\text{m}$ )	90Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	90dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	poor
Typical price per pair inc VAT	£329



# GOODMANS MAXIM 2

GOODMANS LOUDSPEAKERS LTD, 2 MARPLES WAY, KINGSCROFT CENTRE, HAVANT, HANTS PO9 1JS. TEL: (0705) 486344

BEST BUY



The *Maxim 2* differs only slightly from its 1986 predecessor, but incorporates improvements in the power handling and smoothness of the tweeter, which is now ferrofluid-cooled. That apart, it is a tiny (5 litre) cabinet, reflex-loaded at the rear, tidily enough finished in a 'black ash' vinyl wrap. Cabinet walls are only 15mm, but are stiffened by the inseting of front and rear panels. The two drivers take up much of the front baffle, the small (105mm eff. diam.) paper cone handling bass and midrange duties before handing over to a ferrofluid version of the familiar 19mm Audax tweeter. A rather thick frame for the woven polyester grille lacks any rebating and looks acoustically unpromising.

Such a small enclosure is fated to be tucked away on bookshelves, and the *Maxim 2* will certainly benefit from some degree of wall assistance in the bass. But it is also a serious enough loudspeaker to be given a proper stand – even though this could add 50-100 per cent to the cost. *Maxim* can also be used in free space, with appropriate amplifier bass boost. Build quality was good throughout, the 3rd order crossover hardwired with thin cabling.

## LAB REPORT

Sensitivity was a reasonable enough 86dB – falling a little beyond today's norm but more than adequate nonetheless. This was accomplished while maintaining a kind amplifier load, with the minimum a very conservative 7.3ohms – but not without compromising the bass extension, which provides

a –6dB point at a highish 85Hz (inevitable perhaps for such a tiny 'miniature'). An amplifier power range of 20-50W is indicated, noting that the absolute loudness capability is somewhat limited.

Though the characteristics have a somewhat different shape to the norm, broadening the mid-dominance typical of small miniatures to a degree which is likely to create an individual sound character, the response traces are generally smooth and progressive – and singularly improved when the grille was left off. The two drive units are well integrated, and off-axis responses tie in quite well. The room response shows the mid dominance clearly enough, but also that it is notably smooth and even, and well balanced overall, despite the early bass rolloff.

Distortion shows improvements over the *Maxim* tested previously in a number of areas of the spectrum, so clearly Goodmans have done more than tweak the tweeter, and the results compare favourably with other models in this price/size class. With our samples pair matching proved to be a close enough  $\pm 0.7$ dB.

## SOUND QUALITY

The *PM* panel were less than enthusiastic about the *Maxim 2*, finding it difficult to come to terms with the lack of scale and 'weight', and not unduly impressed by the rather 'boxy', 'forward' midband. Indeed one dealer panelist correctly identified the *Maxim* characteristic from his knowledge of the original – gaining much respect and kudos from the other panelists as a result! Accepting these limitations, there was praise for the basically sound integration and balance, for the lively and communicative presentation, and several brownie points for trying hard!

The *MC* panel was sufficiently impressed to rate the  $\mathcal{Z}$  slightly above average overall, which is an exceptional result for the price. Again, commenting on the inevitable lack of 'scale', the sound was considered well controlled and communicative, with good clarity and fine focus, and nicely musical in the upper bass.

## CONCLUSIONS

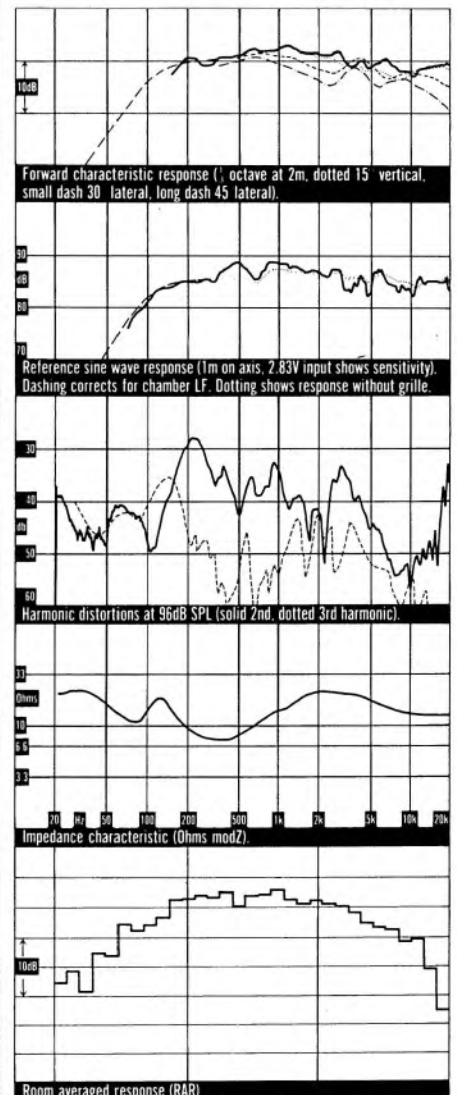
The *Maxim 2* is a clear refinement of the *Maxim* that more than justifies the extra tenner on the price, and comfortably merits a similar Best Buy rating. However, it is a slightly idiosyncratic speaker in terms of sound presentation, appealing strongly to some listeners and leaving others underwhelmed, so prior audition is mandatory.

## TEST RESULTS

Size (height x width x depth)	26 x 17 x 19cms
Recommended amplifier power	20 – 50W
Recommended placement	near wall on shelf or stand, free space with bass boost
Frequency response ( $\pm 3$ dB, 2m)	105Hz – 20kHz
Low frequency rolloff (–6dB/1m)	85Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	86dB/W
Approximate max sound level (pair at 2m)	97dBA
Impedance characteristic (ease of drive)	V good
Forward response uniformity	V good
Typical price per pair inc VAT	£80

Reprinted from issue No. 53

Reviewed by Martin Colloms and Paul Messenger



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# HARBETH HL COMPACT

HARBETH ACOUSTICS, 3 ENTERPRISE PARK, HAYWARDS HEATH, WEST SUSSEX. TEL: (0444) 74371.



The *HL Compact* is Harbeth's most recent model, and breaks with previous company practice in the use of *TFX* as the bass unit cone material, and in the aluminium dome used in the tweeter. The latter also has a damped rear cavity presumably to reduce and damp the main lower frequency resonance. The thermoplastic *TFX* is one of the more recent loudspeaker innovations, and has a high stiffness to weight ratio with good internal self damping.

The bass unit has a large motor assembly and carefully flared cone. Instead of the usual centre cap, the unit features a fixed pole piece extension along which the cone is free to move. Clearly made with some precision, only a very small gap appears between the cone and the fixed extension.

Construction is basically chipboard, but otherwise follows normal Harbeth practice. The main carcass into which the front and rear panels are screwed is made from thin-wall panels extensively mass-damped with bituminous sheet, and then further lined with sound absorbing foam. The remaining space is filled with rolls of polyester. Wiring is of standard quality and tagged, but the glassfibre board-mounted 15-component crossover is well made and fitted near the 4mm binding post terminal pad, allowing normal or bi-wire connection.

The design listening axis is a little below the tweeter line, so the speakers are designed to be used on tall open stands, well away from room boundaries. The baffle is set back slightly within an enclosure whose sides frame the largely unobstructive reticulated

foam covers. The finish is real wood and there is a lot of attention to detail. The whole thing reeks of old fashioned craftsmanship and quality.

## LAB REPORT

There was a regrettable 1-2dB difference between channels in the 2-4kHz region, the speakers otherwise meeting the 0.3dB matching specified in the supplied check sheet. The grilles made absolutely no measurable difference to the output, and had precious little audible effect either. The impedance plot shows no real nasties, with a minimum of about 7ohms. Power handling is specified as 85 watts, and sensitivity is average. In practice the Harbeth is not really designed to raise the dead - you're more likely to buy it for its subtlety and finesse. Distortion levels are low.

Response linearity is very good, though there is a subtle falling off of energy in the extreme treble. Off-axis responses are reasonable, albeit worsening at wider incident angles and in the 15° above axis run, which confirms the manufacturer's advice about the listening axis.

## SOUND QUALITY

The *HL Compact* somehow managed to deliver something a little less than the sum of the parts. Neutrality was obvious, as was poise and sophistication, but at the same time it lacked real clarity and sounded somehow bland and understated. 'Restrained - slightly crowded' wrote one, whilst another said 'smooth but not clear.' This lack of resolution led to reduced atmosphere and ambience generally, which the panel noted and reflected in their scoring.

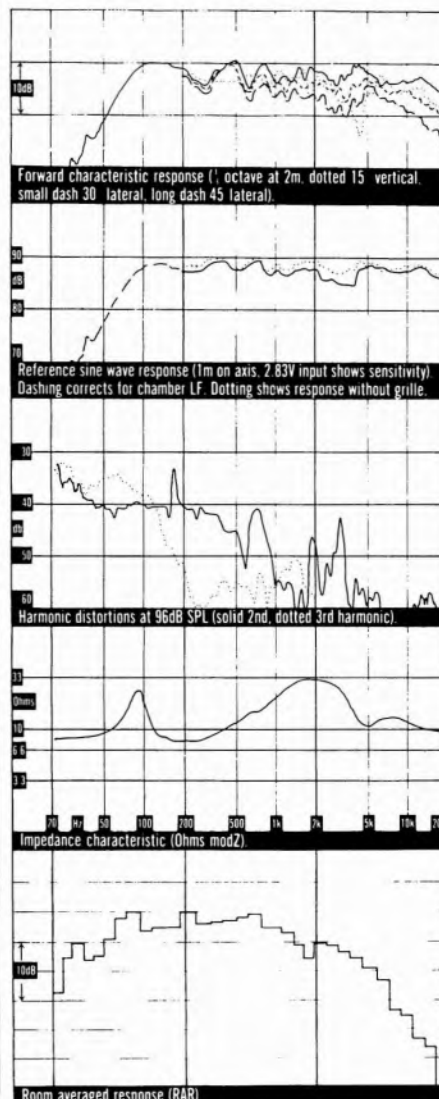
Various things (positioning, stands, cabling etc) were tried in an attempt to improve the performance of the Harbeth, partly because the constituents of the sound were individually so promising. Bi-wiring using Mission solid core went some way to restoring resolution, so it's possible that rewiring internally with something similar instead of the stranded cable now used might improve things further.

## CONCLUSIONS

For some reason, the phrase 'so near and yet so far' springs to mind. This loudspeaker seems to do everything right individually, yet the ingredients don't gel collectively. If your priorities are low coloration and good stereo positioning, the *HL Compact* will serve you well. If you're looking for something a little more palpable, that can bite as well as bark, you may find it a little too polite.

## TEST RESULTS

Size (height x width x depth)	52 x 27.2 x 28.1cm
Recommended amplifier power	25 - 85 watts
Recommended placement	open space, on high stands
Frequency response ( $\pm 3dB$ , 2m)	70Hz - 20kHz
Low frequency rolloff (-6dB/1m)	65Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	87.5dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	good
Typical price per pair inc VAT	from £455



# HEYBROOK POINT 5

HEYBROOK HI-FI LTD., ESTOVER CLOSE, ESTOVER IND. EST., PLYMOUTH, DEVON PL6 7PL. TEL: (0752) 780311.



Of all the budget loudspeaker introductions in the last year or so, Heybrook's *Point Five* is by far the most inventive. The wiring is based on thin, solid core cables (DNM style, with the two conductors separated to approximate infinite spacing). The crossover is pretty minimalist, consisting simply of a high pass section for the tweeter. But the most interesting feature is the enclosure, in which baffle, sides and rear are V-grooved and assembled from one piece of chipboard, while 25mm thick *Medite* top and bottom panels are fastened on afterwards *via* neoprene gaskets. Conventionally the front and back are made separately, but the Heybrook method is said to confer certain structural advantages and produce an ultimately less resonant enclosure. It also creates manufacturing difficulties which have been solved only by employing novel techniques.

The insides are lined with a combination of polyester and longhair wool, which again is above and beyond the call of duty at this end of the market. Even the baffle covers break the mould by using a stiff wire frame (no sharp edges!) to support the cloth. External design is fresh and original, featuring textured black vinyl as a refreshing alternative to imitation wood.

Bass alignment is corrected for use in proximity to a rear wall (about 20cm is optimum in most situations), and the listening axis is designed so that the speakers can be positioned without toe-in. Suitable stands are now available at just short of £50. They're not everybody's idea of pretty, but they work well.

## LAB REPORT

Disappointingly, pair matching of the test loudspeakers was 2-3dB adrift between 5 and 8kHz, while both samples showed clear signs of a narrow bandwidth suckout notch around 5kHz. Given that Heybrook specify a 20° off-axis lateral listening and measurement axis, it was mildly depressing to find that the suckout had broadened considerably by 30° though it was never very deep in absolute terms. Bass alignment is properly tailored for the recommended siting.

The *Point Five* is rather less sensitive than most, at around 86dB/W, and power handling is not its best feature, though it is nevertheless possible to achieve reasonable SPLs. The impedance plot is very smooth, implying a largely resistive 8ohm load. Finally, and as anticipated, the grille design is a real success from the measurement angle. Though detectable to the ear, its influence was extremely subtle.

## SOUND QUALITY

Tests on the scale of this project are all about having expectations confirmed – and preconceptions exposed. I was mildly disappointed and surprised by the performance of this loudspeaker. I agree with the panelist who described the *Point Five* as having a somewhat 'recessed mid, and a hollow voice'. (I'd add 'boxy'). And another (who like me has expressed highly favourable views on the model in the past) who described it as 'a bit lacking in dynamics . . . and murky (with a lack of projection . . . (and) congested'. The *Point Five* sounded just this way in two separate listening rooms and with a range of partnering equipment. The lack of consistency with what was known of the model in the past suggests that changes have crept in, perhaps inadvertently during the course of the last year's production.

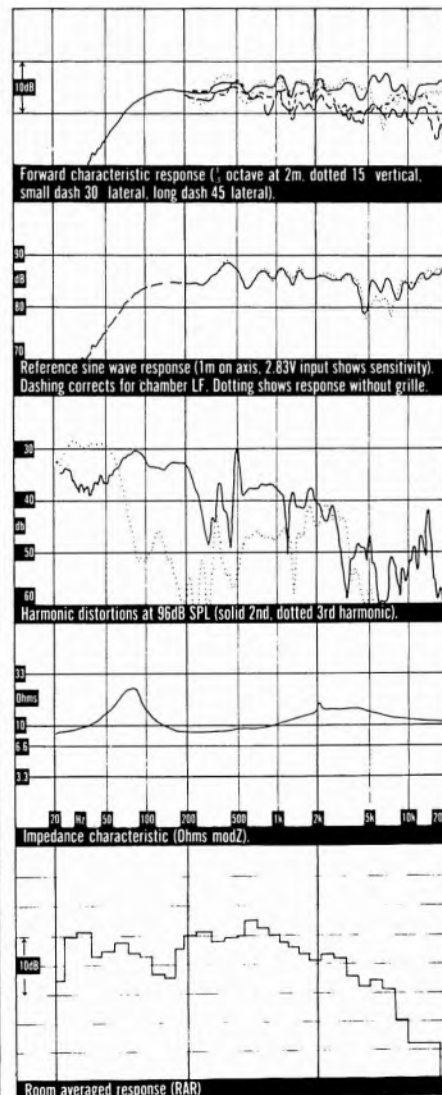
The samples tested received a very low aggregate score, and although there was nothing in the least unpleasant about the design, it did have an undercharacterised, indefinite quality, which wanted for colour and differentiation and which seemed spatially flat – and this after careful experiment with siting and both vertical and lateral orientation.

## CONCLUSIONS

Early versions of this speaker sounded tactile and alive. Something seems to have changed, however, and the review samples were coloured as well as lacking in resolution and life: a disappointing result.

## TEST RESULTS

Size (height x width x depth)	37.5 x 23 x 23cm
Recommended amplifier power	15 – 75 watts
Recommended placement	near wall, on matching stands
Frequency response ( $\pm 3$ dB, 2m)	80Hz – 20kHz
Low frequency roll off ( $-6$ dB/1m)	65Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	86dB
Impedance characteristic (ease of drive)	excellent
Forward response uniformity	average
Typical price per pair inc VAT	£139



# INFINITY RS2000

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

BEST BUY



After a short hiccup, US loudspeaker manufacturer Infinity is back in the UK. Now under Rotel UK's aegis, distribution will probably have a rather higher profile than before and pricing may be keener too. The RS2000 is amongst the smallest models Infinity make, and directly succeeds their most popular model ever (they say), the RS-10.

The drive unit complement is modern and not un-European in flavour, especially in the case of the polypropylene cone bass/mid driver. This appears to be well enough made but has a fairly small magnet assembly. Less conventional, a soft form of expanded polystyrene is used as the tweeter dome material, and also in the centre cap and roll termination on the bass driver. The units are linked by a simple crossover.

An above average standard of vinyl wrap box is made with an excellent grade of chipboard, so the structure is substantially non-resonant despite the absence of damping or bracing. The insides are well lagged (for warmth?), and some care is taken to reduce diffraction in the horizontal plane, for example by radiusing the baffle edges and the inside of the grille – despite which these adversely affect the sound audibly and measurably. In any case the grille looks suspiciously like an afterthought.

Although well made, there's no real evidence of audiophile-oriented engineering either inside or out. Connections are made via simple spring terminals. Siting is specifically said to be relatively unimportant, but Infinity do recommend placing the speakers away from walls and especially corners.

## LAB REPORT

Nominally a 6ohm loudspeaker, the RS2000 also makes excursions into the 4ohm region. Furthermore phase angles are quite large especially around 90Hz, so the partnering amplifier will need good load tolerance if its power rating is to be fully exploited. That said, sensitivity is an extraordinarily high 91.5dB/W, so high levels may be achieved with minimal power input.

Forward response uniformity is quite good on the whole, though undoubtedly a bit ragged in the fine detail. Driver integration is extremely good, holding up well even way off-axis, but a severe tweeter resonance leads to the peaks and troughs seen in some of the response plots between 6 and 9kHz. Bass extension is surprisingly good (small loudspeakers often sacrifice bass in the interests of sensitivity), but the signal here isn't entirely clean – 2nd harmonic distortion levels are very high. Pair matching is good, but the grilles do modify the output, and should be removed for best results.

## SOUND QUALITY

The RS2000 emerged with honour from its panel exposure. 'Clean, with good focus', 'pretty natural', and 'a very plausible open kind of sound' were culled from the comments. The only point that attracted consistent criticism from more than one member of the panel was a rather 'spitty' treble. 'Brittle' was another word used, and there doesn't seem a ready answer to this; listening from slightly off-axis may perhaps be the most helpful suggestion.

The balance of the Infinity is decidedly 'bright', but on the whole, and notwithstanding the comments already made, the sound is extremely coherent and well focused. And brightness doesn't seem to get in the way or detract from the clarity, though others may react differently.

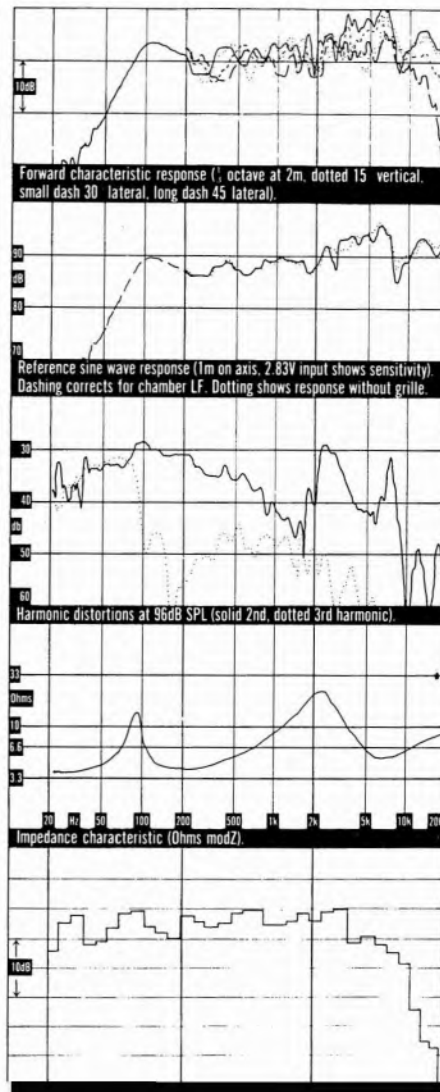
Bass is predictably in short supply, but not completely absent and certainly of good quality with just a trace of a box type coloration on occasions. Stereo imagery is very precise laterally, if somewhat foreshortened in depth, since the frequency (im)balance reduces the LF ambient cues that characterise more distantly placed instruments in most buildings. In the final analysis, the quick, accurate midband is what affords the Infinity a level of musical achievement out of proportion to its modest size and price.

## CONCLUSIONS

This is an excellent small loudspeaker, and the new lower price means it's also very good value for money. The balance is a little bright and occasionally edgy, but the midband doesn't mask the music, which is allowed full expression: Best Buy.

## TEST RESULTS

Size (height x width x depth)	36.2 x 22.5 x 20cm
Recommended amplifier power	15 – 75 watts
Recommended placement	near rear wall, high stands
Frequency response ( $\pm 3dB/1m$ )	70Hz – 20kHz (see text)
Low frequency rolloff ( $-6dB/1m$ )	70Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	91.5dB/W
Impedance characteristic (ease of drive)	poor
Forward response uniformity	average
Typical price per pair inc VAT	£130



# JBL L80T

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



The US-designed *L80T* is a large, freestanding 3-way loudspeaker, which means it corresponds to the usual US definition of 'bookshelf' size. A quintessential JBL-type design, it is actually assembled in Denmark using drivers from JBL's Los Angeles plant to keep costs in check, though you might not have guessed this had you seen the price tag first.

The enclosure itself is simply cavernous. Structural control is assisted by thick (19mm) chipboard, and by stiffening battens across the baffle and rear panels. Additionally, the midrange unit sub-enclosure line is extended through to the rear panel and acts as a brace between front and back. The side panels are unbraced, and acoustic energy floating around inside is tackled only by a small amount of acoustic cladding, a wish and a prayer. The enclosure sits directly on the floor *via* a plinth, but without the benefit of spikes or any other floor coupling method.

The drive units are archetypal JBL. The bass driver appears to have an untreated pulp cone; in fact it's something called *Aquaplas* (claimed 'light and rigid'). JBL's proprietary *SFG* (symmetrical field geometry) magnet structure reduces 2nd-order magnetic distortion. The chassis basket is a very impressive aluminium diecast item. The midrange unit cone is based on a laminated polymer of some unspecified kind, and the tweeter is JBL's now familiar ribbed titanium dome. Crossover points are at 800Hz and 4.5kHz, avoiding the area around 3kHz where the ear has maximum sensitivity.

Enclosure finish is in real wood (walnut or oak), but the rather bluff, obelisk-like styling

may not look wholly at home in a Georgian town house setting.

## LAB REPORT

As claimed, JBL's *SFG* drivers provide unusually low distortion levels – for the most part in the same ballpark as many amplifiers. The electrical load is fairly easy too, though impedance is down around 50ohms over much of the audio frequency band. The two examples of the pair were not too precisely matched near the general area of the crossover. The midrange and tweeter units are offset to distribute diffraction effects, but the enclosures are not 'handed'; that is the offset is to the right of the centre line on both enclosures, so the off-axis responses from a forward facing stereo pair heard at a central listening seat will differ somewhat. Removing the grilles seems like a good idea from the curves, and also from the sounds.

The *L80T* is aligned for a flat anechoic response, and bass is well extended, the -6dB point being 55Hz and subjectively lower still. One reason for the last point is suggested by the in-room integrated response, showing quite high low frequency energy. Further up the audio band there is some unevenness in the region 300Hz-2kHz, and also a suggestion of lift around 20kHz, the tweeter HF resonance being at a slightly lower frequency than several more recent metal dome designs.

## SOUND QUALITY

'Jumbo bass' noted one listener, more by way of complaint than commendation. In fact bass depth and quality were not the problem; the midband was. For the most part, the midrange has a rather 'darkened', 'shadowy' quality with some nasal coloration, plus a degree of upper midband emphasis. The result of mixing these ingredients was rather opaque, and in the words of one observer, 'oppressive'. And of course it is precisely this midrange that provides the harmonic overtone structure for bass notes, contributing significantly to the perceived quality of the bass.

So although there is no reason to suppose this JBL is anything less than fully competent in the LF region, music making JBL-style was a little thick and heavy, with some quite audible boxy colorations given the right material (many kinds of music showed this quality only too clearly). The sound lacked openness and clarity, though the treble quality itself attracted little adverse comment.

Despite these shortcomings, the *L80T* remains an imposing and in many ways impressive performer. Its strengths may not convince those who place information retrieval and tunefulness above all else, but do provide music making characterised by architectural strength, large image scale and dynamic consistency. These are feats not to

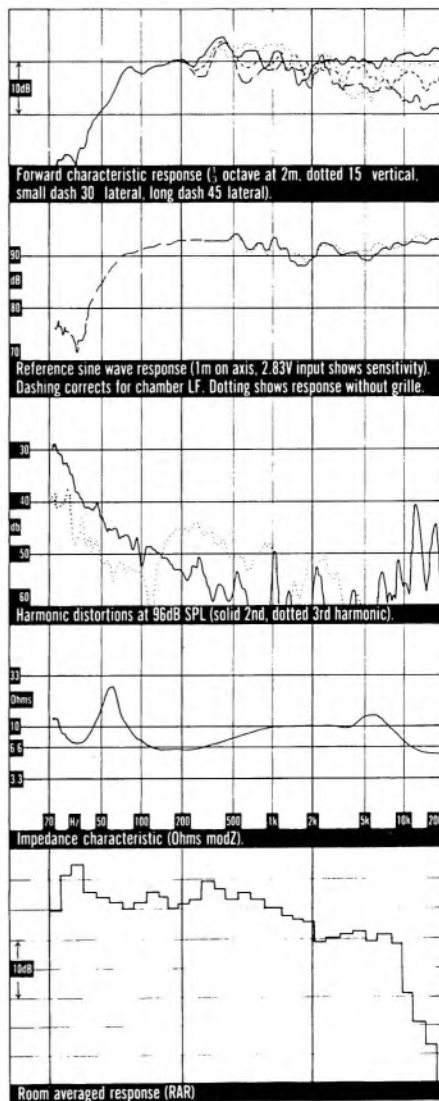
be overlooked.

## CONCLUSIONS

A certain amount of coloration and midband murkiness takes the edge off what is otherwise a powerful and impressive performer – interesting, if not specifically recommendable.

## TEST RESULTS

Size (height x width x depth)	85.1 x 35.6 x 30.3cm
Recommended amplifier power	20 – 200 watts
Recommended placement	floorstanding, open space
Frequency response ( $\pm 3dB$ , 2m)	55Hz – 20kHz
Low frequency rolloff (-6dB/1m)	55Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	89.5dB
Impedance characteristic (ease of drive)	average
Forward response uniformity	good
Typical price per pair inc VAT	£550



# JPW P1

JPW LOUDSPEAKERS LTD., UNIT 1, RICHMOND WALK, PLYMOUTH, DEVON PL1 4LL. TEL: (0752) 607000.

RECOMMENDED



The formula is straightforward enough, but the *P1* offers a lot for the money in two key respects, even at its new £125 price level. First, it's a nice big box, just under 20 litres in volume; secondly, all but the rear surface is covered in a genuine – albeit slightly vague looking – wood veneer. The rear is left undressed, so avoid standing the *P1* in front of mirrors!

The drive units consist of two Vifa units: a 200mm doped, straight-sided paper cone unit with foam surround, lightweight cast chassis and rather small magnet assembly; and a 19mm soft plastic dome tweeter with ferrofluid damping. The relatively simple crossover is adequately made and provides second order slopes. The enclosure is sealed – moderately effectively – and the rear panel has a pair of good quality 4mm binding posts screwed directly through the wood panel, not to a separate plastic subpanel as usual – a good point. The *P1* is designed to be used at least 50cm from the wall behind, and on tallish open stands.

## LAB REPORT

The front grilles are internally rebated to minimise their influence on the sound. Nevertheless, their removal had a surprisingly large effect on the measured response. There was also some advantage in grille removal for listening. Pair matching was good at bass and mid frequencies, but about one decibel out over much of the treble region. This was just detectable as a mild shift of balance with HF-rich material.

In measurement terms at least, the *P1* is

on pretty firm ground. Measured anechoically the response is almost a straight line, after making allowance for the odd local dip and rise. Some clustering of energy in the midband (centred on about 2kHz) is evident on the in-room averaged response, however. A sharp, narrow suckout is also seen around 10kHz, presumably the effect of a resonance in the tweeter dome. The rest of the measurements gave good results, notably the very clean off-axis performance which suggests unusually fine standards of crossover integration.

Sensitivity is a quite high 89dB/W, and power handling pretty good, though the sound tends to sound rather 'cluttered' if driven very hard. Nevertheless quite high levels can be achieved with this design, even when using modestly powered amplifiers.

## SOUND QUALITY

As in previous years, this is a fine sounding design that continues to cut the mustard even in today's highly competitive environment. But the *P1* is now beginning to sound a little ragged around the edges in a variety of ways; generally clear and detailed, it is also rather lacking in 'balls' and has restricted image depth, probably because the bass is somewhat undernourished. And I've already mentioned the slight lack of consistency when driven hard.

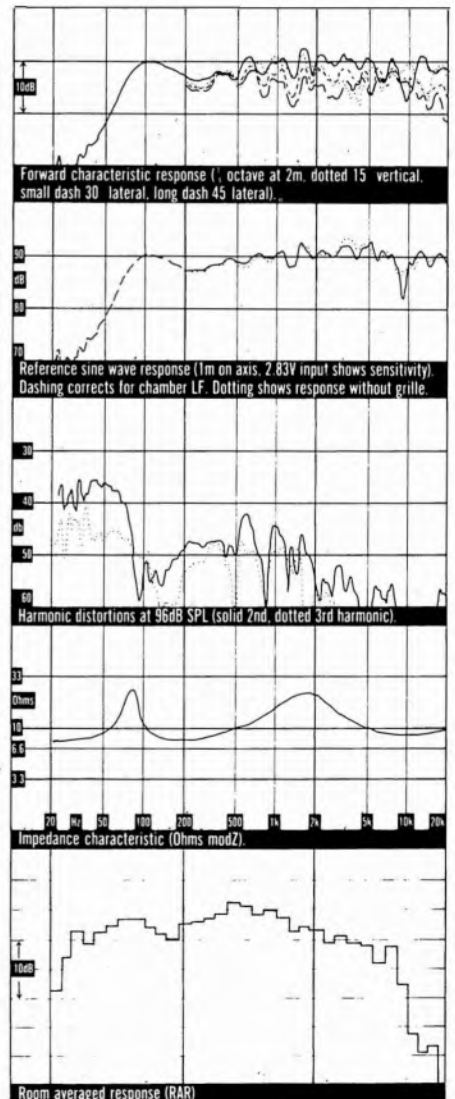
Whatever the limitations, the bottom line is positive – and that's the way the panel saw it too. Achieving a near average overall score. The more negative comments described an occasionally disembodied quality, some muddling (especially during loud passages), and a touch of crudeness, paralleling the comments above. But the light, fast and crisp qualities of the design also attracted explicit praise. Typical of the panelists' reactions was one which praised the clarity and unobtrusiveness of the model.

## CONCLUSIONS

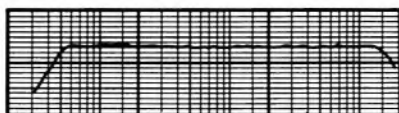
No longer a clear leader on musical grounds, JPW's *P1* remains a competent and pleasing design well suited to the qualities of most budget price systems. It can sound a little shallow and thin, however, and the tweeter isn't the sweetest around.

## TEST RESULTS

Size (height x width x depth)	44 x 25.9 x 26.1cm
Recommended amplifier power	20 – 70 watts
Recommended placement	free space, on stands
Frequency response ( $\pm 3$ dB, 2m)	75Hz – 20kHz
Low frequency rolloff ( $-6$ dB/1m)	60Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	89dB
Impedance characteristic (ease of drive)	average
Forward response uniformity	above average
Typical price per pair inc VAT	£125



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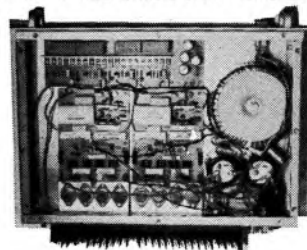
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# KEF R102

KEF ELECTRONICS LTD., TOVIL, MAIDSTONE, KENT ME15 6QP. TEL: (0622) 672261.

RECOMMENDED



The key claims for the compact 10.5litre £335 *R102* are that it is efficient, easy to drive and has excellent bass extension for its size (best case 40Hz, -6dB with a maximum SPL of 107dBA - KEF's figures). High sensitivity is partly achieved by using a 'hybrid' crossover technique, carrying out broad response shaping at low (pre-amp) level where power losses can effectively be avoided. This section of the circuit is contained within a small mains-powered black box known as a *Kube* (KEF universal bass equaliser) which is patched into the amplifier's tape monitor loop - a duplicate set of tape connections on *Kube's* rear makes good this loss. It also provides some control over bass shape and extension, allowing the *102* to be re-aligned for various room positions, both near walls and in free space.

The loudspeaker proper resisted all attempts with the can opener except *via* the tweeter orifice, which was too small to be of much use. As far as could be ascertained, the enclosure is braced front to rear and well lagged, but undamped. The box itself is very well made, finished in a high quality real wood veneer, and with high grade brass terminals at the rear. The 160mm bass unit appears very well made with a flared polypropylene cone and a novel basket in moulded plastic. The tweeter is the familiar *T33* ferrofluid-cooled/damped, soft dome unit.

## LAB REPORT

The intrinsic response shape peaks between 1-2kHz, but *Kube* both effectively (and very accurately) flattens the amplitude response,

and also allows suitable LF response shaping for all normal room positions - or simply for the user's tastes. The important point is that it did what it was supposed to do. The room average response is essentially flat with the speakers measured away from room boundaries (Contour '0', Extend 'on').

The normal responses were absolutely flat, while the 'Extend' switch slightly slows the rate of rolloff below the bass cutoff point without much affecting the in-band response. The Contour control allowed fine adjustment in the region below about 500Hz; maximum shelf boost/cut measured was 1dB at 300Hz, 1.5dB at 100Hz and 3dB at 80-100Hz (the knee of the response curve). Response uniformity remained good 30° off-axis laterally and was still pretty consistent, if poorer, at 45°. The trace taken 15° above the main axis shows substantial phase cancellation between the drivers, with a hole 10dB deep and 1-2kHz wide centred on 2.5kHz. High stands are obviously necessary.

The effect of the grilles was substantial but (according to KEF) beneficial. Don't you believe it. The surprisingly heavy grilles have a disastrous subjective effect, smearing and smothering the music ruthlessly. Pair matching was A1. The drive amplifier won't need to be very powerful, but must be happy driving a (largely resistive) 4ohm load - and it should have a tape monitor loop.

## SOUND QUALITY

I used the *R102* well away from walls on Celestion *700* stands (which are ideal by the way) - and without covers, as explained. Setting up posed no problems, and I have little to say about the various *Cube* controls; their effects are limited anyway. Unfortunately I blew a *102* up during the panel listening tests, so panel comments were not obtained.

Speaking personally therefore, I was delighted by the *102* on the whole. Bass is good for the enclosure size, and totally natural and unstrained in quality. More important, however, was the sheer openness of the sound: this KEF is amongst the most un-box-like speakers around. Aside from a slightly 'shrill' upper midband (cause unknown), it is extremely articulate and together, and sounds intrinsically unprocessed. Especially unusual in such a physically small loudspeaker, it has that rare and precious quality of creating a large scale image without loss of specificity. The *102* represents the most convincing *Kube* application yet - by far.

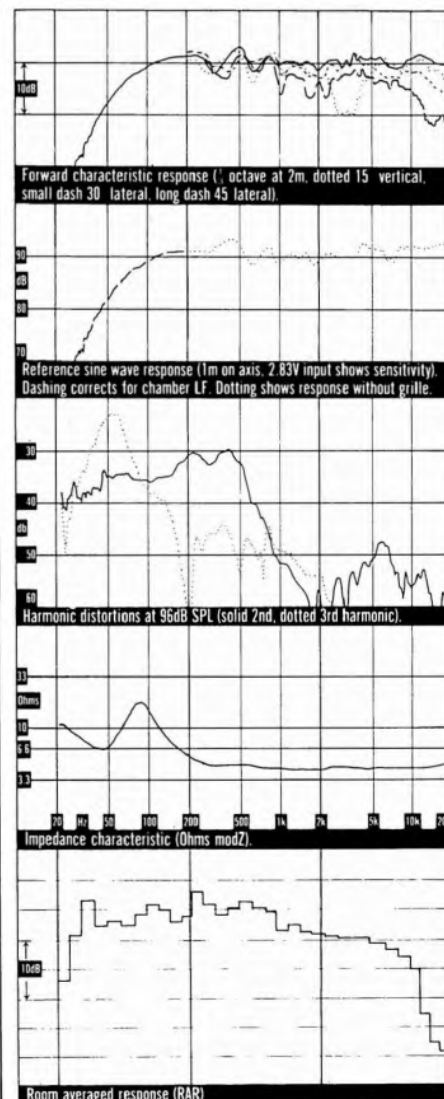
The shortcoming remains, and it's an important one. Whilst all the good things already outlined were happening, they were happening on the end of an amplifier that had suddenly started to sound slightly grubby and dirty - just the kind of quality often associated with cheap amplifiers and filters, which of course is exactly what the *Kube* is.

## CONCLUSIONS

Clearly Recommended, the *102* is a startlingly successful application of the *Kube* semi-active crossover in the cause of making a small loudspeaker sound bigger. The result is a polished, sophisticated sound with real range and vitality. But the sound quality of the *Kube* itself remains somewhat suspect in an audiophile context.

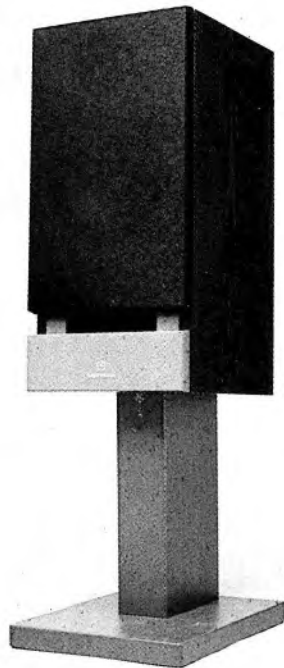
## TEST RESULTS

Size (height x width x depth)	33 x 20.7 x 26.3cm
Recommended amplifier power	50 - 200 watts
Recommended placement	near wall or in open space, high stands
Frequency response ( $\pm 3$ dB, 2m)	80Hz - 20kHz*
Low frequency rolloff (-6dB/1m)	60Hz*
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	89.5dB
Impedance characteristic (ease of drive)	below average (see text)
Forward response uniformity	excellent
Typical price per pair inc VAT	£335
*extend 'on' contour '0'	



# LINN NEXUS

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



The *Nexus* is a classic 8 inch two-way design, reflex-loaded using a deep, long, rectangular, forward-facing port whose cross sectional area increases towards the outside. This shape has the effect of spreading the frequency and reducing the amplitude of the system resonance (Q), and probably cutting down turbulence too. The drivers are Linn's standard Scanspeak-sourced small dome tweeter, with some acoustic loading courtesy of a sculpted faceplate, and a Tonagen-sourced bass unit. The latter has a rather flimsy looking pressed chassis, a decent size magnet, and flared plastic cone with soft centre cap. Hardly like a Linn driver at all in fact, but the *Nexus* is hardly like a traditional Linn loudspeaker . . .

Far greater efforts seem to have gone into the enclosure. The heavy carcass has thick walls and is fully shelf-braced, both above and below bass unit level, with additional battening and panel grooving. The grey baffle is a high grade plastic moulding, facilitating the complex tapered port profile. It's also vital to the system's aesthetics, which in the author's opinion are masterly.

A channel is cut into the wood all the way around the baffle, and this acts as home for an elasticated band around the edge of the front cloth cover. This very elegant piece of lateral thinking means no framework for the cover, and no attachment to resonate or cause diffraction – another neat and elegant solution that creates a more integrated appearance.

The system is full of innovative features. The 12-element crossover has unusually

steep 5th-order slopes and a mild amount of phase correction. The printed circuit board is mounted in its own cavity at the rear, and uses components of pretty standard commercial quality. Bi-wiring or standard connections are available, conversion unusually using internal soldered links. Recommended positioning is within a few inches of a rear wall.

Dedicated stands are included in the package. With a matching finish, they are spiked pedestal types incorporating a backwards tilt, and even include channels to conceal the cables.

## LAB REPORT

The anechoic plots show a shelving up of response around 500Hz, presumably to allow for siting near a rear wall. There's little sign of Linn's traditional mid-dominant balance, apart from a trace in the room-averaged response, which still looks well enough tailored. Off-axis responses are unusually even and free from crossover 'notches', but there are some in-band HF resonances that add a touch of sharpness to the plots.

Pair matching is near perfect, and as expected the cloth covers had no noticeable effect on the measurements – and an only just (sometimes!) detectable effect on the sound. Distortion levels are unusually low, and sensitivity is high, partly because the load impedance spends much of its time hovering around 50ohms. Reactive components are slight, however, and the *Nexus* should be an unproblematical enough load.

## SOUND QUALITY

Under panel testing conditions, performed with single- rather than bi-wired connections, the *Nexus* failed to shine. There were strong and remarkably unanimous criticisms from all panel members: "boxy and shut in . . . oddly dark . . . lack of HF detail . . . deadened quality . . . fluffy HF, flabby mid . . . congested" are culled almost at random from the score sheets.

There can be little doubt that the traditional benefits of Linn and other good audiophile speakers – resolution, timing and pitch – were all short-changed in the *Nexus*. On the other hand, this loudspeaker was surprisingly strong on tonal accuracy, which has not been a notable strength of Linn loudspeakers in the past. In fact the *Nexus* sounded a good deal more neutral than the offerings of certain other manufacturers who have always placed great emphasis on this one criterion.

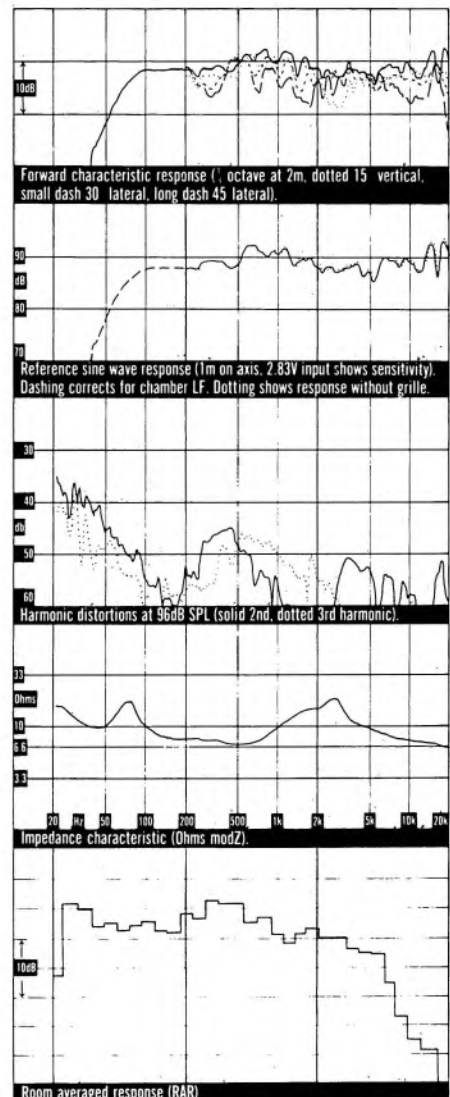
Bi-wiring did help, however. The congestion eased to an extent, and the speaker was able to go loud with less strain and therefore more naturally. The *Nexus* is also capable of quite solid, spacious imagery in all planes. But it remains a little coarse and blurred.

## CONCLUSIONS

This uneven performer would probably benefit from further development. Strong where Linn speakers have traditionally been weak and *vice versa*, it's hard to avoid the conclusion that the *Nexus* is somewhat unre-fined, congested and dynamically wanting. At the same time it proved tonally accurate, capable of producing a solid, stable sonic picture. Finally the aesthetics provide an object lesson to many other manufacturers.

## TEST RESULTS

Size (height x width x depth)	49 x 23.5 x 30.4cm
Recommended amplifier power	20 – 100 watts
Recommended placement	near rear wall, supplied stands
Frequency response ( $\pm 3dB$ , 2m)	60Hz – 20kHz
Low frequency rolloff ( $-6dB/1m$ )	60Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	89dB
Impedance characteristic (ease of drive)	average
Forward response uniformity	average
Typical price per pair inc VAT	£350 (inc. stands)





# MB QUART 390

SOUNDTEC MARKETING, UNIT 9, BELFONTE TRADING EST., MUCKLOW HILL, HALESOWEN, W. MIDS. B62 8DR. TEL: (021) 550 7387.



MB Electric is a West German loudspeaker manufacturer intent on 'doing a Canton' by opening the Britain market to up-market European loudspeakers. It's interesting to see the subtly different emphases that MB's designers place on certain aspects of loudspeaker design.

The obvious first point is the sheer quality of the *Quart 390* as a piece of furniture. It just oozes class. The woodwork is unmistakably real wood, with no edges that haven't been fully radiused, or at least smoothed round, and end caps on the most visible side overhangs. Even the quality of the chipboard is better than we generally find in British loudspeakers. However the overhanging sides are not ideal acoustically, and the deep, unrebrated grille frames don't help, despite felt covering on the baffle itself. And good as build quality is, the styling is – dare I say it? – Teutonic.

The 3-way drive unit complement is also unusual. A titanium dome tweeter is coupled to dedicated midrange and bass units, both with plain shallow profile pulp cones and the latter with a very small magnet. These are mounted asymmetrically on the front baffle, but are not handed left and right. There's a certain logic to MB's choice of drivers, since lightweight pulp cones often come nearest to matching the excellent transient response and resolution characteristics of metal tweeters.

Internal build is very simple. There's no bracing or damping other than the midrange line, which connects the front and rear panels. A well made 9-element crossover pro-

vides 2nd and 3rd order slopes at 400Hz and 1.8kHz. The latter is smack in the most sensitive part of the midband, a problem 3-way designs have no excuse not to solve.

## LAB REPORT

The fundamental response trend is about right measured anechoically, but the bass goes quite deep and its level could prove overwhelming in smaller rooms. Concealed within the overall trend, however, is a ragged mid and top end. The tweeter especially has some enormous peaks and troughs (more peaks than troughs in fact) within its nominal passband, and doesn't really stack up alongside the latest generation of very sophisticated metal domes from Celestion, Wharfedale and Elac. On a positive note, driver integration holds up well off-axis (as indeed it should).

Sensitivity is a quite high 89.5dB/W, though the operating ceiling before audible compression is not exceptional. Moreover, load impedance is low, approximating 4ohms and with some reactive components. Pair matching is very good, but the grilles have a substantial measured effect – on balance I prefer them left off.

## SOUND QUALITY

The range of opinions expressed on this loudspeaker include certain recurrent qualities, including 'clarity', 'vividness', but there was also a 'lack of harmonic differentiation' and 'edginess'. Surprisingly nobody mentioned the bass, which was rather overshadowed by the brittle upper mid and 'whistly' top. The result was superficially fast and dynamic, but it was also poorly integrated and messy – not to mention distinctly bright.

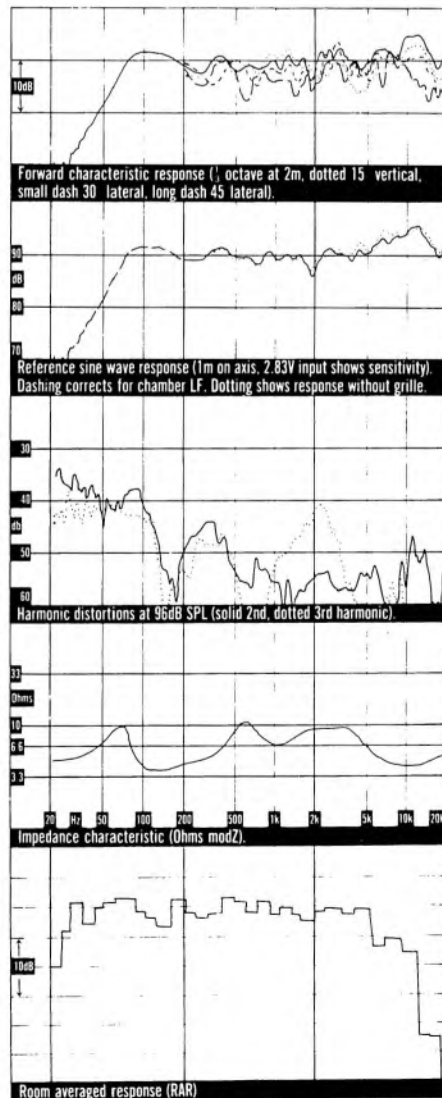
One listener put his finger on something important when he described the stereo imaging produced by the MB as 'wide – polarised to right and left, without a coherent centre image'. *Exactment*. The image doesn't focus, not simply because of the asymmetric drive unit disposition, but for what lay behind this – an intrinsic lack of focus and coherence in the sound. However sharp and clear it sounds on first acquaintance, there was no underlying art: The MB sounds literally like a box of assorted drivers. Mostly ill-assorted.

## CONCLUSIONS

Sharp but ultimately a crude and rather unresponsive sounding product, the usual stereotypes of German loudspeakers regrettably held true. Like so many others, the *Quart 390* is extremely bright, sometimes aggressively so. This upfront nature might work in some systems, but recommendation is clearly out, despite the excellent construction.

## TEST RESULTS

Size (height x width x depth)	52 x 31 x 30.5cm
Recommended amplifier power	20 – 150 watts
Recommended placement	open space, on stands
Frequency response ( $\pm 3dB$ , 2m)	60Hz – 20kHz
Low frequency rolloff ( $-6dB/1m$ )	60Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	89.5dB/W
Impedance characteristic (ease of drive)	below average
Forward response uniformity	below average
Typical price per pair inc VAT	£499



## MISSION 700LE

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



Reviewed and Recommended in 1986, Mission re-submitted the popularly priced 700LE for 1987, though any changes appeared small in nature and degree.

The 'Leading Edge' is a compact 9.5 litre 'bookshelf' model aligned for mounting near and almost touching a rear wall (on stands such as Mission's spiked optional extras rather than bookshelves please). The response is tailored to give optimum listening seat response with the speaker directed straight ahead, and with Mission's 'inverted' baffle configuration (tweeter below bass/mid).

The baffle itself is a single plastic reinforced moulding, as is the properly rebated grille frame, while the carcass is 12mm chip-board, clad in 'black ash' vinyl. Bass and mid-range comes from a 150mm coated pulp/paper unit, while the tweeter is a 19mm polyamide dome. The mild second-order crossover uses decent quality components, but with tag connections to the drivers; the spring-loaded terminals can (just) take 4mm plugs.

## LAB REPORT

Sensitivity is a generous 89dB/W, capable of delivering good levels with even the smallest amplifiers, while fine power handling confers substantial maximum loudness capabilities. Amplifier loading characteristics were not the easiest, but the 50hm minimum is innocuous enough nevertheless, and most unlikely to give any difficulties. Bass extension is somewhat limited, -6dB being at a highish 66Hz.

The basic frequency responses show very close correspondence with those obtained in earlier reviews, albeit with a slight improvement in treble smoothness (possibly due to tweeter sample variations); there is some improvement with the grilles removed. The mid bass shows slight underdamping, but the general integration on- and off-axis was pretty good, confirming Mission's designed optimisation to the 20 per cent horizontal listening axis. The room response again showed close similarity to the 1986 model, the slightly 'mid forward' character being a little more noticeable.

Distortion, however, showed a significant improvement on the latest samples, while pair matching was fairly good, albeit showing occasional  $\pm 1$ dB treble variations.

## SOUND QUALITY

Again confirming the 1986 findings, the 700LE scored a straight average with encouraging consistency on both listening tests. The PM panel found the sound quite clear, lively, open, tight, and 'out of the box', if a touch small and aggressive, with some criticism of bass quality and midband congestion.

The MC panel findings were very similar, again praising articulation and lively dynamics, and again noting some mild mid coloration, hardness and brightness, with a slightly 'lightweight' balance and limited stereo depth.

## CONCLUSIONS

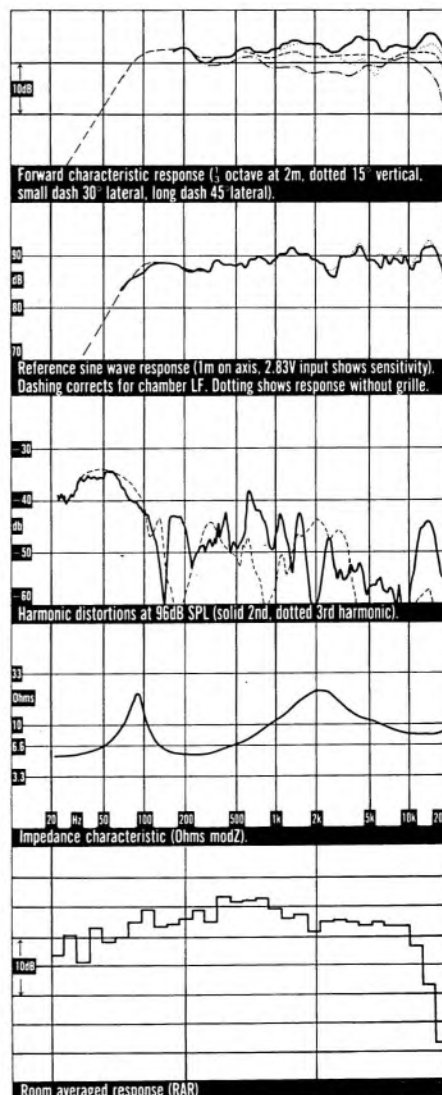
The 700LE remains a fully competitive model, carefully contrived to be suitable for close-to-wall siting and deserving confident Recommendation.

## TEST RESULTS

Size (height x width x depth)	38 x 21 x 21cm
Recommended amplifier power	10 - 100W
Recommended placement	straight ahead on stand near wall
Frequency response ( $\pm 3$ dB, 2m)	80Hz - 20kHz
Low frequency rolloff (-6dB/1m)	66Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	89dB/W
Approximate max sound level (pair at 2m)	103.5dBA
Impedance characteristic (ease of drive)	above average
Forward response uniformity	good plus
Typical price per pair inc VAT	£140

Reprinted from issue No. 53

Reviewed by Martin Colloms and Paul Messenger



# MISSION 737R

MISSION ELECTRONICS LTD., STONEHILL, HUNTINGDON PE18 6ED. TEL: (0408) 52777.



The 737 has had a long career not far from the geometric centre of the Mission loudspeaker hierarchy. In earlier days the original 737 had a distinctly 'commercial' balance, but as the *Renaissance* tag suggests, the born again 737 is designed to fulfil a much stricter brief.

This is clearly not just another medium size box. The high tech bass unit, itself a refugee from the 770, has a 'fast' polypropylene cone and 215mm nominal frame diameter, fitted to a diecast magnesium chassis. The tweeter is a 19mm polymer dome, the two coming together at 2.5kHz via a simple 3-element hard-wired crossover network mounted adjacent to the terminal block. Input is via good quality 4mm binding posts, and the internal cavity is well stuffed with acoustic foam.

The engineering content is higher than usual. The baffle, for example, is a thick section MDF panel, and includes a damped resistive multi-hole port (the modern successor to the drinking straw-lined port common about a decade ago). The baffle is neatly finished in a grey gunmetal, projecting clearly of the enclosure proper so that the front cover surround fits flush with the front surface and doesn't act as a diffraction source. Nevertheless you might still wish to remove it to avoid the slight subjective 'deadening' effect of the cloth.

The *Renaissance* is normally sold complete with a pair of one piece stands which screw securely onto the loudspeaker base. Carpet piercing spikes are included in the deal, but the stands are assembled from

wood panels, and are hollow and resonant. The 737 is designed for use close to room boundaries. Finish, in genuine vinylwood, is very smart.

## LAB REPORT

It's a fair bet that this loudspeaker was designed with help from the very anechoic chamber hired for the sinewave response testing of this project, notwithstanding which the 737 shows some distinctive measured shortcomings, mainly in poor mid/top integration. Measured from 15° above this was not particularly apparent, but there was a varying severe suckout centred on 3kHz on all other test axes.

The frequency balance is a little on the ragged side in the tweeter's domain, though low and mid frequency responses are much more impressive. The room integrated response shows how well the speaker handles the room interface when sited as intended back against a wall, even though it does look a little mid prominent (which ties in with the subjectively observed balance). Distortion levels border on the exceptionally low.

Impedance values are fair, with no particularly reactive elements evident, which makes the Mission a straightforward enough amplifier load. Sensitivity is such that high levels can be reached with only moderately powerful amplifiers. A good 40 watt/channel model will handle most typical applications. Pair matching is good, but the grilles made a noticeable difference to the sound, which reinforces the comments made earlier.

## SOUND QUALITY

The response discontinuity thrown up in the measurements was all too obvious on audition, though many individual features of the sound impressed. The midband, for example, was more articulate and open than many, yet the treble sounded detached and prominent, so even though clarity was good, the overall effect was unbalanced.

From the panel's notes, comments like 'thin and whiney strings' and 'sizzly top' were all too common. Bass reproduction was surprisingly deep and energetic, yet it seemed somewhat out of character with the rest of the loudspeaker, sounding a little slow and often lacking a well defined sense of pitch and timing. Moving the speakers away from the rear wall, however, went a long way towards restoring a proper balance.

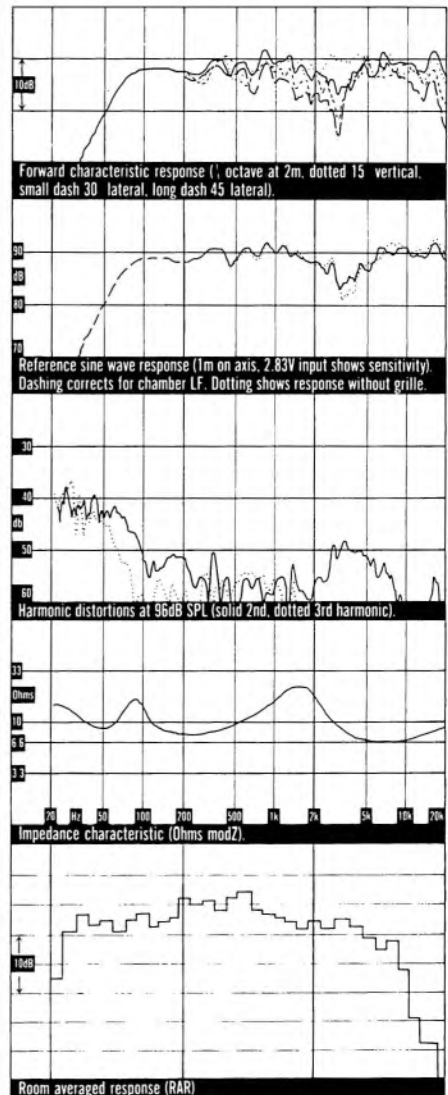
## CONCLUSIONS

This is an interesting and far from unworthy design: on the right day and with a following wind it can sound remarkably persuasive. Unfortunately it lacks balance, tending to 'tizz and boom' either side of a highly articulate but recessed midband. When it worked it

was glorious; when it didn't, the music sounded bloated and out of control. Recommendation withheld with regret.

## TEST RESULTS

Size (height x width x depth)	54 x 25 x 27cm
Recommended amplifier power	20 - 120 watts
Recommended placement	near wall on dedicated low stands
Frequency response ( $\pm 3\text{dB}$ , 2m)	60Hz - 20kHz
Low frequency roll off ( $-6\text{dB}/1\text{m}$ )	60Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	88.5dB/W
Impedance characteristic (ease of drive)	average
Forward response uniformity	average
Typical price per pair inc VAT	£250



# HEYBROOK POINT FIVE



## A REALLY DIFFERENT LOW COST TWO WAY LOUDSPEAKER

Heybrook's Pint-Size Point Five is the latest addition to the ranks of low cost two-way loudspeakers. But in a world which is mostly populated by clones, makeweights and also-rans, this one really is different.

What the Point Five is really all about, though, are the 3 qualities, speed, resolution and real attack and force. There's enough substance backing it up to add some flesh to the bones, too, so the music also has body and a well defined resonant structure.

The very high levels of resolution achievable with this design were plainly apparent on a wide range of materials, control was evident all the time, in the way notes were released, in the build-up to crescendos, in the tidiness of the bass, in the precision with which stereo images were projected into the space around, and in front of, the speakers.

Finally - and on a resoundingly positive note - I must mention the unusually dynamic nature of the Point Five. Unlike most smallish loudspeakers, it doesn't appear to compress or change in sound as it goes loud, and with this unusual freedom from squash, it's quite easy to take the speaker right up to, and even beyond, its working dynamic range.

In short, this is one budget loudspeaker that works. Instead of trying to squeeze every last Hertz in the bass, or decibel in level, Heybrook have concentrated on

making a loudspeaker that is, above all, detailed, articulate and dynamic, whilst retaining excellent control. It's a powerful list of virtues at the price.

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### The Heybrook is an excellent all-round design

that could easily be awarded top marks for compatibility. It is easy to drive, very clean-sounding and it is well-balanced at both bass and treble extremes.

One excellent feature of the Heybrook speaker is its full bass performance.

The treble frequencies sounded excellent too, and the sound was unusually clean and dynamic particularly when playing material with lots of cymbal work. Indeed, the little Point Fives often sounded the equal of a much bigger and much more expensive design.

Stereo imagery was pin-point sharp and highly detailed, yet not in a cold or dissecting manner. The Heybrook Point Five is an excellent example of cost-effective engineering where economies have been made to overall advantage. From the clever design of the cabinet with its mediate top and bottom pieces to the simple crossover and specially designed bass/mid unit, the whole speaker is an example of how to build a top class small speaker at a very reasonable selling price.

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# HI-FI Answers

## Sound quality is, in a nutshell excellent

The speaker is always under firm and positive control. Transient and dynamic behaviour are both exemplary or better, and bass quality is fast, pitch accurate and has lots of drive.

The Point Five is simply very refined, and gives a 'big' sound with excellent dynamics and space, and very good resolution of detail. Best of all, though, is the midband which has a rare openness and an alive quality that is not easily mistaken. This is a loudspeaker where, given a decently well behaved reproduction system, the stereo soundstage comes out more than half way to meet the listener.

I believe that the new budget Heybrook is a significant product. By designing intelligently within tight cost constraints, the company have come up with something genuinely new and with obvious potential design stretch for future up-market models to exploit. Meanwhile, the Point Five's lively, forthcoming sound is very much in tune with what is required of a small, modern speaker. I'm positive it's going to be enormously and deservedly successful.

## THE HIT LIST

### SPEAKERS HEYBROOK POINT FIVE

MC, 2W, CB  
Review: January 1988 Design/Manufacturer: UK

The new Point Five, a small two-way loudspeaker from Heybrook, marks a break with the past in more ways than one. The enclosure is easily the most novel feature - the baffle being part of the main structure rather than being mounted in afterwards as usual. Heybrook had to use new construction techniques to achieve this, the benefit being a structure with greater physical integrity and which is easier to control.

Internal wiring is solid-core, which should be observed elsewhere in the partnering system too, and the crossover is also built in line with solid-core ideas as far as possible.

Used a few inches clear of a wall the Point Fives have a bass and midrange that are marvellously expressive and articulate, and exhibit real control and excellent stereo. On very early samples the tweeter was slightly uncouth, but this trait has now been cured.

# MONITOR AUDIO R452 MD

MONITOR AUDIO LTD., 34 CLIFTON ROAD, CAMBRIDGE CB1 4ZW. TEL: (0223) 246344.



Monitor Audio have offered a conventional 2-way model in a big vented enclosure known as the *R352* for a number of years now. The *R452/MD* is a linear development of that model, the main distinguishing features being the metal dome tweeter with which MA are fast becoming synonymous, and a rather higher price to match.

The enclosure is an upgraded version of that used in the familiar *352*: the large (36 litre) box is fully veneered on all surfaces, with balancing veneers on the inside. In contrast to the cheaper model, the *452*'s baffle is also veneered and based on thicker stock. There is internal bracing for the two side panels, and a layer of sound absorbent foam is firmly fixed to all surfaces except the baffle.

The metal dome tweeter has an aluminium covering mesh to protect the delicate diaphragm. The 8 inch bass driver is comparatively low-tech, with a pressed steel chassis, a deeply flared, doped pulp cone (the *352* has an undoped bass cone), and a midrange to average size magnet. The hard-wired crossover features four modestly specified components, and wiring is MA's own multi-strand type, soldered rather than tagged.

The reflex-loaded enclosure is best used on lowish stands and well clear of walls. The grilles are attractive in appearance but unbrated internally; I was deeply unsurprised to discover that they're best left off.

## LAB REPORT

Sensitivity around 89dB/W is quite high, and the *452* will also accept a fair amount of stick,

the bottom line being that amplifier requirements are more qualitative than quantitative. A good 20 watt amplifier will suit in many situations, but it is important for other reasons that bass control is beyond reproach.

The anechoic responses were generally quite good, though some lack of integration between midrange and treble is seen in a 2kHz wide suckout around 3kHz. In energy terms, the bass was deep and well extended, and perhaps more neutral objectively than to the ear. Elsewhere a generalised downwards response trend favours the midband, though all is smooth and well contrived. The anechoic tests provide ample justification for removing the grilles. Distortion and impedance data were fine, the former indicating good driver design and the latter a sensibly easy, high-Z amplifier load.

## SOUND QUALITY

The panel liked this speaker. "Very good sense of acoustic" and "best impression of 'being there' we've had so far" were typical comments. But this didn't blind anyone to some quite noticeable weaknesses too, the most obvious of which was a tonal balance problem. Whilst the bass end was rich and propulsive, indeed almost fruity at times, the lower mid sounded thin and 'pinched'. And the latter rather than the former dominated the musical performance of this speaker.

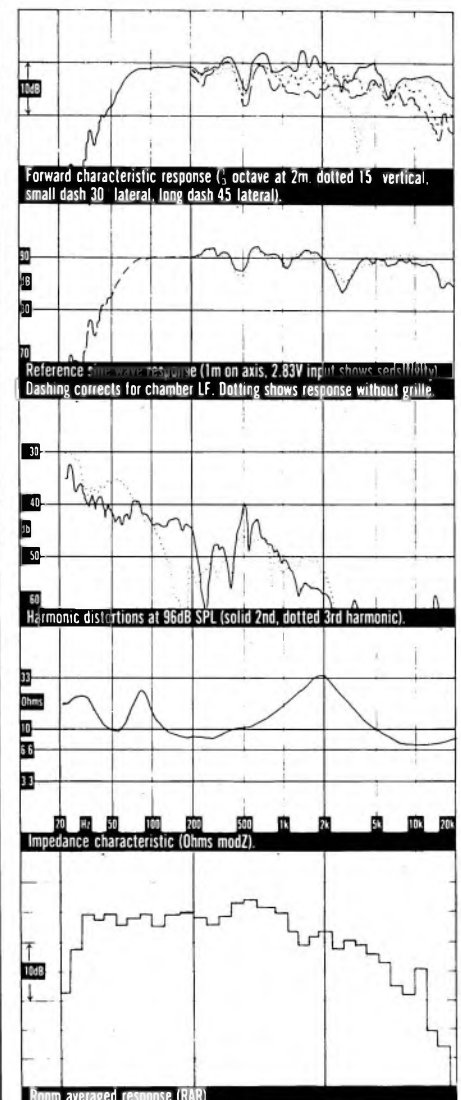
The *452* is something of a curate's egg in practice. The treble is sweet and open, coloration levels are mostly low, and dynamics and speed are unrestrained. But some hollow 'boxy' effects can be heard through the port even at normal listening distances – maybe it would have been better mounted on the rear – and the 'squeaky clean' sound lacked an important element of body or weight. This left the sound rather abrasive and overtly hi-fi-ish at times, notwithstanding the excellent tweeter. Panelists noted some shrillness and woodiness, along with some loss of depth.

## CONCLUSIONS

On the plus side this is a big, efficient, dynamic box with plenty of balls. But it's all rather unintegrated and over-explicit. The *R452* is well enough priced and presentable, but the cheaper *R352* represents the better compromise on balance and even better value.

## TEST RESULTS

Size (height x width x depth)	64 x 25 x 31.8cm
Recommended amplifier power	20 – 150 watts
Recommended placement	open space, low stands
Frequency response ( $\pm 3dB$ , 2m)	60Hz – 20kHz
Low frequency rolloff ( $-6dB/1m$ )	55Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	89dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	below average
Typical price per pair inc VAT	£349



# MONITOR AUDIO R852 MD

MONITOR AUDIO LTD., 34 CLIFTON ROAD, CAMBRIDGE CB1 4ZW. TEL: (0223) 246344.



Although better used away from side walls and other obstructions, the *R852* tends to sound best with a bit of a helping hand from the rear wall, to augment what can otherwise be a rather dry bass. About a foot clear of the wall behind is a good starting point, except perhaps in smaller rooms.

In this loudspeaker, Monitor Audio use a vented voice-coil version of the aluminium dome tweeter whose development they co-sponsored. The bass driver is an equally well made unit with a flared plastic cone built into a very stable diecast basket, fitted with a large vented magnet assembly. A very simple crossover consists of a capacitor and an inductor. Here the stranded proprietary wiring is soldered at all connection points.

The sealed box enclosure is something special, with 18mm balanced wood veneered stock braced along side panels and a foam sound-absorbent lining. As usual with Monitor Audio, the veneer is real, but the species of tree used for our samples is quite new to the British loudspeaker industry. Rejoicing under the name Kenyan Black, it's a highly distinctive, rich, deeply figured, straight grain wood which stands very little chance of being mistaken for MFI teak, even though this means they'll stand out rather obviously amongst the blackened ash. The drive units are neatly rebated flush with the baffle. With or without the removable front cover, this is real furniture, but without is clearly best from the musical angle. Heybrook's *HBS-1* stands could have been purpose made; they weren't, but they could have been.

## LAB REPORT

Apart from the characteristically sharp high-Q resonance 'spike' at a little above 20kHz common to metal dome tweeters (not reproduced on most of the plots accompanying this test), the *852* has a notably smooth amplitude response. The averaged in-room plot shows little obvious 'character', and the anechoic responses were also satisfactory, albeit with some emphasis in the midband. Distribution is good too, albeit with some sharp phase cancellation apparent on the 15° vertical off-axis plot; optimum listening height is on an axis normal to the plane of the tweeter. Pair matching was near perfect, but the grille did make an appreciable difference to the measured output – on the face of it, the response is smoother with the covers on than off.

The distortion and impedance (ease of drive) results are unexceptional, but sensitivity is comfortably high. The metal dome tweeter can handle a great deal of power – proportionately more than the bass unit – and the speaker could be driven to high levels without muddling or 'squash'.

## SOUND QUALITY

The *852* achieved something close to average scores from the listening panel. This doesn't in fact mean that it made average sounding noises, but rather that some strongly polarised pro and anti comments tended to cancel out, giving a result that doesn't really do the loudspeaker justice.

The forward, explicit character of the *R852* was both its best and worst feature. Some loss of stereo depth was noted. The bass could be described as light, even thin, but on the whole I liked its quality a lot. The speaker has tremendous speed and a really tactile nature when reproducing drumskins and the like, a lot of which stems from good bass integration with a clean sounding midband and treble, which in turn means that the harmonic structure of bass tones is correctly handled.

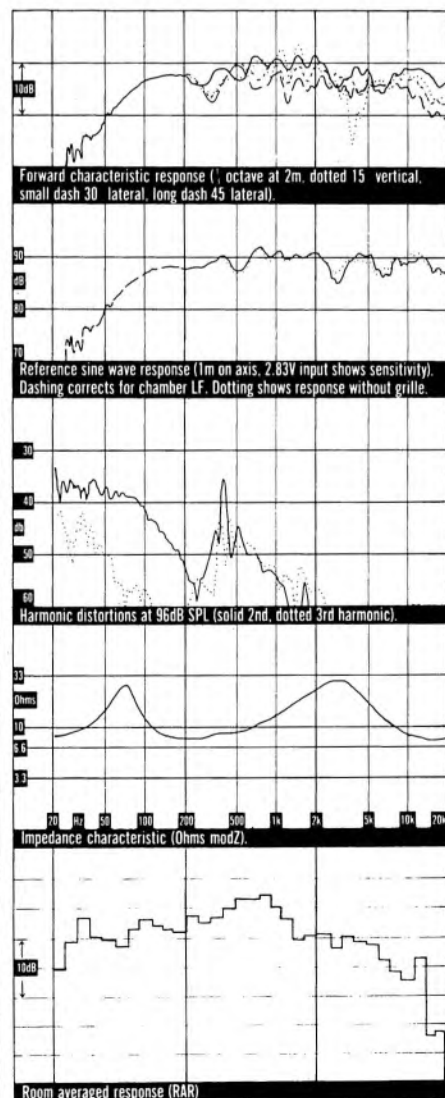
The metal dome unit didn't escape without criticism. One panelist described the *852* as 'rather bland apart from an aggressive HF'. With some music, the midband seemed overshadowed and distant, and all panel members talked in terms of 'graininess' and 'sibilance'.

## CONCLUSIONS

Beautifully knocked together, the *R852* is a maximum information design, and as potentially satisfying musically as it is demanding of the performance standards of the rest of the system. With the caveat that it can sound a little coarse or aggressive, it would still be perverse not to Recommend this talented loudspeaker.

## TEST RESULTS

Size (height x width x depth)	45 x 25 x 27.5cm
Recommended amplifier power	20 – 120 watts
Recommended placement	open space or near rear wall, high stands
Frequency response ( $\pm 3\text{dB}$ , 2m)	80Hz – 20kHz
Low frequency rolloff ( $-6\text{dB}/1\text{m}$ )	68Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	89dB
Impedance characteristic (ease of drive)	average
Forward response uniformity	good
Typical price per pair inc VAT	£380



# MUSICAL FIDELITY MC2

MUSICAL FIDELITY LTD., UNIT 16, OLYMPIC TRADING ESTATE, FULTON ROAD, WEMBLEY HA9 0ND. TEL: (01) 900 2866.

BEST BUY



This is the smaller of two Musical Fidelity loudspeakers (a smaller one still is due for release shortly), but the 25litre enclosure is still very much an open space, stand mounting proposition. It will not give of its best without the freedom to 'breathe', and needs lots of surrounding free air. Classic 'universal' stands like the ubiquitous Heybrook *HBS-1* are ideal.

The design is developed from the *MC-4* (see separate review), with the same very rigid enclosure featuring an inset back panel and dressed in a black vinyl woodgrain covering. The insides are stuffed to the gills with a rabbit's warren of bracing, interspersed with tightly packed rolls of polyester wadding. Attention to detail is evident in a number of areas, not least the use of reticulated foam instead of cloth for the grilles, the provision of two pairs of input terminals for (optional) bi-wiring, and twisted internal wiring. But the crossover is contained on a single PC board (two are used in the *MC-4*, one for each arm of the network).

Also in common with the *MC-4*, the tweeter is a version of the Elac 30mm metal dome, with the usual mesh cover to reduce its inherent vulnerability. However, the bass unit has a pressed steel chassis, a modest to average motor assembly, a plasticised PVC cone with an inverted surround, and a porous cloth centre cap. Bass is reflex loaded, the port being positioned on the rear panel. As with the *MC-4*, the *MC-2* is built in mirror image pairs, the tweeter being slightly offset from the centre line to spread diffraction effects.

## LAB REPORT

The *MC-2* has a textbook measured performance. The 1m axial response can be contained within a 3dB envelope all the way from 70Hz to 20kHz. The response shape breaks up a little off-axis, but the main effect is a fairly sharp rolloff at the extreme high frequency end of the passband, which is a characteristic of the Elac metal dome. Some phasing effects are apparent in the crossover region, but they are better controlled than usual – integration of the two drive units can only be judged a success. Bass extension is, however, slightly disappointing given the enclosure size.

Sensitivity measures an average-ish 87.5dB, but power handling is high and the *MC-2* can produce pretty high volume levels, uncompressed. The impedance plot shows no sharp changes and therefore very small reactive components, whilst the absolute impedance value never drops below about 7ohms. Distortion levels are low, and pair matching was excellent with our samples. The reticulated foam grille makes little or no difference to the sound or measurements.

## SOUND QUALITY

The two Musical Fidelity designs covered in this issue – the *MC-2* and the *MC-4* – achieved the highest scores given for any of the models covered in the panel tests. This is especially gratifying in the case of the considerably less expensive *MC-2*, which is (figuratively) asked to run where the *MC-4* only needs to stroll.

The *MC-2* is a clean and open transducer, with excellent tonal differentiation and extremely explicit imagery, though compressed a little in the depth plane. It has an unflinching coherent quality as though all of the elements of the design are working together as a system, not just as a bunch of discrete components. The mid/top transition was seamless, whilst bass quality (if not quantity) was exceptional. "I've just noticed lower registers on this piece I've never heard before", wrote one panelist, talking of a Mahler symphony excerpt (No 4/Inbal on Denon CD). The treble is smooth and clear, if a trace wispy and obvious at times.

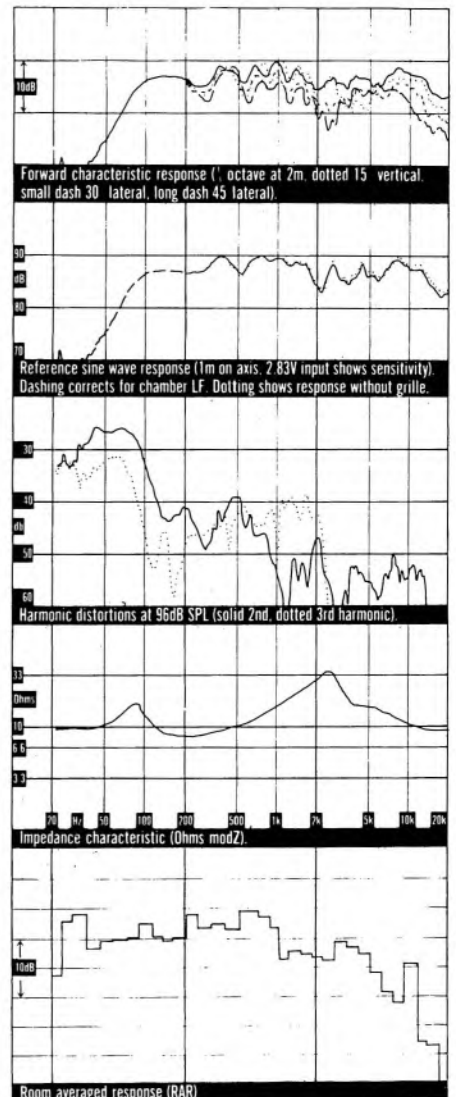
The panel were clear about their reasons for liking this model: "Very clear – lots of detail and ambience" wrote one, who went on to praise high standards of separation and clear focus. A touch of brightness was also noted, but not strongly criticised.

## CONCLUSIONS

This is an exceptional and painstaking design which offers liveliness, clarity and articulation along with very fine I.F resolution in the context of a slightly bright, lightweight presentation – clear Best Buy material.

## TEST RESULTS

Size (height x width x depth)	48.5 x 25.5 x 16.5cm
Recommended amplifier power	30 – 100 watts
Recommended placement	open space and stands
Frequency response ( $\pm 3$ dB, 2m)	60Hz – 20kHz
Low frequency rolloff ( $-6$ dB/1m)	65Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	87.5dB
Impedance characteristic (ease of drive)	excellent
Forward response uniformity	excellent
Typical price per pair inc VAT	£300

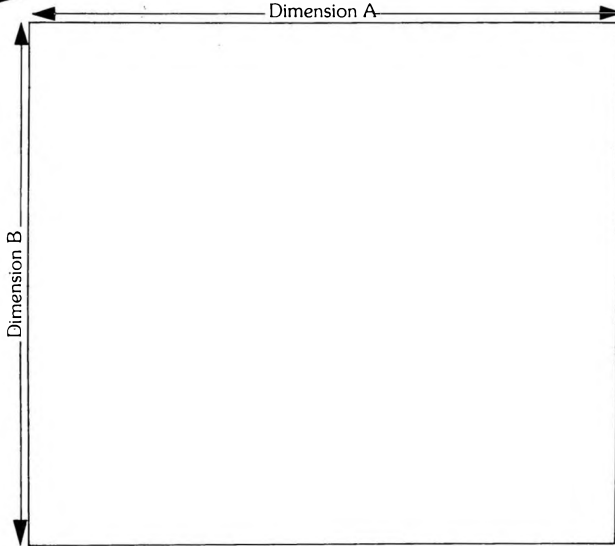


# **kj** SYSTEM DESIGN BRIEF

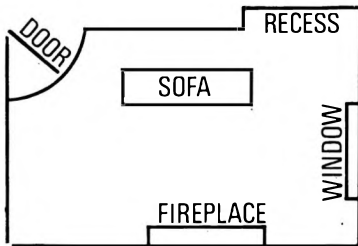
You can use this form to take advice from our team of hi-fi consultants who will be pleased to recommend suitable equipment. You can use it even if you are only intending to replace one or several items within your existing system.

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Please draw the shape of your living room.



(Diagram of example room layout)



**MEASUREMENTS**

Dimension A: .....

Dimension B: .....

Ceiling Height: .....

Is the room wall to wall carpeted? YES  NO

Please indicate on the plan where you would normally sit when listening. Also indicate positioning of doors, windows, major items of furniture and any unusual aspects of the room (i.e. odd recesses or non rectangular shape)

What type of music do you listen to? (tick any relevant)

- |             |                          |                |                          |
|-------------|--------------------------|----------------|--------------------------|
| JAZZ        | <input type="checkbox"/> | EASY LISTENING | <input type="checkbox"/> |
| GENERAL POP | <input type="checkbox"/> | HEAVY METAL    | <input type="checkbox"/> |
| CLASSICAL   | <input type="checkbox"/> |                |                          |

What items do you want incorporated in your system?  
(tick relevant boxes)

- |                       |                          |                                |                          |
|-----------------------|--------------------------|--------------------------------|--------------------------|
| AMPLIFIER             | <input type="checkbox"/> | RECEIVER                       | <input type="checkbox"/> |
|                       |                          | (combines amplifier and radio) |                          |
| RADIO TUNER           | <input type="checkbox"/> | TURNTABLE                      | <input type="checkbox"/> |
|                       |                          | (with arm and cartridge)       |                          |
| CD PLAYER             | <input type="checkbox"/> | CASSETTE DECK                  | <input type="checkbox"/> |
| CD PLAYER             | <input type="checkbox"/> | SPEAKERS                       | <input type="checkbox"/> |
| (with remote control) |                          |                                |                          |

Any other items? .....

What items are you retaining in your system?  
(Please state with brand name and model no.)

.....  
.....  
.....

Are there any particular brands or models you would like incorporated in our recommendations?

.....

If you want a Radio Tuner which wavebands do you listen to?  
(tick any that are relevant)

- FM/VHF  MEDIUM  LONG

How do you intend mounting your speakers?  
(They should not be placed directly on the floor unless designed to be so.)

- FLOOR STANDS  WALL BRACKETS  EXISTING SHELVES

If Stands or Wall Brackets; please tick the box if you want suitable ones to be quoted for.

Do you have any equipment you wish to part exchange?  
(Please state, giving brand name and model no.)

.....  
.....  
.....

Is the equipment in full working order? YES  NO

What financial budget are you considering after deducting for Part Exchange allowance?

(i.e. the nett amount you are prepared to spend) £ .....

Please tick box if quotation for instalment credit required

Please tick box if you prefer installation of equipment

If you decide to purchase from us how would you expect to conclude the transaction?  
by PERSONAL VISIT  by MAIL ORDER

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ADDRESS .....

..... POST CODE .....

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# MUSICAL FIDELITY MC4

MUSICAL FIDELITY LTD., UNIT 16, OLYMPIC TRADING ESTATE, FULTON ROAD, WEMBLEY HA9 0ND. TEL: (01) 900 2866.

RECOMMENDED



Musical Fidelity are making their debut in loudspeakers with two models, of which the £500 32litre *MC-4* is the larger. Designed for use in an open position, the enclosure design stresses structural rigidity. The back is inset to stiffen the sides (the 'Wharfedale tray'), and an elaborate system of cross bracing is employed inside. The walls are constructed from unusually thick (20mm) MDF.

The slightly offset tweeter (mirrored on the two enclosures) is a version of the Elac metal dome (originally developed by Elac in co-operation with Monitor Audio). The bass unit has a completely clear plastic cone made from a polypropylene sub-species called *TFX*. Any problems associated with centre cap design have been solved by side-stepping them *à la* Naim *SBL* with a fixed and rather phallic looking extension to the pole piece, a small air gap allowing the bass cone to do its thing unimpeded. The motor assembly is enormous, and the chassis is a high quality diecasting.

The electrical network splits the bass and tweeter arms using two quite separate PC boards. A near inaccessible terminal block retains the separate wiring through to the amplifier for optional bi-wiring. The sophisticated (or do I mean complicated?) crossover employs 10W polypropylene capacitors and other high grade components, with LC-OFC PTFE sheathed cables. Bass alignment uses a port, with gas-flowed profile to reduce turbulence.

Appearance is modern and clean cut, but the reticulated foam covers, although acoustically preferable to cloth, never really sit

square and flat, and the obtrusive baffle graphics have attracted unfavourable comment (the author quite likes the effect, but has notoriously bad taste). Enclosure finish is a better than average black vinyl wood-grain – one might have expected real wood at this sort of price.

## LAB REPORT

The sophisticated engineering results in excellent measurements, though there is more than a suggestion of top and bottom emphasis which might have led to classic tizz and boom symptoms on a lesser system. The room averaged response shape shows a top that rolls away because of the directivity of the largish dome tweeter – the (well restrained) brightness is only apparent on axis. Extreme HF apart, the *MC-4* has a usefully wide radiation pattern, but some phase cancellation is apparent above the normal axis, and when measured at 45° lateral.

Pair matching is near perfect, and the reticulated foam covers are sonically nearly neutral. Sensitivity checks out at an average-ish 87.5dB/W, and power handling up to the point of audible overload is very high. The speaker is perfectly capable of cleanly reproducing 100dB or more average levels in normal size rooms.

## SOUND QUALITY

Sharing honours with its cheaper stable-mate, the *MC-4* scored best of all the loudspeakers assessed by the listening panel. Key recurrent observations were of a fine sense of atmosphere and occasion, an excellent spatial sense (these things are related, and certainly spring from a combination of excellent imagery and good low level resolution), plus good timing and a positive rhythmic quality. And, for that matter, a high standard of all round resolution.

The *MC-4* has a subtly different balance from the *MC-2*: with greater solidity and more spring to its step in the midband, it also provides consistently larger image scale, without loss of specificity or focus.

One mild criticism was that the system could sound a little hollow, which I confirmed in my own listening. The balance could also sound a little bright and shallow – a characteristic of this tweeter – though never thin. Any criticisms were mild though, and totally swamped by the remarkably pervasive positive qualities. The *MC-4* is amplifier fussy, however, and can sound muddled when loud unless driven, preferably bi-wired, from a strong and potent amplifier.

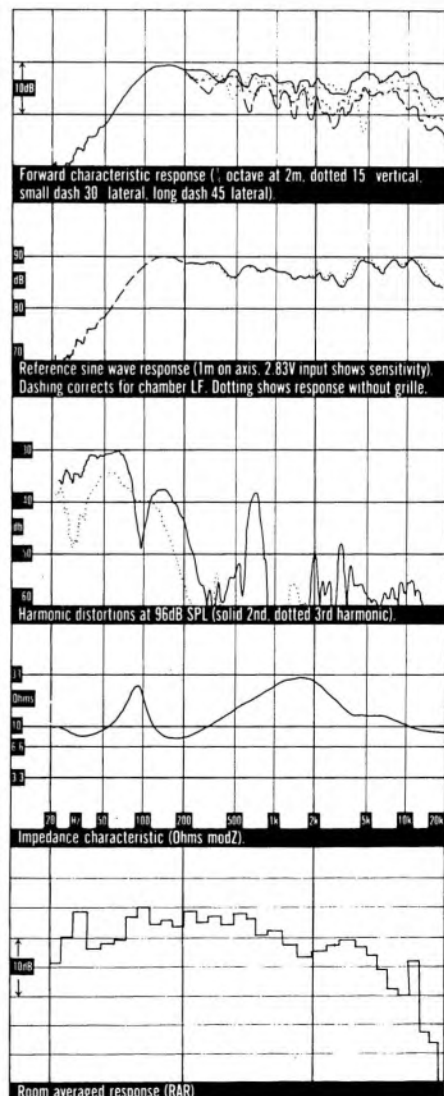
## CONCLUSIONS

Superb sound and highly recommended, the brash exterior only finds a distant echo in the product itself which is fast, assured, and refined. The *MC-4* is of the 'unvarnished

truth' school, and will not lightly suffer poor ancillaries (or James Last/Mantovani etc...).

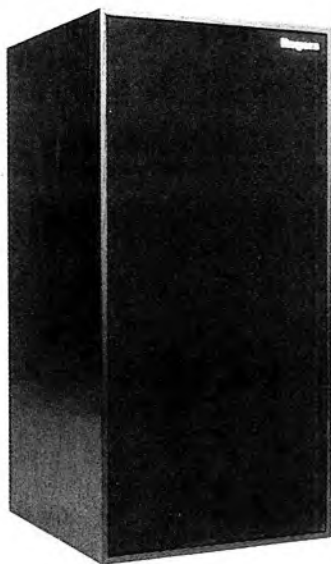
## TEST RESULTS

Size (height x width x depth)	56.5 x 26.9 x 29cm
Recommended amplifier power	40 – 150 watts
Recommended placement	open space, on stands
Frequency response ( $\pm 3$ dB, 2m)	60Hz – 20kHz
Low frequency rolloff ( $-6$ dB/1m)	60Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	87.5dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	excellent
Typical price per pair inc VAT	£499



## ROGERS LS7t

SWISSTONE ELECTRONICS LTD, 310 COMMONSIDE EAST, MITCHAM, SURREY. TEL: (01) 640 2172



Rogers have been known for decades as one of the guardians of the 'BBC sound', and the £360 7t (and its sister *Studio 1a*) are latest in a long line of medium sized reflex-loaded models. The 7t still owes much to the original *LS5/6* and its numerous subsequent offspring, which were amongst the pioneers of plastic cone technology, but is slightly more compact and more cost-effectively engineered.

The 7t uses a recently refined 200mm polypropylene-coned driver for bass and mid-range duties, and the *t* suffix refers to a 25mm metal (Titanium) dome tweeter. Another innovation is the bi-wired crossover, allowing each driver and its crossover circuitry to be driven independently by separate cables if desired.

The carcass of the 34 litre real wood veneered enclosure is 12mm chipboard, with additional bituminous damping panels and internal foam, while the baffle is 19mm MDF. The grille frame is not only thin but also chamfered to reduce unwanted reflections, while the port is also carefully shaped. The 3rd-order crossover is of decent quality, with film capacitors and hardwiring, and average quality multistrand cable. It is designed and aligned for free space mounting, on good quality 40cm stands.

## LAB REPORT

Unlike those early BBC-style monitors, the 7t has a quite high sensitivity of 88.5dB/W – enough to give good level from low powered amplifiers, yet with the power handling to deliver high output from a powerful

amplifier. Furthermore, the loudspeaker's impedance characteristic presents a very easy load. Bass shows reasonable extension, the -6dB point being at 50Hz, with moderate rolloff thereafter despite the reflex design.

Frequency responses are generally very promising: even, well balanced and unusually smooth, though with the merest suggestion of the 'three-humped' effect that boosts the midband and frequency extremes. The two metre off-axis curves show remarkably good integration and correspondence, and although the grille does have a marked effect, it is probably best left in place. The room averaged response is generally good too, but does appear to reinforce the slight band emphases referred to above. Free space siting is clearly mandatory.

Distortion measured much better than average, and pair matching was held to an impressive  $\pm 0.3$ dB.

## SOUND QUALITY

Though the bass performance was disappointingly 'overblown' and uneven under the *PM* listening conditions – probably a function of room, system, placement and predominantly vinyl sources – the 7t still scraped a 'good' overall rating, by virtue of its fine mid-range, low coloration, decent stereo, and good loudness capabilities.

The *MC* panel was more complimentary, rating the 7t 'good plus' and particularly praising the bi-wire option for extra focus, definition and clarity. Here criticism of the bass was limited to a slight 'softening', while the sound overall was considered lively, clear, open and transparent. Balance was largely neutral, with a touch of mid 'forwardness', while the treble was qualitatively well liked.

## CONCLUSIONS

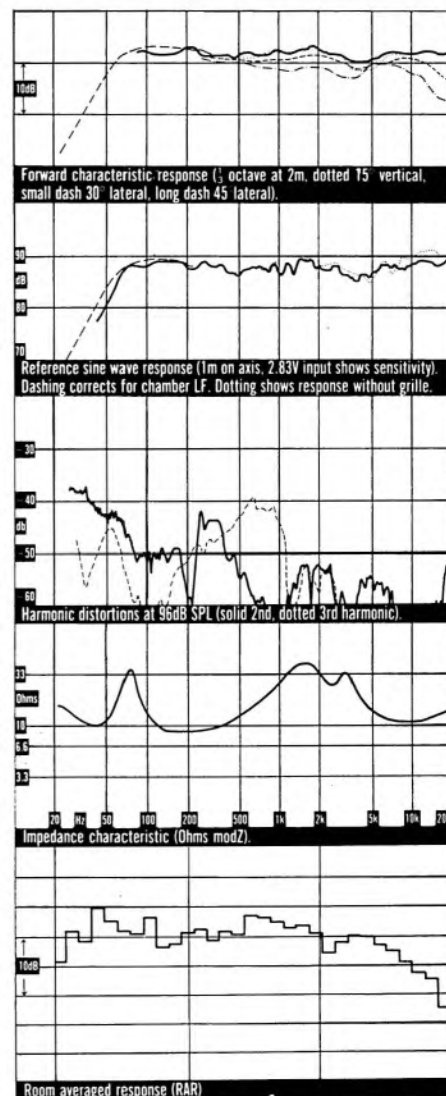
The *LS7t* clearly deserves Recommendation, offering a fine combination of 'classic' qualities at a reasonable price. However, it will not suit all systems and rooms equally well, so a home trial is worth pursuing prior to purchase. Free space siting and good quality stands are mandatory, and the overall alignment probably favours CD rather better than vinyl LP.

## TEST RESULTS

Size (height x width x depth)	56 x 27 x 28cms
Recommended amplifier power	12 – 150W
Recommended placement	free space on 40cm stands
Frequency response ( $\pm 3$ dB, 2m)	50Hz – 20kHz
Low frequency rolloff ( $-6$ dB/1m)	48Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	88.5dB/W
Approximate max sound level (pair at 2m)	105dB/A
Impedance characteristic (ease of drive)	V good
Forward response uniformity	excellent
Typical price per pair inc VAT	£360

Reprinted from issue No. 53

Reviewed by Martin Colloms and Paul Messenger



# ROTEL RL850 II

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

BEST BUY



Rotel's 850 loudspeaker has been around a few years now, but has been recently updated in a number of areas – including the price! Selling at around £120, this is a conventional enough, medium sized two-way 'bookshelf' model, built in Britain to Rotel UK's design, and clearly intended to partner their popular range of amplifiers and other electronics.

The ingredients have changed little, with a 200mm doped paper cone bass/mid driver, and a newly revised 25mm soft fabric dome tweeter, connected *via* a simple 2nd order crossover curiously using tags instead of hard-wired as previously. The sealed box enclosure is finished in 'black ash' vinyl and constructed from modest 15mm chipboard. There is no added bracing apart from the recessed baffle, though the ensemble feels encouragingly rigid nonetheless. The woven grille is built onto a thick chipboard frame with no rebating, so is probably better left unused.

Build quality is average, with clear evidence of careful cost control but also plenty of the ingredients that help maximise sound quality. The low frequency alignment suggests the enclosures should be sited away from nearby walls in free space, on 40cm stands.

## LAB REPORT

Comparison with its predecessor shows that Rotel have managed to upgrade the measured performance overall by small but distinct margins. Sensitivity is little different, and plumb average, while the generous main driver has sufficient power-handling to

create decent loudness levels. Bass is nicely extended for this class of speaker, with  $-6\text{dB}$  at 50Hz. The impedance curve is mild, the loading minimum of 7ohms providing a kind load for the amplifier.

The response curves do show certain specific balance characteristics (an unavoidable brightness, for example) but are well ordered, fall between respectable limits across the band, and show small but distinct improvements in smoothness and flatness over its predecessor. The grille is better left off, though its influence is less pernicious than might have been feared. The room-averaged response again shows many similarities to the original, but also confirms the more even energy-balance through the mid and treble.

Distortion has been significantly improved, and is most commendable by any standards, and pair-matching on our samples was again good – within  $\pm 0.5\text{dB}$  across the band.

## SOUND QUALITY

The *PM* panel were a little reserved in their praise, but still rated the 850 a straight average, which is no mean achievement. Treble was a little 'spiky' and obtrusive, while bass also seemed a touch heavy under these listening conditions. "Lacking thrill power" was how one listener expressed his feelings, though thoroughly workmanlike and competent nonetheless.

The 850 did rather better during the *MC* tests, scraping an 'above average' overall, which is very good for the price. The bass clearly worked better here, and although there was still some criticism of treble 'brightness' and mild 'grain', the rest of the package proved well balanced and clear, with good presence, decent focus, and fair stereo depth.

## CONCLUSIONS

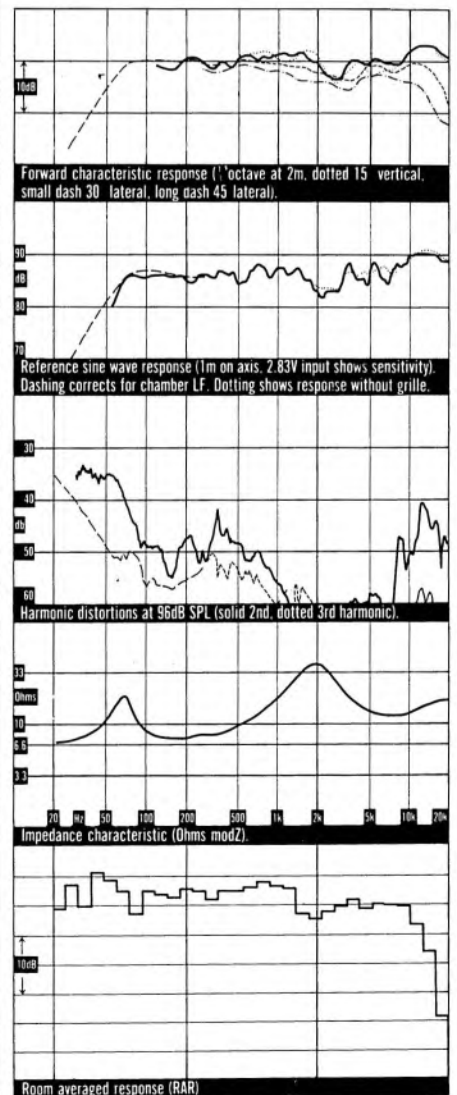
Loudspeaker design is the art of compromise, and on these grounds it is hard to argue with Rotel's very competitive package. Strongly recommended, but with the usual caveat that it will not be to every taste, prospective purchasers should note the need for decent stands and free space siting.

## TEST RESULTS

Size (height x width x depth)	44 x 25 x 24cms
Recommended amplifier power	15 – 75W
Recommended placement	free space on 40cm stands
Frequency response ( $\pm 3\text{dB}$ , 2m)	60Hz – 20kHz
Low frequency rolloff ( $-6\text{dB}$ , 1m)	50Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	86.5dB/W
Approximate max sound level (pair at 2m)	100dBA
Impedance characteristic (ease of drive)	V good
Forward response uniformity	good plus
Typical price per pair inc VAT	£120

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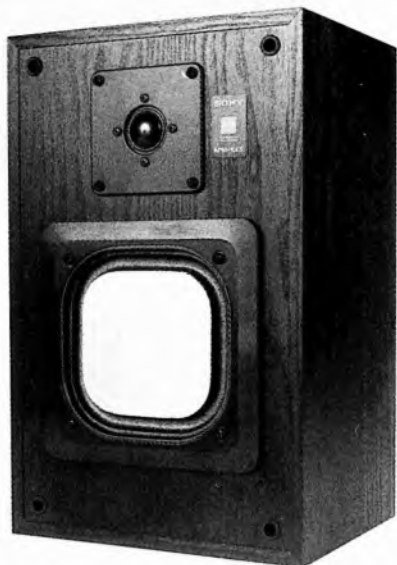
Reviewed by Martin Colloms and Paul Messenger



# SONY APM10ES

BEST BUY

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



Sony have already had significant success with their German-sourced hi-fi loudspeakers, notably the *APM 22ES* and *20ES*, but in an effort to provide even sharper price competition, the £99 *APM10ES* has taken over from the *20*. Consequently manufacture is undertaken in the UK, where in fact much of the design work was carried out.

Not surprisingly, it is a simple two way 'bookshelf' model, with a sealed-box enclosure of 14.5 litres, aligned for siting fairly close to a rear wall on good quality stands. Luxury touches can hardly be expected at this price point, but a distinguishing feature linking Sony's *ES* speakers is the Japanese-made APM alloy honeycomb flat diaphragm drive units, which offer a measure of time alignment. A variant of this is used for the bass/mid unit, while the largish (27mm) tweeter is a conventional plastic dome.

Build quality of our pre-production samples was very good, and the ingredients seem pretty good on the whole, particularly considering the modest price. The cabinetwork is chipboard, 12mm for the carcass and 15mm for the baffle. Damping consists of a polyester wad plus additional material on the carcass sides, while a 120mm square of 15mm chipboard reinforces the back panel behind the tweeter. The 11mm grille frame lacks any rebating. The 3rd order PCB crossover is hardwired using multistrand cable – thicker to the bass unit – and the drivers are seated on silicon sealant.

## LAB REPORT

Late delivery meant the *APM10s* missed the

anechoic chamber work, so we are forced to rely on measurements supplied by Sony with inevitable methodology inconsistencies. Nevertheless there is sufficient to provide a reasonably clear picture.

Sensitivity is around average, and sufficient to give decent sound levels without recourse to an unusually powerful amplifier. The impedance curve errs on the low side, but not unacceptably so for any decent amplifier.

The response trace shows some small scale irregularities but an impressively even overall progression, with a steadily rising trend into the treble. Clearly this balance would benefit from some assistance at low frequencies by wall mounting. The room-averaged response is very promising – just a little mid forward and bass shy, but with good overall balance and a very respectable low frequency extension. Distortions appear to be acceptably under control.

## SOUND QUALITY

The Sony distinguished itself on the *PM* listening tests, with a 'good' overall rating that was far better than one has any right to expect for the price. The panel may have been swayed by its superiority over the immediate predecessors, but the overall balance and system integration were particularly praised, though there were criticisms of a slightly brash and coarse treble, and a mild lack of *joie de vivre*.

The *MC* panel were less effusive, but still rated the *10ES* a more than respectable average overall. There was praise for the lack of coloration and good dynamics and stereo focus, though the mid sounded a little 'hard', thin and unforgiving. Once again elements of treble harshness and bass 'lightness' were noted.

## CONCLUSIONS

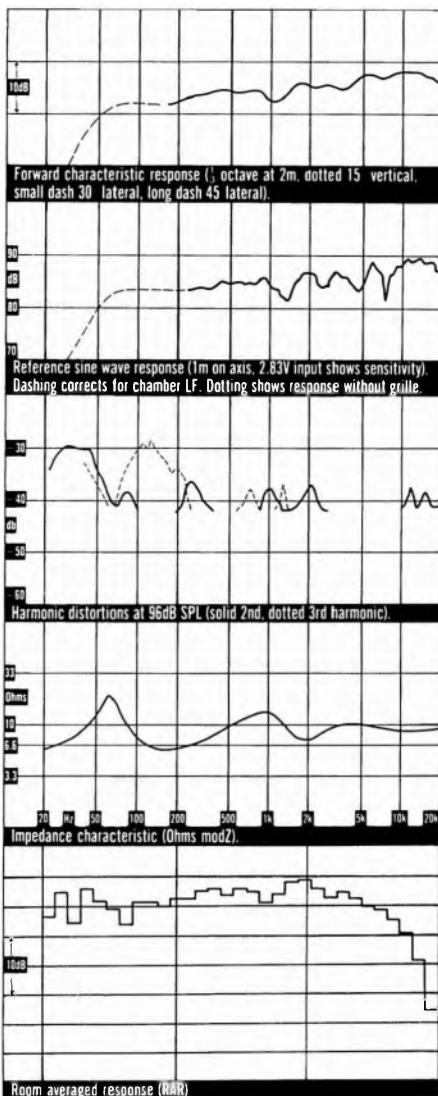
At its highly competitive £100 price point, the *APM10ES* is an obvious Best Buy. Not without criticism, and with the caveat that we were unable to carry out our usual comprehensive lab tests, it still provides fine all round qualities with little serious compromise, and can do justice to a good quality hi-fi system of Sony or specialist origins

## TEST RESULTS

Size (height x width x depth)	40 x 25 x 20cms
Recommended amplifier power	(15) – 75W
Recommended placement	on 40cm stands, 40cm from rear wall
Frequency response ( $\pm 3dB$ , 2m)	80Hz – 18kHz
Low frequency rolloff ( $-6dB$ , 1m)	55Hz
Sensitivity (ref 2.83V/1W, 8ohms, 1m)	87dB/W
Approximate max sound level (pair at 2m)	102dB
Impedance characteristic (ease of drive)	good
Forward response uniformity	not checked*
Typical price per pair inc VAT	£100

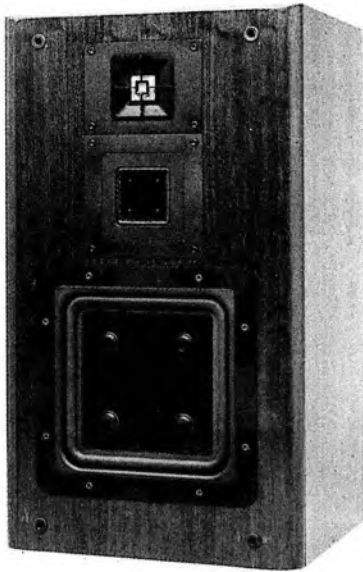
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Reviewed by Martin Colloms and Paul Messenger



# SONY APM66ES

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



Though flat diaphragm loudspeakers were pioneered by UK manufacturers such as KEF and Celestion in the 1960s, they have since become a persistent theme of Japanese loudspeaker design, though mainly for cosmetic reasons and at the low cost end of the market. Sony's *ES* range is something of an exception, however: the *APM-66ES* has flat square units because the designers believe in them.

The argument is that a cone shaped wavefront is in itself a distortion and sounds wrong; that a planar wavefront better mimics reality. But to enable a flat plate to stay piston at high rates of acceleration (high frequencies) requires high stiffness which generally implies excessive moving mass. Cones are inherently stiff even when made with materials like paper, but Sony have thrown expensive skinned honeycomb aluminium – similar to aircraft flooring – at the flat driver problem, and won.

The *APM-66ES* uses three flat diaphragm units, the larger two of which are constructed in the way described. The tweeter uses a derivation of the same technology but has a hard graphite vapour deposited coating.

The enclosure is very large, very heavy (24+kg) and has extensive bracing, damping and lagging. A major feature is the smooth rounding of the longer front edges, to better distribute diffraction effects. The three drivers are mounted vertically in-line and flush with the front panel. They are wired through a high power crossover to a single pair of 4mm sockets on the rear. The

enclosure is now a sealed box, though previous versions were reflex loaded.

One disappointing feature is that the crossover point to the tweeter remains at 3kHz, exactly where it would be with a 2-way design, Sony having missed the opportunity to place this significant break point further out of harm's way, say over 5kHz.

## LAB REPORT

The *APM-66ES* is engineered accurately for a flat anechoic response, and under these conditions the bass starts to roll away around 80Hz, and is about -10dB at 30Hz or so. The effect in any normally proportioned UK listening room will be to magnify this bass output (not its extension); no compensation has been made for this, so the *66ES* is predictably bass heavy.

The upper bass, mid and top end are ruler flat, but note the local fluctuations in output, suggesting roughness in response and perhaps pointing to some resonances or interference effects between drivers (probably the latter). And the tweeter has a very sharp resonant mode above the audio band at about 22kHz (typical also of metal dome tweeters). The off-axis responses hold up well at 30° laterally, rather less so at 45°; interference effects between the units take a severe toll at 15° above the tweeter axis, though this is of limited relevance with fairly large designs such as this.

Pair matching is a little disappointing (worst case is 2dB in error, though averaged results are very close), and the grille has a drastic effect on HF output. The Sony is only moderately easy to drive, though sensitivity is a high 89dB/W. 2nd (but not 3rd) harmonic distortion is on the high side.

## SOUND QUALITY

Problems noted on audition included a 'semi-detached' treble, described variously as 'gritty' and 'thin', and a 'flat', 'slow' bass. The bass criticisms almost certainly stem from the excess output mentioned above. The treble problems may well be a by-product of the phase effects described earlier between the mid and high frequency units. Although the problem is restricted to a narrow discrete band of frequencies, it effectively prevents the speaker from giving a properly 'open mouthed' account of the music; it could be that quite subtle crossover changes would effect a cure. There was also panel criticism that the sound was 'over-wide', but sheer physical size seems to be the reason; extra listener distancing provides improved perspectives.

On the other hand, strengths were happily many. The bass is deep and powerful enough to make the world move. The mid is particularly crisp and open, if not especially smooth, offering an almost holographic insight and

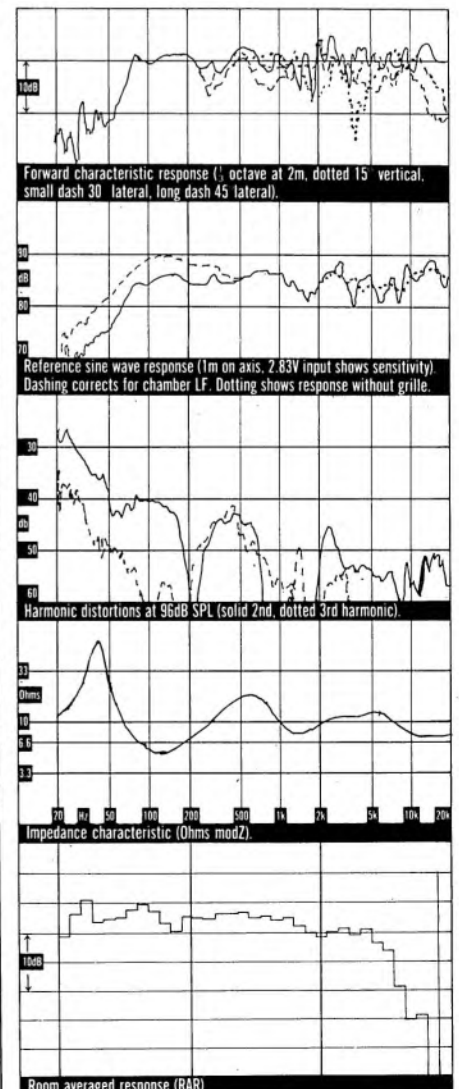
electrostatic clarity into the 90% of the vital musical information contained within its passband.

## CONCLUSIONS

The Sony *APM-66ES* is an intriguing and capable beast which has great midband stability and resolution. On the negative side, the bass plainly needs further taming for UK domestic environments (it's even excessive anechoically), and the treble sounds phasey.

## TEST RESULTS

Size (height x width x depth)	66 x 38 x 36.5cm
Recommended amplifier power	20 – 160 watts
Recommended placement	open space, low stands
Frequency response ( $\pm 3$ dB, 2m)	30Hz – 20kHz
Low frequency roll-off ( $-6$ dB/1m)	60Hz
Sensitivity (ref 2.83V/1W, Bohms; 1m)	89dB
Impedance characteristic (ease of drive)	average
Forward response uniformity	average
Typical price per pair inc VAT	£700

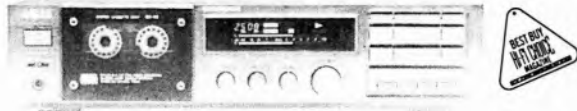


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# SPENDOR SP2

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RECOMMENDED



With the original *BC1* and its virtual successor the *SP1* well established, Spendor has been researching a less expensive 30 litre alternative for a few years now. The *SA2* came first, to some degree then eclipsed by the superior and cheaper *Prelude*. Now, developed from the *SP1* and sharing that fine model's 200mm polypropylene coned bass-mid unit, we have the *SP2*. The treble is handled by a special version of the established Scan *D2008* tweeter, a 19mm soft dome offering a superior performance, and in this case, ferro-fluid damped. Optimum positioning is in free space, on 40-50cm high stands.

The finely veneered enclosure is critically balanced by an optimum choice of chipboard grade and thickness, the panels bitumen damped internally. This is a reflex loaded design, tuned to 33Hz, and the ducted port is internally damped by a foam lining absorbing the higher resonant modes in the duct.

## LAB REPORT

Reference sensitivity was about average at 87dB while the axial frequency response showed a highly uniform characteristic,  $\pm 2.5$ dB 50Hz to 15kHz. The bass was well extended, reaching 45Hz,  $-6$ dB.

A minimum power rating of 15W was indicated, while the *SP2* coped with up to 150W peak programme, generating decent sound levels of 104dBA from a pair in a typical room. The impedance curve showed an easy load.

At 2 metres, the  $\pm 3$ dB response was a wide 48Hz to 20kHz, with the set of forward responses showing quite excellent unifor-

mity. The slightly down-tilted response is typical of subjectively well balanced compact box systems. In the listening room the speaker showed an even well balanced characteristic with good power down to 30Hz. Integration was very good through the frequency range.

At the high 96dB sound level, the distortion above 150Hz held to a moderate 0.4%, bar some minor clutter above 100Hz. With level reduced to 86dB, third harmonic averaged 0.25%, second 0.1%, both fine results.

## SOUND QUALITY

On test the *SP2* achieved a very high ranking position, only a little behind that of the *SP1*.

Stereo images were well focused, and showed very good width and depth. Well balanced tonally, the response sounded very uniform, though with a touch of 'softness' in the low bass despite good extension. In the upper mid, a hint of 'hardness' was noted, plus slight 'wispieness' in the high treble.

In the Spendor tradition, the *SP2* offered a highly articulate, detailed midrange. Dynamics were presented well, the system sounding open and relatively uncoloured. Just a touch of 'boxiness' was present in the low midrange, but even this was much less than usual.

## CONCLUSIONS

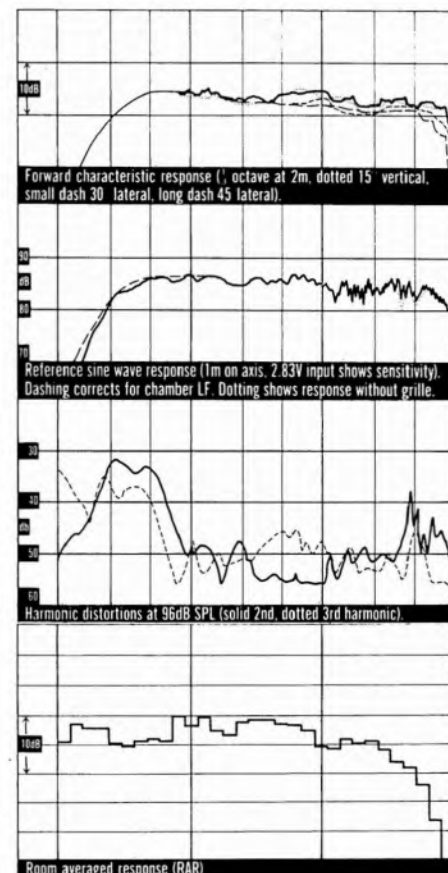
Spendor now have their compact 30 litre monitor. Offering great consistency and accuracy, it slots in neatly below the *SP1*, conceding little to that respected, larger model. With its natural, extended response, low coloration, wide dynamic range, easy amplifier loading and very fine stereo, the *SP2* is a class winner and may be strongly recommended.

## TEST RESULTS

Size (height x width x depth)	50 x 26 x 30cms
Recommended amplifier power	15 - 150W
Recommended placement	rigid open stands
Frequency response ( $\pm 3$ dB, 2m)	48Hz to 20kHz
Low frequency rolloff ( $-6$ dB/1m)	45Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	87dB/W
Approximate max sound level (pair at 2m)	104dBA
Impedance characteristic (ease of drive)	V good
Forward response uniformity	excellent
Typical price per pair inc VAT	£450

Reprinted from Issue No. 53

Reviewed by Martin Colloms



# SPICA TC-50

PRESENCE AUDIO, THE OLD POSTHOUSE, PLUMMERS PLAIN, HORSHAM, W. SUSSEX. TEL: (0403) 76777.



This American speaker comes to the UK with a strong reputation from its homeland, though inevitably crossing the Atlantic Ocean places a premium on the price. The consequences are a smallish two-unit sealed-box bookshelf model of unusual appearance and advanced engineering, selling at a rather hefty £595, but with the weight to match. And for an extra £200 you can have the *SE* version (not tested), substantially 'tweaked' in the UK to offer bi-wiring, stiffer cabinet and the like.

One key *Spica* feature is the wedge-shaped cabinet. This not only prevents the pernicious practice of superimposing a pot plant, or the eventual appearance of coffee cup rings, but has beneficial consequences for dissipating internal reflections, time-aligning the drivers, beefing up cabinet rigidity and distributing resonances in general. A worthwhile pay-off despite the constructional difficulties.

The baffle may look a bit tatty when the grille is removed, but that is immaterial when the grille and the baffle's 'acoustic blanket' work so very well in the system. Only the sides are veneered, but in every other respect build quality is good, with superior materials used - 20mm chipboard and MDF, long-haired wool internal absorption, multistrand hard-wired crossover etc. The drive units come from the Audax catalogue: a 140mm (eff.) treated paper cone bass/mid and 25mm doped soft fabric dome tweeter. Though the appearance suggests wall mounting, free space on high stands proved to be the correct option.

## LAB REPORT

Sensitivity is a little below today's average at 85dB/W, and this is further compromised by an impedance curve which is a little below 8 ohms nominal, so a decent amplifier is mandatory. The pay-off is that the bass is quite well extended, so in this respect *Spica* can mimic much larger loudspeakers, and still offers respectable loudness.

Measured on the correct axis, the basic response is pretty damn flat, but away from this prime direction there are broadband losses centred on 2kHz (the upper mid/lower treble 'presence' region) which will tend to 'deaden' the sound somewhat. This is reflected to a mild degree in the room-averaged response, but apart from a mild excess in the treble this is a most promising distribution. The bass-alignment can be seen to favour high stands in free space. In-room the response goes down well, to around 30Hz, despite the small enclosure volume.

Distortion was satisfactory enough, but by no means exceptional considering the price, while pair matching was rather disappointing, the range of variation covering  $\pm 1$ dB.

## SOUND QUALITY

Notwithstanding the diminutive dimensions, the *FM* panel were pretty impressed by the *TC-50* rating it 'good plus' and helping to justify the highish price. Most praised the bass evenness and tunefulness, finding the balance a touch bright, but the overall effect pleasantly crisp and airy. Dynamics, 'punch' and 'scale' were all present, though there was some mid and treble coarseness and 'smear'.

*MC's* panel was a little less enthusiastic, but still rated the *Spicas* good overall. There was further criticism of the treble quality and slight brightness, and a feeling that the bass lacked solid dynamic impact. Detail and clarity were good, and the soundstage was transparent with quite good depth and focus, but ultimately a feeling that something was lacking. (Perhaps the bi-wire option would turn the trick?)

## CONCLUSIONS

The *Spica* just merits recommendation despite its highish price. For those seeking a high quality compact, it is basically soundly engineered and built, and offers unusual bass extension for its size. However, it still looks as though it wants to be mounted flat against the wall, while acoustically preferring clear surroundings.

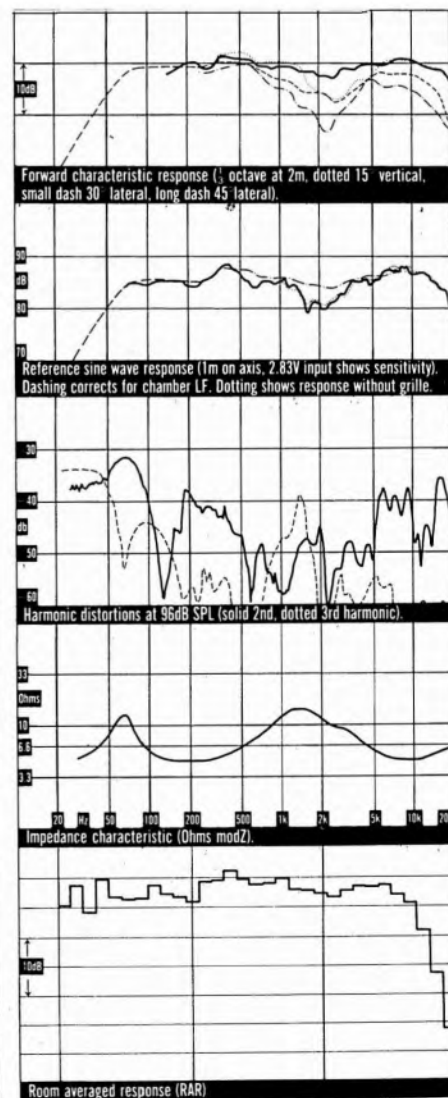
*Note. The agent can now offer a UK upgraded option with improved bracing and bi-wiring.*

## TEST RESULTS

Size (height x width x depth)	40 x 33 x 28 (max) cms
Recommended amplifier power	15 - 75W
Recommended placement	free space on high (50-60cms) stands
Frequency response ( $\pm 3$ dB, 2m)	60Hz - 20kHz
Low frequency rolloff ( $-6$ dB/1m)	48Hz
Sensitivity (ref 2.83V/1W, 8ohms, 1m)	85dB/W
Approximate max sound level (pair at 2m)	98.5dBA
Impedance characteristic (ease of drive)	below average
Forward response uniformity	above average
Typical price per pair inc VAT	£595

Reprinted from issue No. 53

Reviewed by Martin Colloms and Paul Messenger





# TANNOY ECLIPSE

TANNOY PRODUCTS LTD., THE BILTON CENTRE, CORONATION RD., CRESSEX IND. EST., HIGH WYCOMBE, BUCKS. TEL: (0494) 450606.

BEST BUY



The *Eclipse* is Tannoy's new £120 model. It is a typically painstaking design which is obviously built down to a price, but it's also full of subtle detail that proclaims the care that was taken in development.

This stand mounting design is intended for use clear of walls and other obstructions. The engineering is based around classic components, namely a 165mm plastic coned bass unit, a soft dome tweeter and a reflex port set into the rear panel. The bass unit features a hard centre cap (centre caps are a common source of problems at the upper end of the driver passband), and a new (unspecified) material for the inverted roll surround that is designed to give a 'tighter, more detailed' bass. The polyamide dome tweeter is ferrofluid cooled and its already odd shaped, sculpted mounting plate is mounted off centre to spread diffraction effects.

The insides of the *Eclipse* feature a light filling of polyester for sound absorbent purposes, and a well secured hard-wired crossover of simple design with tagged wiring to the drivers. Cabinetwork is quite simple, with 12 and 15mm chip covered in wood effect vinyl. The black front panel has gold lettering to tie in with the gold coloured surround used on both drivers. Good quality 4mm input terminals are fitted. The *Eclipse* is distinctive, even if it's not everybody's idea of pretty.

## LAB REPORT

The test samples were very closely pair matched, which is impressive at this price level. Predictably, the baffle grilles alter the

sound for the worse, measurably as well as audibly, so are best left off. Sensitivity is an ample 87dB, so power requirements are not too great; the impedance plot shows there are reactive components, but experiment suggests there's nothing that will give any half-decent amplifier much cause for concern.

Although flat for the most part, the frequency response plots do suggest that the tweeter level is a little high by a couple of dB, depending on orientation. Otherwise mid/top integration is good, only deteriorating badly at 45° off-axis laterally. The bass stays almost ruler flat down to about 90Hz, which is roughly where the port is tuned, and dies very rapidly thereafter at something close to the theoretical 24dB/octave. The room averaged response shows the fine bass and mid-band tonal balance of this design, along with rather more HF energy than usual.

## SOUND QUALITY

Lately, too many manufacturers seem determined to design loudspeakers that are not inconveniently revealing – making them easy to listen to with a wide spectrum of partnering equipment, instead of stretching performance standards as far as the constraints of price allow. Such loudspeakers will probably never offend, but are equally unlikely to stir the senses. The *Eclipse* isn't like this. It's a highly competent all rounder that comprehensively trounces most of the competition. And it *does* stir the senses.

Being at the low cost end of the market, there are inevitable practical limits to its accomplishment. Its top end is 'spitty' compared to some of the latest metal dome types. And the bass doesn't go especially deep, though it is firm and quick. The most important feature of any loudspeaker, however, is its midband, and this is where the Tannoy excels.

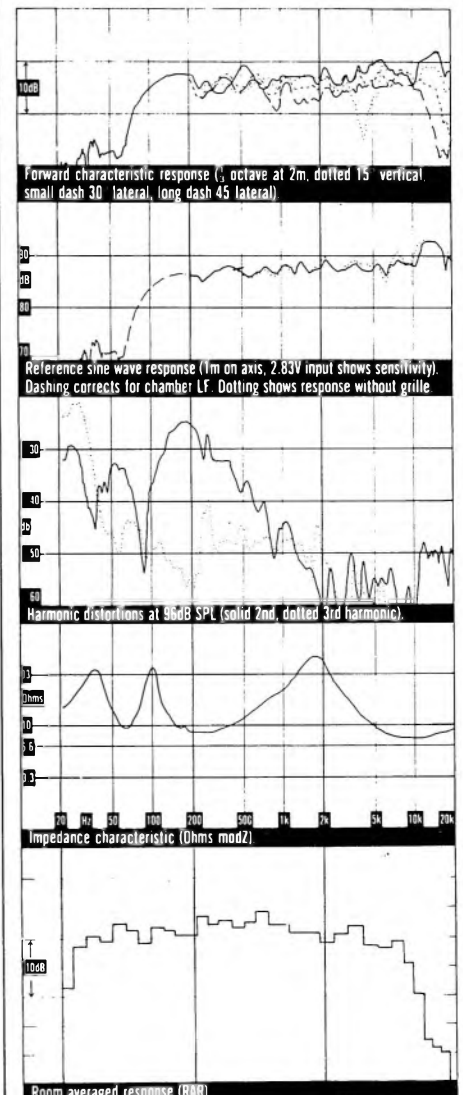
The *Eclipse* has a firm, well projected mid-band with abundant clarity, and just a hint of brightness. The effect is sometimes a touch too brightly lit, but it is nearly always possible to hear what's going on clearly. The panel was equally enthusiastic. Scoring well above average, it attracted comments like 'lively and musical', 'fast', 'spacious presentation with well resolved ambience and good sound-staging', the inevitable 'clear and sharp', and others in a similar vein.

## CONCLUSIONS

Clear, unequivocal Best Buy fodder, this is an excellent low cost design that allows ready access to the music despite eschewing the latest technology.

## TEST RESULTS

Size (height x width x depth)	38.8 x 22.6 x 21cm
Recommended amplifier power	20 – 90 watts
Recommended placement	semi open, on stands
Frequency response ( $\pm 3$ dB, 2m)	80Hz – 20kHz
Low frequency rolloff ( $-6$ dB/1m)	65Hz
Sensitivity (ref 2.83V/1W, 8ohms: 1m)	87dB/W
Impedance characteristic (ease of drive)	average
Forward response uniformity	average
Typical price per pair inc VAT	£120



# 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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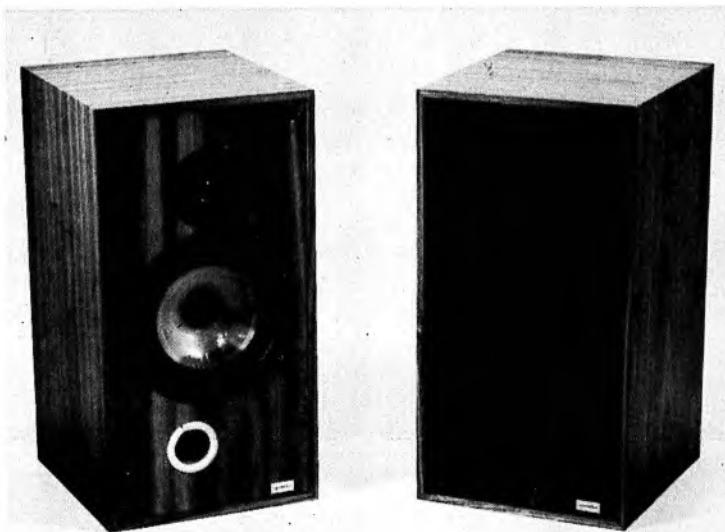
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# WHARFEDALE DELTA 30

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BEST BUY



This is just another formula product on the face of it, with very familiar looking ingredients. The box is covered in standard quality Eurobore black woodgrain vinyl wrap, and the black front panel has green graphics. The drive units are mounted without complications like rebating or gaskets, and so loosely that I was able to tighten the mounting screws a full 360 degrees without distorting the thin chipboard structure – which incidentally could be very easily stripped by over enthusiastic screw tightening.

A simple capacitor/inductor network attached to an edge mounted and potentially vulnerable PC board serves as a crossover, the wiring being normal commercial grade and tagged. Spring connectors are fitted at the rear, and will accept 4mm plugs at a pinch. The only filling is a rather nominal one of acoustic wadding.

Though not an inspiring start, this is not necessarily disastrous in view of the price. The drive units look satisfactory, consisting of a proprietary small soft dome tweeter and a pulp cone bass unit of adequate build. The port is sited at the rear, and Wharfedale recommend positioning near a wall. Unusually, a range of grilles are available in several colours, listed at £9.95 a pair including postage.

## LAB REPORT

The measurements would do credit to a much more costly design. Pair matching isn't perfect, but the differences were small, while the grille covers had a very localised influence on the measurements – almost entirely

above 8kHz. Sensitivity is a fairly high 88.5dB/W, and power handling is subjectively reasonable. Distortion levels attributable to magnetic circuit linearity or saturation effects are acceptable enough, if not exactly low. The *Delta 30* represents a moderate load to partnering amplifiers – it won't embarrass anything reasonable, and you won't usually need too many watts.

Forward response uniformity is close to the state of the art regardless of price, only lack of true bass telling against the model in the final analysis. The off-axis lateral output looks considerably more erratic, and this is reflected in the room averaged response too, but the essential balance is not badly disturbed below 45°. Measured from 15° above the main axis, the crossover notch is very deep and wide, which underlines the importance of raising the speakers sufficiently so that the tweeters are at ear level.

## SOUND QUALITY

The list of adjectives on the score sheets from the blind panel tests was more than usually hedged around with qualifiers like 'quite' and 'some' and 'pretty'. The only things this loudspeaker is *very*, is *very* cheap and *very* good value for money; the latter of course only presumes *quite* good sound in the light of the former; I hope that was *fairly* clear.

The test samples were too ready to rattle at certain frequencies. Aside from this, there does appear to be an upper midband resonance (possibly a sample fault) which was just occasionally excited. The only other problem, if it can be called that, is an inability to accept high input levels without audible compression. Even so, clean results were obtained in a normal size room up to an average of about 92dBa (peaking around 100dBa with the program material used).

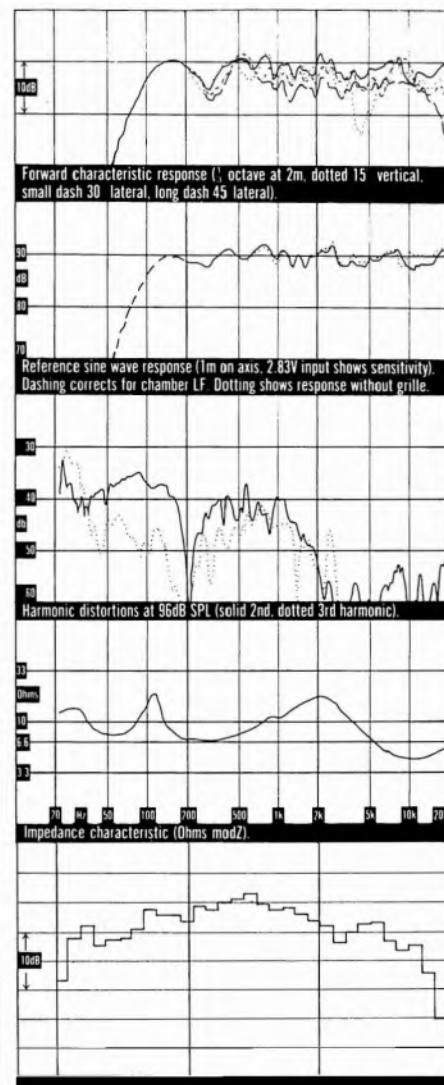
Within the overall limitations described – and the panel's views were consistent with what follows – the *Delta 30* has an open, unmasked quality which provided much clearer access to the music than many more expensive models achieve. Transient ability was both good and well integrated into the midband, and tonal colours were well differentiated. At relatively low levels this is one of the few small loudspeakers that can imitate a piano successfully; OK, *fairly* successfully.

## CONCLUSIONS

Best Buy – and one of very few cheap loudspeakers worth buying, the *Delta 30* is a marvellously articulate and musical design. If only construction quality can be improved just a little without upsetting the price too much...

## TEST RESULTS

Size (height x width x depth)	37.9 x 20 x 16.9cm
Recommended amplifier power	20 – 75 watts
Recommended placement	near wall, on high stands
Frequency response ( $\pm 3dB$ , 2m)	80Hz – 20kHz
Low frequency rolloff ( $-6dB/1m$ )	80Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	88.5dB
Impedance characteristic (ease of drive)	average
Forward response uniformity	excellent
Typical price per pair inc VAT	£80



# WHARFEDALE DIAMOND III

WHARFEDALE LOUDSPEAKERS LTD., SANDLEAS WAY, CROSSGATES, LEEDS LS15 8AL. TEL: (0532) 601222



The Wharfedale *Diamond*, the 5.2 litre loudspeaker in a pint pot, is the model that became a cult, and surely the best selling Wharfedale since *Linton* days. (Remember the *Linton*? You probably have a few pairs in your attic right now...)

The *Diamond* has been painstakingly refined over the years, but the pressure to improve further increased markedly a year or so back when Goodmans introduced a sincere form of flattery called the *Maxim*. So for the *Mk III*, Wharfedale have done the decent thing and replaced the cheap Audax dome/cone tweeter with their in-house small plastic dome, a much higher quality and more civilised unit altogether. Unfortunately this seems to have been the right solution to the wrong problem...

Bass and (more realistically) midrange is pumped out by the same small, long throw, polypropylene coned, large magnet device used all along. The bass unit is rolled in *via* a 5th order high pass filter (24dB/oct acoustic and mechanical plus 6dB/oct electrical *via* a series capacitor), but at the tweeter crossover point there's just a 3rd order network for the tweeter itself. The bass unit takes care of itself.

The electrical system described is exactly as for the *Super Diamond* (that's the one with the wood veneer enclosure), whilst the rude vinyl wrap enclosure and a tasteless cream coloured baffle is pure *Diamond II*. The rest of the story you must know: a tiny rear vented enclosure, unbraced or damped and only minimally lined but stiff by virtue of its size. Recommended placement is near a

rear wall, and tall high grade stands are a practical necessity (even if they are disproportionately costly). It's best to remove the rather obstructive cloth and frame covers too. Shelf mounting usually leaves *Diamonds* sounding boxy and muddled.

## LAB REPORT

The response shape is quite strongly shaped, ostensibly to take account of the acoustic effect of wall loading. In practice it is extremely mid-forward even taking the wall effect into account, as the room averaged response demonstrates. Sensitivity, which measures 86.5dB based on midband output, is subjectively rather less due to the loss of output at the frequency extremes. The output dips a little in the two octaves above 2kHz (roughly), but at the lower end of the audio spectrum bass is better extended than expected for the enclosure size. Pair matching is excellent, though it's all but essential to remove the grille for good results. Distortion levels are satisfactory.

The axial plots reveals a stepped response, with the step appearing around 350Hz. Bass/tweeter integration is excellent, and barely alters off-axis except for the 15° above measuring axis. The electrical load is a fairly straightforward one from an amplifier perspective, while power handling is surprisingly good – powerful amplifiers are a perfectly feasible match, providing the user uses commonsense.

## SOUND QUALITY

However impressive the *Diamond* may seem for such a small box, it's sobering to listen to it in the company of the other models in this project, where the lack of tonal neutrality, plus midband congestion and compressed dynamics were all too obvious. The recent surge of interest in low cost loudspeakers by a number of manufacturers has also done its part to leave the *Diamond* high and dry – even this latest improved version. Wharfedale themselves are one of the guilty parties – their very own *Delta 30* eats the *Diamond* for breakfast, lunch and tea.

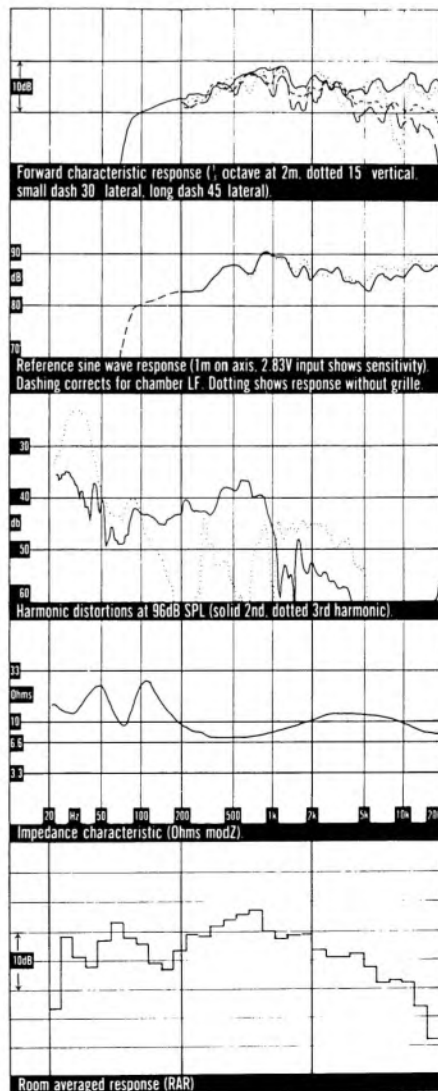
Not being in a position to see the *Diamond* during the panel tests meant that panel members were unable to make allowances for size, and the *Diamond* duly received third lowest scores of the sessions (well below the still lower priced *Delta 30* by the way). Comments like 'Piano sounds rather murky... congestion, loss of clarity in climaxes (and) lack of refinement... quacky, wooden box effect... nasal violins, 'cuppy' voice' were all too common. Certain discrete bands of frequencies sounded clear and well focused, but the nasal, quacky qualities noted ruled the roost elsewhere. The *Diamond* sounded infuriatingly inconsistent.

## CONCLUSIONS

The *Diamond* variously loses information or muddles it. Bass is shallow but warm, and this helps it sound impressively large in scale. But the midband is masked and coloured and the cleaned up treble can't really do much to help.

## TEST RESULTS

Size (height x width x depth)	24 x 18.5 x 20.5cm
Recommended amplifier power	30 – 100 watts
Recommended placement	near wall, stands
Frequency response ( $\pm 3dB$ , 2m)	80Hz – 20kHz
Low frequency rolloff ( $-6dB/1m$ )	75Hz
Sensitivity (ref 2.83V/1W, Bohms; 1m)	86.5dB
Impedance characteristic (ease of drive)	average
Forward response uniformity	below average
Typical price per pair inc VAT	£100



# WHARFEDALE 510.2

WHARFEDALE LOUDSPEAKERS LTD., SANDLEAS WAY, CROSSGATES, LEEDS LS15 8AL. TEL: (0532) 601222



Given the international reputation of the British loudspeaker manufacturing industry, it can come as a shock to discover just how conservative it can be. One area traditionally neglected on the grounds that it is hard to do right is that of the medium size 3-way loudspeaker – where the decision isn't forced on the designer by the sheer size of the enclosure concerned.

The Wharfedale 510 is one of relatively few models to pursue this line. Very much a 'designer' product – the witty, urbane Richard Lee being the guilty party – the original 510 had three drivers, not to extend bandwidth, but simply in an attempt to do the job better. The specific improvements claimed for the current version are improved distribution, especially in the midrange, and a clearer midband. Big bass/mid drivers get very directional at the top end of their passband, which has consequences for the way the speaker interfaces with the listening room, and therefore on image quality and the size and nature of the listening window. Using a specialised midrange driver gets over this, and also should mean that midband transient performances will be better. Although the crossover network itself becomes necessarily much more complex, the crossover points can be better out of harm's way, in this case around 1kHz and 6kHz.

The series 2 version of the 510 incorporates a number of detail refinements, mostly to the bass and midrange units, following experience with the first version. Both cone drivers use a textured plastic material

related to polypropylene. The tweeter is Wharfedale's aluminium dome, positioned between the other two units. Proprietary ring-build technology is used, and the units are fixed into the excellent rear-vented veneered enclosures using Wharfedale's bayonet system – there are no fixing screws in sight. The 510.2 is best used fairly close to a rear wall, and on medium to tall rigid, open stands.

## LAB REPORT

Like many other Wharfedales, the 510.2 has a somewhat mid-dominant response, though wall proximity is designed to 'fill in the gaps' in the bass. That's the theory: in practice the deep bass is over-cooked, and there's a cancellation notch in the upper bass (that's the bit you hear). The room averaged response also suggests that output is gently declining above around 1kHz, which is surprising given that off-axis distribution is extremely wide and uniform laterally, even at 45°. Only when measured from above the tweeter line do some quite severe notches appear, one at 1kHz and another between 2-6kHz.

2nd and 3rd harmonic distortion levels are rather high at 96dB, but disproportionately better at 86dB. The grilles have quite a strong influence on the sound and are best removed for listening. Pair matching is within about 1dB.

## SOUND QUALITY

On the whole, the panel started out liking this speaker, but reactions had changed somewhat by the time the session was concluded. The sound had become, in the words of one listener: 'progressively harder and more fatiguing'. Another noted a 'cupped hands' effect on vocals, and complaints about a bright or detached top which lacked resolution were also common: 'slightly sharp and spitty', was one comment.

My own, much more extended 'hands on' listening led to complementary findings. The 510 is not drastically coloured, except for that 'cupped hands' effect which can be quite striking. But it does have an oddly monochromatic quality. There is also a thinness and wispieness in the treble that might be mistaken for a characteristic of the metal tweeter, but which I strongly suspect is an integration problem between mid and top.

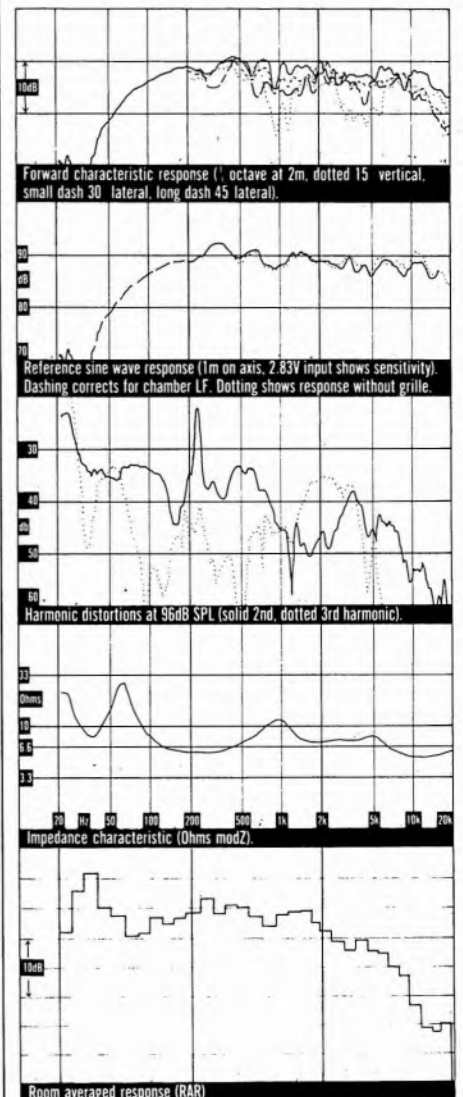
The bass end sounds controlled almost to a fault: it doesn't overhang or boom, but it doesn't really breathe naturally either – the optimum balance is yet to be found, even when used close to a wall. I noticed also that secondary output from side walls was unusually 'honky' in character, and was left wondering-if enclosure behaviour should be investigated further, though this could also be a function of the wider than usual distribution.

## CONCLUSIONS

If this speaker benefits in some respects from the 3-driver configuration, this advantage seems to have been largely masked by other factors. Ultimately, the 502 sounds rather ungracious and monochromatic.

## TEST RESULTS

Size (height x width x depth)	61.5 x 28 x 29.6cm
Recommended amplifier power	20 – 150 watts
Recommended placement	near wall, high stands
Frequency response ( $\pm 3$ dB, 2m)	85Hz – 20kHz
Low frequency rolloff ( $-6$ dB/1m)	50Hz
Sensitivity (ref 2.83V/1W, 8ohms; 1m)	89dB
Impedance characteristic (ease of drive)	below average
Forward response uniformity	average
Typical price per pair inc VAT	£299



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# LOUDSPEAKERS TECH TALK

*Listening and lab test procedures covering these latest reviews.*

A unique strength of *Hi-Fi Choice's* loudspeaker tests over the years has been their consistent methodology. Within practical limits, the aim was to continue in the same vein despite the change in authorship, so as not to compromise the 'portability' of conclusions from previous editions.

This didn't prove too much of a problem with the technical tests, which were done in almost precisely the same manner as on previous occasions, even using the same anechoic test chamber. Although the room itself is different, the room averaged responses were also taken in a similar way, using the same spectrum analyser and microphones. Interestingly, and by happy coincidence, a test run using Celestion *SL6* samples that had been used in the past to calibrate MC's room averaged responses, produced remarkably similar results in AG's room. Unlikely it may be but this is positive evidence that the old and new in-room responses should show reasonable correspondance.

The room used in AG's tests was built in the 1910s, has solid, brick built walls, a tall ceiling and suspended floor. The loudspeakers were generally positioned in the mouth of the wide bay that extends over much of the room width. The room is fully carpeted and furnished. Acoustics lean a little on the dry and analytical side, as long as the listener isn't too close to the wall opposite the bay. Full length curtains were closed behind the loudspeaker to assist the measurement process, though the sound is subjectively preferred with them left open.

This room was used both for 'blind' panel and for personal (hands-on) listening. A second room was also pressed into service to provide some variety and to attempt to quantify room interactions by altering this element in the overall equation. The second room is a little larger, more rectangular in shape (the loudspeakers were pointed down its length, giving an increased listening distance into the bargain), but with similar height ceilings and construction. Unlike

the main listening room, however, this is far from a 'single speaker' room, accommodating TV and video, computer, radio and other appliances.

Paradoxically, this room tends to deliver a consistently good sound from most loudspeakers, without smothering their differences.

To a limited extent, the use of two contrasting listening rooms helps make up for the two listening panels used for the last loudspeaker edition of *Choice*. On this occasion a single panel was used, with members drawn from the following: Paul Crook, Ivor Humphries, James Michael Hughes, Robert King and Dan Houston. Panel testing was done much as in previous years, but using just four musical selections per loudspeaker, in line with the slightly reduced overall emphasis on panel testing. The 'hands on' listening element was increased, and took up a great deal of the available time.

Equipment used throughout the tests included Roksan and Michell *Gyrodec* turntables, mainly with Rega arm and Koetsu *Rosewood Signature* and Ortofon *MC2000* cartridges; various CD players including a Kenwood *DP-1100SG*; DNM and Musical Fidelity *A370* power amplifier. Wiring was mainly solid core, but to minimise losses due to resistance the new Mission solid core was used in 2meter lengths for loudspeaker wiring, doubled up where bi-wiring was allowed. (Stranded cables, mainly Naim, were used to crosscheck some conclusions.) DNM interconnect cable was used between pre- and power amps.

Music ranged widely over classical and rock *genres*, and included extracts from the following: On CD: Mahler *Symphony No 1 & 4* (Inbal etc, Denon), Stravinsky *Soldier's Tale* (Denon), Clarinet Instrumental Works (Gervase de Peyer etc., Chandos), Beethoven *Piano Concerto 1 & 4* (Perahia/ Concertgebouw, CBS), Brahms *German Requiem* (Previn/RPO, Teldec), Bob Dylan *Blonde on Blonde* (CBS), Suzanne Vega *Solitude Standing* (A&M). On LP: Britten *Four Sea Interludes* (Previn/LSO, EMI), Various harpsichord pieces (Jonathan

Woods, Decca), Bartok & Ravel piano concertos (Katchen/ Kertesz/LSO, Decca), Steely Dan *Gauche* (MCA), Joni Mitchell *Dog eat Dog* (Geffen) and more.

Acknowledgements and thanks to Chris Bryant for help with the lab testing, Martin Colloms for advice, and Robert King for general assistance.

## LAB TEST PROGRAMME

For the fifth successive edition the Cambridge Electroacoustics anechoic chamber was used. Despite the comparatively large size of this facility, a degree of low frequency correction is still desirable to approximate true anechoic conditions. Such correction has been applied to both the 1m (reference) and 2m (forward characteristic) response traces.

### The Characteristic Forward Response (2m)

This primary measurement presents visually the forward radiating character of the loudspeaker, over a sensible forward solid angle and throughout the audible frequency range.

The uniformity of response traces taken on and around the main axis represent a crucial aspect of speaker performance, which determines whether good stereo imaging is possible, and whether the speaker will sound markedly different on- and off-axis.

### Reference curve

All loudspeakers (both left- and right-hand models) were measured using sine wave excitation at 1 metre. This provides an accurate representation of the low frequency response. Pair matching can be checked by over-laying the curves of left- and right-handed speakers, and the measurement also sets a reference level against which the distortion can be scaled and the quoted lab sensitivity established.

### Listening room responses

Naturally specific to the room used during the listening test, the computer-averaged in-room response has evolved into one of

the most powerful predictors of subjective performance. The intention is to create a plot of the average forward sound energy arriving at the listening area.

The near ideal speaker may be expected to run more or less flat up to 5kHz; beyond this the response should gradually fall away. Sharper changes in slope will correspond to irregularities in response or directivity, and are therefore suspicious.

### Distortion

Using a swept tracking filter, second and third harmonic distortions were plotted at 96dB.

It is generally accepted that third harmonic distortion is more aurally intrusive than second, so we pay particular attention to the level of third order effects in the midband, where the value should be significantly below 1%. Higher figures are permissible below 100Hz – say 2%, with up to 5% satisfactory levels under 50Hz.

Second harmonic distortion values of perhaps double the level of third may be considered acceptable.

### Impedance

The impedance curves were plotted for all loudspeakers, while the phase angle was monitored and 'worst case' combinations of phase and impedance have been recorded.

### Sensitivity and power rating

From the reference curve, a mean midband sensitivity figure was recorded, corresponding to the sound pressure at 1 metre from the enclosure when energised by 2.83V (sine). A nominal 8ohms draws 1 watt from this voltage, and lower impedance draws more power, on a *pro rata* basis.

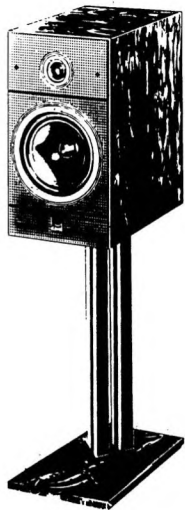
From the power handling, sensitivity and impedance data, a recommendation can thus be made concerning the loudspeaker's minimum and maximum amplifier power rating (per channel, 8ohms). It should be appreciated that this is only a recommendation, and will be modified in practice by individual taste; *ie* a requirement for low or high listening levels as well as by the size and acoustics of the particular listening room.

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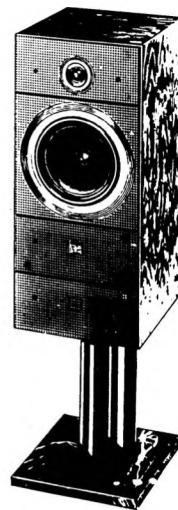
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# LOUDSPEAKERS: CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

The task of trying to pin down trends has been complicated on this occasion by the change in authorship from MC/PM to myself. On the whole we tend to agree much more than we disagree, but when trying to assess a loudspeaker there are inevitable differences in emphasis if not in substance, and I've made no attempt to conceal these in the reviews.

A particular difficulty arises where Recommendations have been brought forward from previous issues. On consideration I decided not to alter the rankings except where I felt there was an overwhelming reason so to do.

On the whole, the methods and criteria that were brought to bear in this *Loudspeakers* project should not prove too much of a culture shock to *Hi-Fi Choice's* regular followers. However, readers may note a rather greater reluctance to recognise virtue in the classic low coloration/low dynamics designs (exemplified by BBC inspired monitors like the *LS3/5a* – not covered here but see *Ariston QLN1* review), and an equivalently slightly greater tolerance of mild sonic shortcomings of an essentially cosmetic nature (mild tonal imbalance, for example), provided such attributes as dynamics and resolution don't suffer.

This last point has wider and more philosophical significance. Over-zealous attitudes towards eliminating all such cosmetic ailments has arguably been the most damaging influence on loudspeaker design in the past decade or two. It has led to design techniques whose primary ends are negative: that is, the prevention of misbehaviour, rather than the positive promotion of good behaviour. The result of this 'play safe' mentality has been a generation of low coloration designs that typically feature heavy, lossy drive unit cones and over-complex crossovers.

It is in this context that the recent trend towards metal dome drive units (especially tweeters) should be considered. The fact that the best of these drivers

tends to be smoother and more linear than soft dome units is useful enough. But it's probably more important that the best of them are inherently less lossy in a damping sense, and by implication capable of higher resolution.

Having said that, some of the metal dome units currently in use sound worse than the soft domes they supplant. And even when this isn't the case, they can be difficult to integrate into existing, familiar designs, and rarely respond fully to the techniques designers know and love. Metal domes don't roll away out of band as conveniently and as smoothly as the best soft dome units, and they are often rather prone to high-Q out of band resonances, both factors that tend to demand rather brutal crossover techniques.

On another tack it is possible to explain the disproportionately good showing of the best very low cost loudspeakers by noting their extreme simplicity. Drivers with low mass diaphragms are used to promote efficiency and/or keep motor (magnet) costs down; lightweight enclosures don't smear much because they don't store much energy; simple crossovers allow the amplifier more direct access to the drive units. These things are the essence of good, minimalist design. By contrast, it often seems that more expensive loudspeakers need to live down the burden of their higher cost and more elaborate construction. OK, I exaggerate, but only to make the point – and only a little.

## BEST BUYS & RECOMMENDATIONS

The 30 or so new reviews in this issue build on a background of well over a hundred previously tested models which are still available – and hopefully still manufactured to the same specifications. The change in authorship on this occasion naturally makes it more difficult than usual to maintain close continuity with the previous projects, so the editor has just had to do his best to correlate standards and opinions between

the different reviewers involved.

The latest project has thrown up some four new additions to our Best Buy accolade, plus eight new Recommended models. This is a somewhat smaller percentage hit rate than last time around, indicating certainly that AG is no softy. But the difference is also attributable to the lower average price of this group, since we have held back reviews of some of the more expensive models for next month's special 'high end' edition *The Collection*.

## UNDER £100

Price constraints mean that these models tend to be miniatures or near-miniatures, and benefit from mounting near a rear wall. In many cases wall brackets will be a cost effective alternative to rigid floor stands, as these little boxes often work better at or above seated listener head height.

This edition's new 'budget' Best Buy is the £80 **Wharfedale Delta 30**. It is classic material for this accolade, corresponding exactly to the description of good cheap minimalist hi-fi given above. Build quality borders on shoddiness, but it is saved from oblivion by three factors: it's cheap; it has a civilised tweeter (rare below £100); and it was designed by someone who knew what they were listening for.

Best buy ratings for the £70 **Goodmans Maxim II**, and £100 **Sony APM10** continue from previous editions.

The *Maxim* is the true miniature which has persistently succeeded in our tests, where its more fashionable Wharfedale *Diamond* rival has never shone (on this occasion rather to AG's surprise). But bear in mind that no miniature can really rival the slightly bigger models that are available at only marginally higher prices.

Sony's UK-made £100 *APM10* more than comfortably made the grade subjectively in the 1987 listening tests, though we couldn't put this model through our own lab tests for logistic reasons, and were forced to rely on Sony's supplied measurements which are not strictly comparable.

Recommended budget models all come from previous test programmes, and include the £90 **Mordaunt-Short MS10II** (a previous Best Buy but not one of AG's favourite speakers), the **Royd A7II** (£99), **Goodmans Point 3** (£90) and **Royd A25** (£99), this last somewhat larger than its rivals).

## £100-£200

Most loudspeakers in this highly popular and competitive price band are 'bookshelf' size 'compacts' – though purpose-built stand supports will invariably make them sound better than any bookshelf. A number will again benefit from some rear wall bass assistance, but some are aligned to work out in free space, with consequent benefits in coloration (sometimes at the expense of sensitivity and power handling).

There are two new Best Buys in this sector. The £120 **Tannoy Eclipse's** simple informative clarity more than makes up for comparatively prosaic technology – an object lesson to anyone who believes that good loudspeakers are simply created by adopting the currently fashionable technical fix.

Now distributed by Rotel UK, at keener prices than formerly, the distinctively styled £130 **Infinity RS2000** is sonically perhaps a little bright and lightweight, but this friendly sounding model is an excellent small loudspeaker and very good value for money.

Continuing Best Buys from earlier projects include the classical/CD oriented **Rotel RL850 II** (£120), the lively **Mission 70** (£110) and the **Tannoy Mercury II** (£160), assuming that the latter's recent cosmetic update has not adversely affected its sonic performance.

A new model to achieve Recommended status is the £120 **B&W DM100i**. Son of a most illustrious predecessor, this is yet another highly competent and practical design from the Worthing company. That said, it is still an update on a now somewhat elderly concept, and falls a little short of the best

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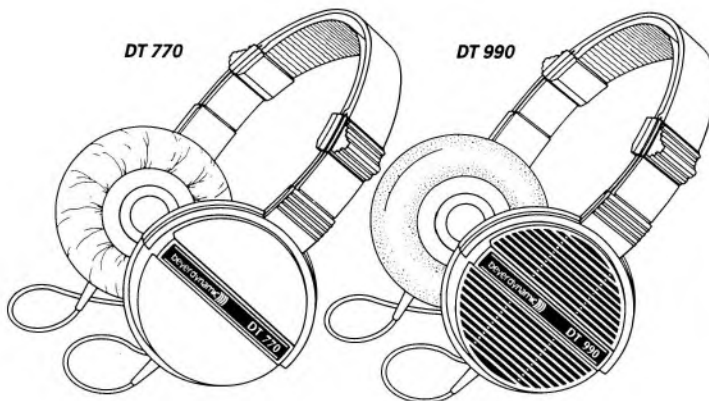
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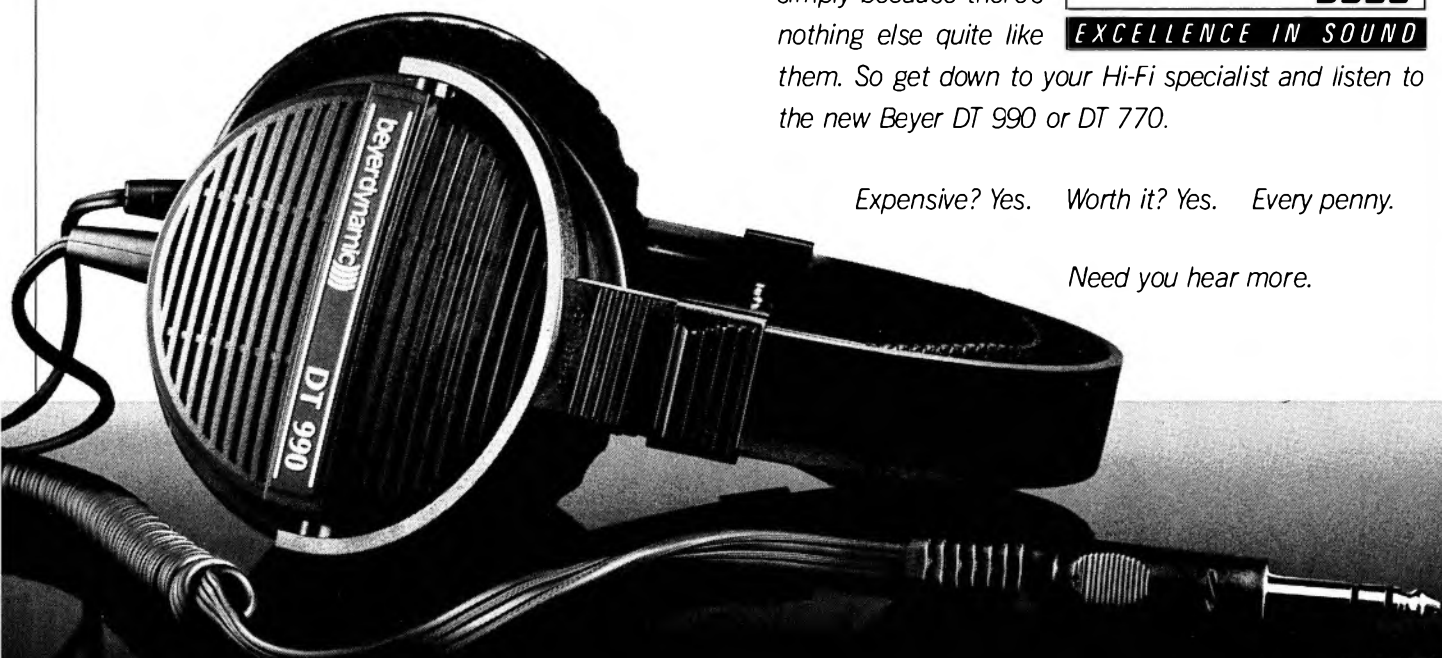
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Also joining the Recommended ranks, the **Celestion DL8** (£199) is a model which handsomely ensorces the trend towards metal tweeter diaphragms, and provides good bass extension besides, though a touch of 'boxiness' suggests the cabinet could be better controlled.

In the light of this issue's reassessment of the £125 **JPW P1**, we have decided to place both this and its £145 **AP2** brother in the Recommended category. Both provide plenty of well finished box for the money, while our sound quality assessments have varied somewhat over the years, comfortably justifying Recommendation but not, on balance, a full Best Buy.

There are plenty of other Recommended models – but again these come from earlier projects. Medium size models benefitting from some rear wall assistance include the **Mission 700LE** (£140), **Acoustic Research AR22BX** (£200), **Monitor Audio R252** (£159), **Rogers LS2** (£170), **Castle Durham** (189) and **Heybrook HB1R** (£189). Small models which demand such assistance are the **Wharfedale 504** (£130) and **Mordaunt-Short MS100** (£189). The **Castle Clyde** (£139) prefers free space siting.

### £200-£300

The **Rogers LS6** (£240) has been the sole occupant of this Best Buy price category for some time, and continues to deserve this endorsement even though a fresh assessment is now perhaps overdue.

However, for this edition it is joined by the **Monitor Audio R352/MD** (£299), at AG's specific request and after careful consideration by MC and PM. There was great confusion over which MA model was which and at what price when we were finalising the last *Loudspeakers* issue, so we erred on the cautious side. But this is certainly a lot of speaker for the money, and clearly the stand out model in Monitor Audio's competitive range.

The **Musical Fidelity MC-2** (£299) is perhaps even more exciting (it certainly tries too hard to look that way), and could well add the vital spark to wake up this somewhat sluggish area of the marketplace. It is meticulously designed to give a marvellously well integrated, coherent and 'fast' sound, and is a persuasive advocate of the metal dome approach to tweeter construction.

There are many Recommended survivors from earlier projects, in a price band where product cycles tend to be much longer than at the fiercely contended budget end of the market: **Castle Pembroke** (£289), **JPW AP3** (£210), **Monitor Audio R700MD** (£270), **Sony APM22ES** (£250).

We also understand that the venerable but still popular **BBC LS3/5A** – surely in the running for a longest design in production award – has recently been 'tweaked' by BBC engineers to good effect. We haven't checked recent samples, and were beginning to feel that Recommendation was becoming marginal, but reports on the latest production are encouraging.

### £300-£1,000

Above £300 we withdraw the Best Buy category with its emphasis on value for money, but there are many highly recommended models nonetheless. These fully justify their highish prices in the context of a decent hi-fi system, but in fact show greater variation between models than is found at lower prices. Many offer a 'bi-wiring' option, and this should certainly be taken up if available.

If it wasn't a loudspeaker, the **Ariston QLN1** (£350) might be called a 'sweetie'. It is a loudspeaker though, and an unkind alternative label might be to call it an *LS3/5A* clone. In fact it's larger than the diminutive BBC monitor, with more bass, much better dynamics and maximum level capability – but very much the same sweet, natural tonal quality and 3-D imagery. At its newly reduced price, it's also surprisingly good value, but efficiency is low and power demands consequently high.

The **KEF 102** (£335) also impressed, in this case for its less euphonic but very natural quality and 'big box' sound achieved partly by the adoption of *Kube* hybrid active/passive crossover technology. But KEF may have made a tactical mistake in giving this their smallest *Kube*-equipped speaker the simplest and lowest spec *Kube*. Surely quality at this point is paramount – a fact implicitly recognised in the design and construction of the loudspeaker itself.

Two designs with rather greater physical dimensions achieved recommended status – namely the £380 **Monitor Audio R852/MD** and the £399 **B&W DM1600**. The Monitor Audio is one of the first to use the Elac metal dome tweeter – indeed they co-sponsored its

development – and the loudspeaker they have built around it is crisp, detailed and unusual in appearance due to the unique Kenyan Black veneer. The B&W has a modern but arguably less interesting appearance, and also supports a metal dome tweeter – not an Elac and certainly not a success. Elaborate internal enclosure design along with decent design elsewhere however make this so-called *Matrix* model a detailed and reasonably refined package.

The most impressive new all-round package, however, is the **Musical Fidelity MC-4**, the larger brother to the *MC-2*, yet another Elac metal dome user, and an unusually elaborate and beautifully constructed loudspeaker. The sound is refined even beyond its £499 price tag, but where other market speakers may content themselves with refinement and polish, this one adds the *MC-2*'s attributes of superb resolution, first class control, explicit dynamics and almost holographic stereo. Bass extension is slightly less than might be expected, however, and the top end might sound a little more obvious than some would like.

The other real find this time round is much more difficult to sum up. The **Acoustic Energy AE1** is a revolutionary £700 miniature which boasts a proprietary laminated metal cone bass and metal dome tweeter (an extensively re-engineered variant of the Elac). The market for fine £700 miniatures is inevitably limited, but used with combination with *Celestion SL-700* stands (which appear to be surprisingly well matched) it will absorb prodigious amounts of power and play at volume levels, and with a fullness and precision in the lower registers, that would not normally be credited. Yet this is the most civilised of loudspeakers, with an exquisite translucency and precision in the midband that is often associated – quite wrongly – only with electrostatics. The *AE1* is the state of the art miniature.

Ongoing Recommendations include the compact **Celestion SL6S** (£350), **Technics RX50** (£500), **B&W Matrix 1E** (£595) and **Spica TC-50** (£595). Larger models – no less sensitive to careful stand mounting and siting – include the **Mission Argonaut** (£700), **Rogers LS7t** (£360), **Harbeth HLIV** (£525), **KEF 104/2** (£806, and better used *without* the optional *Kube* equaliser), **Spendor SP2** (£450) and **SP1** (£680), **JBL 60T** (£399), and **Yamaha NS1000**

(£900).

A number of other loudspeakers have been revised since our last tests, but their track record from the past suggest they should not be overlooked: **Rogers Studio 1M** (£500), **Spendor Prelude** (£320), **Celestion SL600** (£700), **Linn Sara** (£660), **AR44BX** (£350).

### OVER £1,000

The next (July) edition of *Choice* is *The Collection*, which concentrates exclusively on 'high end' components. We are already in the process of compiling a number of new loudspeaker reviews in the £600+ sector of the market, so a full revision of this section is inappropriate until next month's issue. In the meantime, our extant findings will suffice, discussions between the various reviewers suggesting only minor alterations.

Of the two £1,000+ models tested in the last issue, the £1,150 **Mordaunt-Short MS442** clearly made the grade, being nearly all things to all men and neat in appearance to boot. The £1,285 **Roksan Darius** remains fascinating but visually obtrusive and sonically very controversial (*ie* good in parts); we understand some revisions to the latter may have taken place.

A number of models were included in our 1987 *Collection*. Each is Recommended in its way, but none is universal in application, so it is vital to take into account other system components, room size and shape, as well as personal preferences.

Grouping such distinct individuals into any logical order is difficult.

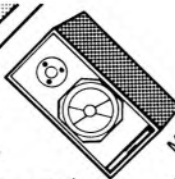
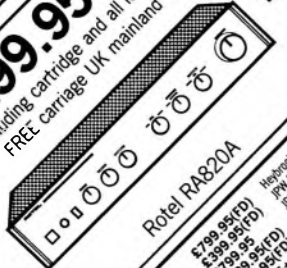
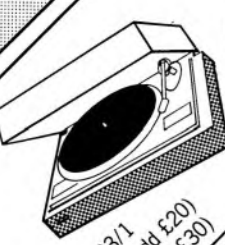
The **Linn Isobarik D/PMS** (£1,695), **Naim SBL** (£1,100), and **Tannoy Westminster** (£3,500) are all designed for rear wall siting, and provide fine dynamic performance while sacrificing something in stereo imaging. The Tannoy in particular prefers a large room – as do the freestanding **KEF R107** (£1,890), **Spendor SA3** (£1,400).

The **Quad ESL63** (£1,458), **Magneplanar MG3a** (£2,650), and **Apogee Scintilla** (£4,990) are three panel designs that have their own particular subtlety and transparency – and some disadvantages as well of course. The dipole-bass **Celestion 6000** (£1,470) maybe fits in here, or maybe alongside the dynamics, as it combines some of the characteristics of each. Visually it doesn't fit anywhere . . .



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Sound Waves, Macclesfield, 0625-615740  
Spaldings, Croydon, 01-654-1231  
Standens, Tonbridge, 0732-353540  
Subjective Audio, London, N13, 01-886-2650  
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Unilef Hi-Fi, New Malden, 01-942-9567  
University Audio, Cambridge, 0223-354237  
Upton Electronics, Paignton, 0803-551329  
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# CHOOSING AND USING . . . INTERCONNECTS

*Paul Messenger attempts to explain the whys and wherefores of interconnect cables without resorting to (too much) jargon.*

I well recall first encountering 'fancy' cables a little more than a decade ago, during a trip in which I first came face to face with the Japanese 'high end' – triode valve amplifiers, horn loudspeakers and all. To one accustomed to supposedly immutable laws of Physics, it was a sobering experience to be confronted with inexplicable but audible differences between connecting cables.

Upon my return I organised the translation of an article on the ins and outs of cables, written by Franco-Japanese guru and experimenter Jean Hiraga, for publication in a prominent UK magazine. History is witness to the still current relevance of this piece, though at the time many regarded it as a joke in rather dubious taste. Happily a few were sufficiently stimulated to conduct their own experiments, and around the same time some interesting specialist cables started to appear on the UK market, mainly from US sources.

Since those seemingly far off days, the UK has developed its own breed of 'hi-fi' cabling, from the multistrand speaker leads successfully marketed by QED, Naim, Linn, Supra (Rotel), Mission *et al*, through to the more recent fashion for 'solid core' interconnects from Origin Live, DNM etc. Specialist cable brands such as Monster and Van den Hul have become known internationally. What was once exclusively the realm of the more extreme 'tweak' has become a worldwide business.

The key observation on cables is that they are much more than mere accessories. Carrying the audio signal just as any amplifier does, it's really not too surprising that they can influence the quality of that signal. Precisely how and why they do so is still only partly understood, though the technically minded will find some clues in *Tech Talk* (pp121).

More relevant than theorising perhaps are the comparative results of the reviews themselves. At this stage in our understanding of the phenomenon, listening tests are the most important arbiter, with

the caveat that in practice results may vary according to the components used in a given system. Our tests should be representative, but at this stage it is difficult to know just how representative.

Likewise it is difficult to establish the precise relevance of the test measurements, though the creation of a body of comparative data covering 40 different types at least provides a yardstick by which any individual example can be judged.

## TOPOLOGY

In its simplest form a cable is a length of conducting material joining two components, though in order to complete the circuit and transmit signal, two conductors are needed. For convenience's sake these are packaged together but kept apart from each other and from electrical contact with the outside world by an insulating sheath, usually some form of plastic – known technically as the dielectric material.

Cables used to conduct low level signals, such as those from the pickup cartridge or between pre- and power amplifiers, often need some form of screening to reduce susceptibility to hum, switch pulses and radio frequency (RF) interference.

Traditional low level signal interconnect cables, such as basic patch-cords and aerial downleads, weave the return conductor to form a screen around a central core. The more elaborate specialist hi-fi interconnects tend to use symmetrical, matched signal and return conductors, and then add an additional, separate screen. And the designer can use the physical winding and weaving of the conductors in order to trade off the basic capacitance/inductance properties of the cable.

## MATERIALS

By and large, electrical conductors tend to be metals, and metals tend to be conductors. But this simplistic interpretation of electrical conductivity ignores the fine

detail that may seem irrelevant in the secondary school classroom, but which seems likely to account for at least some of the differences between audio signal interconnects.

The ideal medium for conducting audio is probably a single, unbroken long crystal of just one type of metal from source to destination. This is so far impossible, not to mention impractical. The crystalline nature of metals leads to microscopic discontinuities along a length of wire. Non-metal impurities (like Oxygen molecules) with different conductive properties tend to congregate at these 'crystal interstices' and tend to act as semi-conductors, diodes and the like, probably helping to upset the overall coherence of the signal.

This explains the efforts that are made to improve conductor purity (particularly copper, which is basically cheap), and the various techniques employed to improve wire-drawing techniques. There is also a school of thought which prefers silver wiring, some of whose high priests have gone all the way with silver-wired cartridges, tonearms, loudspeaker voice coils etc.

The discontinuity problems are compounded at the various plugs and sockets, which invariably involve changing from one kind of metal to another, each change in materials encouraging further distortion of the signal. (Contrary to popular myth, gold-plated phono plugs are not necessarily a good thing; the plating may prevent corrosion and maintain the contact surface in good fettle, but it usually involves extra metal-to-metal discontinuity *via* an intermediate layer of nickel as well.)

The metalwork involved has one set of rules, the insulating materials introduce another, particularly at the junction between the two. Chemical neutrality and manufacturing consistency are both important factors, though neither come cheap.

## MEASUREMENTS

Cables have three basic properties that are a function of the materials used and the topology of the construction. Known as L (inductance), C (capacitance) and R (resistance), the longer the cable, the higher each of these values becomes.

The job of interconnect cables is to transmit signal content rather than power (*ie* quality rather than quantity), from sources to destinations that each have their own inherent L, C and R factors. Normally the factor added by the cable will not make a significant difference to the load and source impedances of the components, though obviously extreme values might be better avoided. Under unusual circumstances there may be some incompatibility, but this is fortunately very rare these days.

The resistance of a cable is entirely neutral in terms of frequency balance, and only normally of any relevance when transferring power, *ie* when driving loudspeakers. But as Paul Miller points out in *Tech Talk*, high resistance can reduce the noise performance of a system under some circumstances, and is obviously not desirable *per se*.

Leakage is a self explanatory measurement of the effectiveness of the insulation and/or the fitting of plugs. The higher the value the better of course (our measurement maximum is 350Mohms).

The microphony of the cables, presented graphically is determined by their electrical output when physically (mechanically) excited. Again the levels encountered are generally much better than they need to be to avoid directly influencing the signal, but the measurement still provides another clue to assessing the quality of cable design and construction.

Ultimately, there is still much to learn about cables and their effects. For the moment, the safest advice is for individuals to try any available alternatives for themselves.



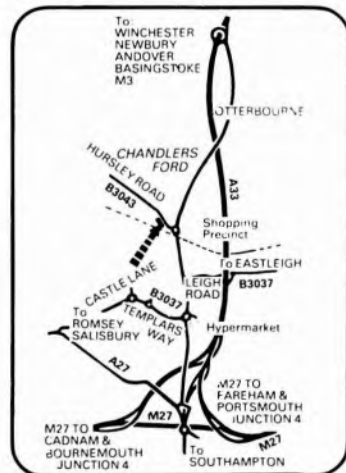
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# APATURE LSD

APATURE PRODUCTS, PRESTON, USA.

(AT PRESENT NOT DISTRIBUTED IN THE UK).

Currently available only in the US, this brightly-coloured symmetrical interconnect has eight silver-plated copper conductors, insulated with PTFE and tightly wound to reduce inductance to a very low 0.4µH. A drain wire terminates an aluminium foil screen at both ends of the cable, and the entire affair is enclosed in a 'hi-flex' transparent PVC jacket.

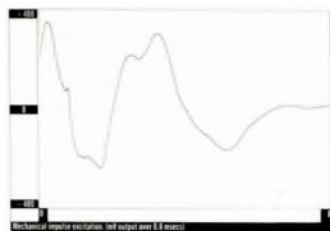
Leakage was compromised by flux migration in the gold-plated phono plugs; a value of 1.93Mohm together with a very low Q of 3.89 is hardly satisfactory. Furthermore, this was the most microphonic cable in our test necessitating a x0.1 reduction just to fit the +352mV/-235mV impulse response on the graph. This was due to a massive LF (375Hz) transient, peaking at -16.3dB!

A faint resonant boom was audible in the listening tests at very low frequencies, but otherwise this cable sounded remark-

ably neutral and well-controlled. Treble detail was sharp and precise without sounding bright or splashy, playing its part in the overall neutrality of the cable. Given improvements in quality control, this cable could be worth considering if and when introduced into the UK and depending upon price.

## TEST RESULTS

Resistance	28mohms
Inductance	0.4uH
Capacitance	46.6pF
Leakage	1.927Mohms
Q factor	3.89
Price (1m terminated pair)	see text



# AUDIONOTE FLEXIBLE SILVER ANS

AUDIO BY DESIGN, 8 DYKE ROAD MEWS, 74/76 DYKE ROAD,

BRIGHTON BN1 3JD. TEL: (0273) 203277.

RECOMMENDED

Supplied through Audio by Design, this remarkably flexible interconnect embodies much of AudioNote's silver cable technology. The signal and return conductors are a symmetrical twisted pair, using several silver strands per core and colour-coded polyethylene insulation. The DC resistance was a very high 375ohm, increasing the chance of HF generation noise through the interaction of circulating earth currents. Fortunately, a surrounding copper braid (terminated at one end) screens the cable quite effectively.

The soft insulating jacket fails to clamp the signal cores rigidly and this is reflected in the +30.38mV peak output on the mechanical impulse test, caused by rapid charge migration (note the x1 vertical scaling). In the frequency domain a peak is observed at 350Hz (-52dB), together with a -82dB cluster at 3.1kHz, 3.8kHz and 4.5kHz.

Subjectively, however, ANS

interconnect scores a hit with its transparent midband and revealing but quite unforced treble quality. Only at lower frequencies did the performance fall behind, the cable introducing a faint 'muddying' coloration that occasionally softened the impact of transient notes. More important perhaps, this cable's unusual flexibility makes it ideal for use as a tonearm cable, a role in which it will find undoubted success.

## TEST RESULTS

Resistance	375mohms
Inductance	0.8uH
Capacitance	102.7pF
Leakage	30.3Mohms
Q factor	19
Price (1m terminated pair)	£85



# AUDIONOTE COPPER ANC

AUDIO BY DESIGN, 8 DYKE ROAD MEWS, 74/76 DYKE ROAD,

BRIGHTON BN1 3JD. TEL: (0273) 203277.

RECOMMENDED

This relatively stiff, bright red interconnect is AudioNote's cheapest and uses OFHC (High Crystal) copper strands in a symmetrical, twin-axial arrangement. The signal and return cores are colour-coded and wrapped in a further layer of white polypropylene that also supports the peripheral screening braid. Grounded at both ends, the importers have fitted a set of particularly robust and sleek-looking phono plugs that actually lock onto the cable jacket via a threaded grub screw.

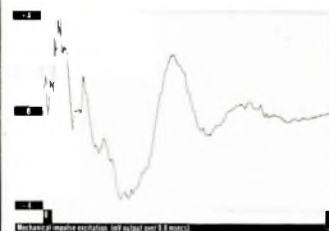
Inductance is commendably low and resistance moderate but capacitance is a rather high 290pF. 6.1Mohm signal-to-return leakage is also a little suspect, as is the low Q factor of 17. Subject to the impulse vibration test, ANC produced a voltage swing of +3.72mV/-3.58mV with the principal output centred around 625Hz (-58.2dB), allowing the trace to be reproduced with x10

vertical scaling.

ANC sounded punchy, with a faintly lean but tightly-focused bass character. This crystalline precision waned somewhat at higher frequencies though, and a slightly veiled or 'fizzy' coloration became apparent. But taking the overall audio quality even with a recent price increase into account, Recommended status seems appropriate.

## TEST RESULTS

Resistance	103mohms
Inductance	0.5uH
Capacitance	290.2pF
Leakage	6.09Mohms
Q factor	17
Price (1m terminated pair)	£35



# AUDIONOTE SILVER ANV

AUDIO BY DESIGN, 8 DYKE ROAD MEWS, 74/76 DYKE ROAD,

BRIGHTON BN1 3JD. TEL: (0273) 203277.

Essentially a rather more rigid version of the flexible ANS interconnect, 21 silver strands of 99.9% purity are massed into a symmetrical Litz array for signal and return cores, insulated with colour-coded polyethylene dielectric. Unfortunately, in an attempt to clamp these cores close up against the phono plugs using a thin rubber compound, leakage was increased to 16.7Mohm, with a Q of just 15. And the DC resistance as a far too high 460ohm.

These cores are clamped by a surrounding PVC jacket, followed by a copper screening braid and a final silver-grey PVC outer skin, all of which confers good vibrational immunity - note the x10 scaling for the +2.11mV/-1.02mV reaction; -88.6dB frequency components were observed at both 750Hz and 1.13kHz.

Far weightier-sounding than the flexible ANS, ANV interconnect also possesses a fair degree

of treble clarity and sparkle. Knocking it down a few rungs, however, is a sense of restriction and loss of transparency through the critical midrange. Suitable for use with tonally lean systems perhaps, ANV is a little unbalanced (not to mention expensive) for general recommendation.

## TEST RESULTS

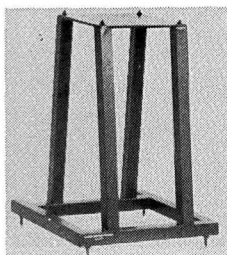
Resistance	460mohms
Inductance	0.8uH
Capacitance	139.2pF
Leakage	16.9Mohms
Q factor	15
Price (1m terminated pair)	£140



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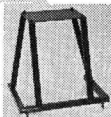
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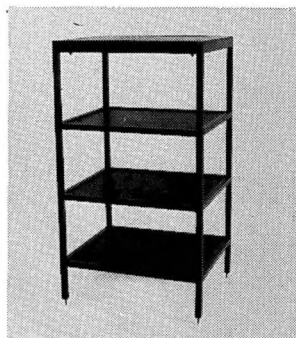
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# AUDIOQUEST REFERENCE 2

A&R CAMBRIDGE LTD., DENNY INDUSTRIAL ESTATE,  
WATERBEACH, CAMBRIDGE CB5 9PB. TEL: (0223) 861550.

Imported from the US by Arcam Ltd, the Audioquest cables span a considerable price range, the *Reference 2* being one of their cheaper offerings. The symmetrical construction has twisted signal and return conductors individually insulated with colour-coded polypropylene. Foamed polypropylene fibres support a naked drain wire which grounds the aluminium foil screen at one end of the cable. The multiple OF copper stranding gives low resistance, while both capacitance and inductances were moderate.

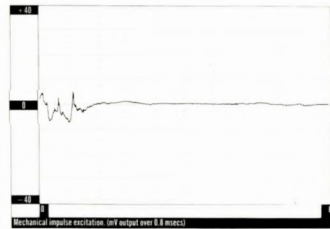
Audioquest's slightly loose mauve PVC jacket was less immune to vibration than the harder inner polypropylene dielectric, the result being a +4.76mV/-7.01mV impulse composed almost entirely of broad-band noise.

Subjectively, this cable sounded slightly 'flat', failing to re-create the full stereo depth of a performance successfully.

There was also a slight loss of bass weight and authority, leading to a lean overall balance but a fair share of detail nonetheless. Ultimately, however, *Reference 2* simply damped much of the atmosphere and emotional charge of a musical performance.

## TEST RESULTS

Resistance	79mohms
Inductance	0.6uH
Capacitance	98.3pF
Leakage	350 + Mohms
Q factor	100 +
Price (1m terminated pair)	£29



# AUDIOQUEST LIVEWIRE TOPAZ

A&R CAMBRIDGE LTD., DENNY INDUSTRIAL ESTATE,  
WATERBEACH, CAMBRIDGE CB5 9PB. TEL: (0223) 861550.

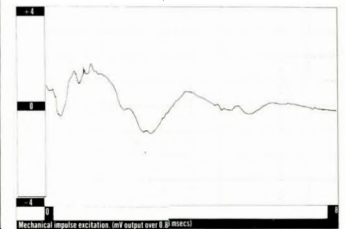
Soon to replace *Reference 2*, Audioquest's *Topaz* is a rather more substantial cable, featuring Arcam's own gold-plated plugs which indicate cable directionality. Symmetrical signal and return conductors have several OFHC copper strands, sheathed in a tight polypropylene insulation. A drain wire is wrapped around the return core and is terminated at the source-end of the cable; a mylar-backed foil screen provides further shielding while the whole array is jacketed in soft brown PVC.

Technically, *Topaz* offers some improvements over *Reference 2*. The basic parameters show lower capacitance, slightly higher resistance and a moderately high inductance of 1µH. Leakage is excellent, and the microphony test (x10) shows a limited +1.67mV/-1.07mV (-67.5dB) burst centred on 500Hz, with another better-suppressed peak at 1.5kHz, -89dB.

Sounding 'bigger' and faintly richer than *Reference 2*, *Topaz* was also slightly grainy at the top end and could become a little ragged or forward when handling complex signals. It just falls short of Recommendation, but is certainly more viable than the cable it replaces.

## TEST RESULTS

Resistance	96mohms
Inductance	1.0uH
Capacitance	87.2pF
Leakage	350 + Mohms
Q factor	100 +
Price (1m terminated pair)	£29



# AUDIOQUEST LIVEWIRE RUBY

A&R CAMBRIDGE LTD., DENNY INDUSTRIAL ESTATE,  
WATERBEACH, CAMBRIDGE CB5 9PB. TEL: (0223) 861550.

RECOMMENDED

Based around the same cable geometry as *Topaz*, the heavier *Ruby* interconnect is a twin-axial design using twisted strands of FCL copper in place of OFHC copper. FCL stands for Functionally Crystal-Less - not amorphous as implied but more like PC OCC in structure, where the individual copper crystals are extremely elongated, thereby reducing unwanted grain boundaries. Nevertheless, if the cable is stressed these brittle crystals will undoubtedly fracture, giving rise to secondary discontinuities in the lattice.

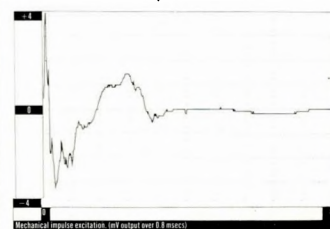
Inductance measures a high 1.05µH, higher still than *Topaz* in fact. More worrying, however, is the 156Mohm leakage and Q-factor of 84, presumably due to flux migration. That said, the microphony test was passed at the x10 level, the 0.28msec impulse registering +6.34mV/-3.26mV with frequency components at 750Hz (-79.6dB) and

6.3kHz (-96.7dB). By 3.6msecs the cable had fully stabilised.

Smoother sounding than *Topaz*, the extended crystal *Ruby* is less grainy and coarse, and better able to resolve complex passages. There was a residual smearing of metal guitar strings, for instance, but the overall character showed a balanced neutrality.

## TEST RESULTS

Resistance	107mohms
Inductance	1.05uH
Capacitance	93.8pF
Leakage	156Mohms
Q factor	84
Price (1m terminated pair)	£45



# AUDIOQUEST LIVEWIRE QUARTZ

A&R CAMBRIDGE LTD., DENNY INDUSTRIAL ESTATE,  
WATERBEACH, CAMBRIDGE CB5 9PB. TEL: (0223) 861550.

RECOMMENDED

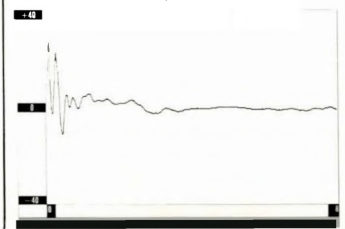
Featuring Arcam's heavy-duty three-piece phono plugs, *Quartz* embodies the symmetrical geometry of the *Topaz* and *Ruby* Audioquest cables but with the bonus of PTFE insulation for the twisted signal and return conductors. The overall construction is first rate, from the quality of the soldering to the satin-black soft PVC jacket that surrounds the conductors and mylar-backed screen.

Inductance is reduced to 0.9µH by tighter winding, so this particular directional cable is more suitable than the others for long runs. Resistance, capacitance and leakage are all fine, while the mechanical impulse revealed a transient response and subsequent recovery signature similar to the *Ruby* cable, albeit at a higher output (+22.4mV/-10.64mV) requiring a x1 aspect ratio; the fundamental frequency component is highlighted at 1.37kHz (-69.6dB).

The progressive sweetening of treble detail through Audioquest's range finally reaches *Quartz'* excellent and totally unflagging resolution of HF information - the change in dielectric may not have been entirely coincidental! *Quartz* has an ideal, neutral balance that embodies sparkling clarity without the drawbacks of harshness or compression.

## TEST RESULTS

Resistance	98mohms
Inductance	0.9uH
Capacitance	90.5pF
Leakage	350 + Mohms
Q factor	100 +
Price (1m terminated pair)	£65



# AUDIO TECHNICA AT6115

AUDIO TECHNICA LTD., TECHNICA HOUSE, LOCKWOOD

CLOSE, LEEDS LS11 5UU. TEL: (0532) 771441.

Launched as successor to Audio Technica's popular *LC-OFC* interconnect, *AT6115* makes use of a new form of extended-crystal copper called PC-OCC: Perfect Crystal by Ohno Continuous Casting refers to the technique whereby molten copper is drawn through a heated die and only allowed to nucleate at the point where unidirectional crystal growth is assured; grain boundaries and lattice discontinuities are therefore reduced. The cable itself is of asymmetric coaxial construction, with 77x0.1mm OCC signal strands insulated from the OCC braid by a peripheral polyethylene dielectric. An outer jacket of red PVC completes the package.

The LCR parameters, plus leakage, are all beyond criticism, though the impulse reaction was near the top of the x10 range with fluctuations of +3.45mV and -1.82mV.

Subjectively, this cable sounds

somewhat 'quieter' than the original *LC-OFC* interconnect, but is also less transparent and three-dimensional in presentation. Vocal sibilance seems very slightly increased, and mild veiling and constriction is always present. This is a slightly disappointing overall result then, perhaps due to the asymmetric design.

## TEST RESULTS

Resistance	65mohms
Inductance	0.4uH
Capacitance	114.9pF
Leakage	350+ Mohms
Q factor	100+
Price (1m terminated pair)	£50



# AURAL SYMPHONICS AS-ONE

AURAL SYMPHONICS, 216 FLINTBURY COURT,

AN JOSE, CALIFORNIA 95148.

Currently only available State-side, Aural Symphonics *AS-One* is nevertheless a very interesting, directional interconnect, using four PTFE insulated, multi-strand, silver-plated OF copper conductors per cable. Two of these twisted conductors are used for signal; one for return; the fourth is only connected to the signal pin at the source-end of the interconnect. A silver-plated copper braid (terminated at both ends) acts as a screen, while the outer jacket is fashioned from PTFE tape. Massive, lockable WBT phono plugs are included.

Technically, *AS-One* suffers from exceedingly high capacitance, but benefits from extremely low resistance and loop inductance. The high capacitance is reflected in the movement of the cores under duress, the variation and charge migration leading to a double +17.5mV pulse. Equilibration is rapid,

however.

Sparkingly detailed, this cable enjoyed the same open and transparent midband as the better solid-core derivatives. Only marred by a faintly smeared and tizzy treble quality, on the whole it sounds remarkably neutral and faithful to the source, so will be worth seeking out if and when it arrives on these shores!

## TEST RESULTS

Resistance	19mohms
Inductance	0.8uH
Capacitance	389.4pF
Leakage	181 Mohms
Q factor	100+
Price (1m terminated pair)	\$80 (see text)



# BUDGET OFC INTERCONNECT

UNBRANDED - SUPPLIED WITH EQUIPMENT

One step up from ordinary give-away 'patch cords' one finds thicker, OFC (oxygen free copper) interconnects. The example tested here was in fact of Teac origin, but identical samples are available from the likes of Nakamichi and Sony, the latter available off the shelf for about £7. Both left and right coaxial channels are bonded together but are separately insulated in a soft PVC.

Series inductance is a commendably low 0.45µH, but the 191ohm loop resistance is actually higher than that measured with the cheaper hook-up cables. Nevertheless, the higher purity copper and improved insulation brings some benefits on the mechanical impulse test, the +1.2mV peak output (x10 vertical scale) being lower in amplitude even though the charge migration trend was similar to that observed with the budget cable.

Subjectively, this cable did lift much of the aural fog experienced with the scrawny standard hook-up leads. Bass was deeper and the overall balance warmer, but essential treble detail was still muted. Those looking to upgrade cabling should set sights higher than this.

## TEST RESULTS

Resistance	191mohms
Inductance	0.45uH
Capacitance	61.8pF
Leakage	350+ Mohms
Q factor	100+
Price (1m terminated pair)	c£7 (see text)



# BUDGET PATCH CORDS

UNBRANDED - SUPPLIED WITH EQUIPMENT

These thin coaxial interconnects are typical examples of the unbranded 'hook-up' cables usually supplied free of charge with hi-fi components. DC resistance was moderately high, due to the limited number of copper strands used, but capacitance and loop inductance were commendably low. Taking into account the good leakage and Q-figures, this budget cable would seem to be a match for the costliest designs in numerical lumped parameter terms at least!

This cable produced a peak output of +26.37mV in reaction to the mechanical impulse, based around a centre frequency of 2.63kHz (-76.5dB), while the high frequency noise floor reached a minimum of -95dB. Equilibration of the migrating charge was slightly protracted though, requiring 8.5msec.

In sound quality terms the basic nature of this cable was clearly evident. Both frequency

extremes were restricted, and a thick, veiling coloration hung over most performances. However, one should not lose sight of the unpretentious nature of such cables, which will certainly get a new system up and running with the minimum fuss. When this is completed, a more transparent cable can be sought out and its improvement appreciated.

## TEST RESULTS

Resistance	154mohms
Inductance	0.4uH
Capacitance	81.3pF
Leakage	350+ Mohms
Q factor	100+
Price (1m terminated pair)	see text



## DELTEC SLINK

DELTEC LTD., 16 CLAUDE ROAD, ROATH,

CARDIFF CF2 3PZ. TEL: (0222) 482818.

BEST BUY

One of the earliest solid-core derivatives, Deltec's *Slink* has four silver-plated 0.4mm diameter OFC strands arranged in a 'star-quad' array. The twisted cores are insulated in a colour-coded (grey/white) high grade PTFE, and good quality, gold-plated phono plugs provide silver-soldered termination. The low 0.5 $\mu$ H series inductance and 71ohm resistance is to be expected from the construction, just as the 230Mohm leakage resistance is consistent with the grade of dielectric.

Subject to the standard mechanical impulse, *Slink* demonstrated a rapid swing of the initial charge migration with a drop of +16.91mV to -12.18mV in the first 60 $\mu$ secs. Some residual vibration (375Hz, 1kHz at -61.7dB) resulted in a broad +1.86mV output up to 6msecs, due to fluctuations in capacitance.

Erring on the lean side of neutral, *Slink* also displayed an

uncommon transparency throughout the midband with a smooth and highly detailed treble to match. Recent improvements in construction (including new plugs) seem to have reduced any high frequency brittleness. *Slink* is ideally used in less than 4 metre lengths, under which conditions it represents a confident Best Buy.

### TEST RESULTS

Resistance	71mohms
Inductance	0.5 $\mu$ H
Capacitance	82.3pF
Leakage	230Mohms
Q factor	100+
Price (1m terminated pair)	£32



## DENON LC-OFC

HAYDEN LABORATORIES LTD., HAYDEN HOUSE, CHILTERN

HILL, CHALFONT ST. PETER, BUCKS. TEL: (0753) 888447.

Not currently available as a separate stock item, this LC-OFC interconnect is nevertheless supplied with Denon's top-flight CD-players, which makes it fair game for coverage here. Sealed, non-magnetic gold-plated phono plugs are fitted and the cable itself is protected within a soft-brown PVC jacket. The actual multi-stranded LC-OFC conductors are arranged in the classic asymmetric coaxial format, leading to an average figure for both inductance and capacitance but slightly above average resistance.

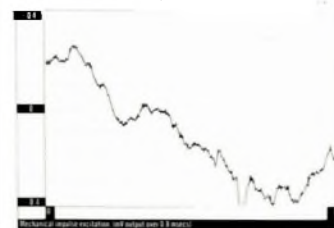
Denon's cable is fairly flexible, but the dielectric is densely packed and so the cable remains inherently 'solid'. The impulse reaction (x100) demonstrates this cable's low microphony; peaking at only +257 $\mu$ V, the resultant charge migration was nonetheless a little sluggish, full equilibrium only being reached after 13.4msecs.

Tonally this cable introduced a

peculiar 'twangy' coloration at high frequencies, and a slightly soft bass, leading to a lean overall balance. Upper midrange detail, such as vocal sibilants, was artificially highlighted by this forward presentation. In absolute terms this cable proved a disappointment - sufficiently so as to be a limiting factor in the sound quality of the high-end equipment with which it is supplied.

### TEST RESULTS

Resistance	115mohms
Inductance	0.65 $\mu$ H
Capacitance	85.5pF
Leakage	350+ Mohms
Q factor	100+
Price (1m terminated pair)	see text



## DELTEC BLACK SLINK

DELTEC LTD., 16 CLAUDE ROAD, ROATH,

CARDIFF CF2 3PZ. TEL: (0222) 482818.

RECOMMENDED

Eight 0.4mm silver-plated OFC strands are used for both signal and return, each individually insulated in high-grade PTFE and tightly wound in a way that minimises insulator contact. An internal 3mm heat-shrunk polyethylene jacket clamps these cores and gradually anneals the copper, thereby removing residual lattice dislocations. This very rigid array is surrounded by a balanced screening braid which may be terminated at the source and *via* a PTFE-insulated flying lead. A gloss-black sleeve and chunky WBT phono plugs complete the cable, resulting in an overall diameter of 13mm!

The L, C and leakage technical parameters are comparable with *Slink*, but resistance is obviously reduced. More importantly, microphony was an extremely low and symmetrical +337.7 $\mu$ V/-232.5 $\mu$ V on the mechanical impulse, with -99.8dB at 2.125kHz the main frequency component.

*Black Slink* led the field by a considerable margin in the listening tests. Inherently neutral, the cable faithfully reproduces broad and deep stereo soundstages with precise focus and a sense of tactility. The frequency extremes enjoy excellent detail resolution and seemingly limitless extension. As a reference quality interconnect, *Black Slink* may be confidently recommended.

### TEST RESULTS

Resistance	48mohms
Inductance	0.5 $\mu$ H
Capacitance	91.1pF
Leakage	232Mohms
Q factor	100+
Price (1m terminated pair)	£152



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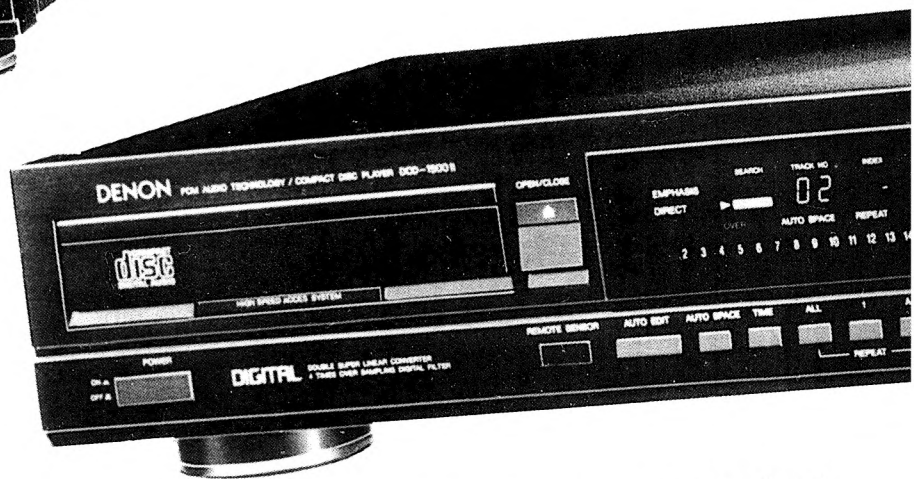
*Gramophone, March 1988*



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*CD Review, December 1987/January 1988*



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## DNM SOLID-CORE

DNM, 15 HIGHLAND AVENUE, BRENTWOOD,

ESSEX CM15 9DD. TEL: (0277) 225865.

RECOMMENDED

Adopting what must be the simplest possible construction, this DNM interconnect has two parallel conductors spaced a constant 6mm apart in a stiff PVC dielectric strip. Both signal and return cores are composed of nickel-plated copper, about 0.5mm in diameter and independently insulated with thin polyethylene jackets.

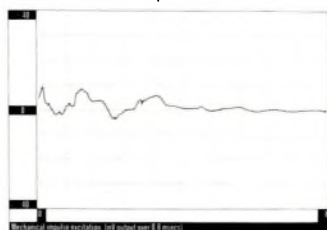
As expected, the inductance was a very high 1.58 $\mu$ H, the Q-factor a rather low 23, and the 1m loop resistance also high at 285ohm. Though not the highest in this test group, such a figure could possibly incur HF noise problems through circulating earth currents. (Despite what has been stated elsewhere, resistance in interconnects is important.) The mechanical impulse test produced a +9.19mV/-3.63mV output (x1 trace), with components at 875Hz (-61.9dB) and 1.63kHz (-68.6dB).

This cable has a light and breezy balance, transparent in

the midband and full of sparkling detail in the treble. There was an occasional hint of forwardness in the upper treble, but this rarely exaggerated sibilants, for example. Very low bass was curtailed, but what remained was tight, coherent and rhythmically sound. Recommended for short lengths in its present form, a future shielded version should certainly be worth investigating too.

### TEST RESULTS

Resistance	285mohms
Inductance	0.58 $\mu$ H
Capacitance	12.9pF
Leakage	345Mohms
Q factor	23
Price (1m terminated pair)	£35



## KIMBER KABLE PSB

R.A.T.A. LTD., EDGE BANK HOUSE, SNELSMERGH,

KENDAL, CUMBRIA LA8 9AS. TEL: (05398) 3247.

BEST BUY

Kimber Kable are popular American cables imported by RATA, and *FSB* is their cheapest interconnect, comprising three PTFE-coated conductors each containing seven OFC strands of varying thickness. Furthermore, Kimber claim to have surface-treated the copper by electrolytic deposition. Colour-coded for identification, the three-wire braid has red for signal, blue for return, and a further black core terminated at the destination-end of this directional interconnect to provide some additional screening.

As the cores are not clamped, the highish +20.64mV impulse reaction was to be expected (x1 vertical scaling). Components are seen at 5.5kHz (-83.7dB) and 16kHz (-88.2dB). Inductance was moderate but loop resistance and parallel capacitance were commendably low.

Possessing an exceedingly transparent midband but slightly 'clanky' treble, *FSB* sometimes gave the impression of artificially magnifying subtle high frequency

detail. Nevertheless, this cable always managed to sound remarkably uncluttered and open, the explicit treble definition proving to be a real bonus at this price level. Fine material value as well, it therefore warrants a Best Buy rating.

### TEST RESULTS

Resistance	68mohms
Inductance	0.75 $\mu$ H
Capacitance	58.7pF
Leakage	350+ Mohms
Q factor	100+
Price (1m terminated pair)	£32



## KIMBER KABLE KC-1

R.A.T.A. LTD., EDGE BANK HOUSE, SNELSMERGH,

KENDAL, CUMBRIA LA8 9AS. TEL: (05398) 3247.

The green-sleeved *KC-1* is considerably stiffer than the cheaper *FSB* interconnect, though in essence this cable incorporates the same conductor geometry of three TC (PTFE) insulated multi-diameter copper strands. However, *KC-1*'s black screen wire is terminated at both ends, and a naked drain wire is soldered at the destination end only. A graphite-impregnated fabric shield and tight PVC jacket surround the conductors.

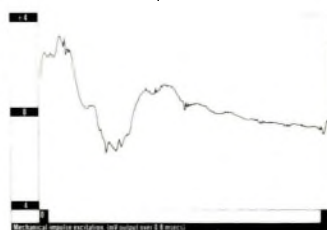
The capacitance of *KC-1* is almost exactly double that of *FSB*, while resistance and inductance remain essentially unchanged. Tighter construction leads to a much improved +3.02mV/-1.62mV reaction to mechanical impulse, with a single component at 1.25kHz (-77.3dB). The high frequency noise floor above 5kHz was only -92.5dB.

Tonally faintly leaner and brighter than the more open-

weave *FSB*, *KC-1*'s treble detail was just too sharp and grainy. Such detail was very slightly smeared during the loudest percussive sequences, even though much of the cheaper cable's transparency remained throughout the midband. Unfortunately, though the attempt at shielding is admirable, the more flexible *FSB* is clearly the better buy.

### TEST RESULTS

Resistance	58mohms
Inductance	0.6 $\mu$ H
Capacitance	116.4pF
Leakage	328Mohms
Q factor	100+
Price (1m terminated pair)	£47



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## KIMBER KABLE KC-AG

R.A.T.A. LTD., EDGE BANK HOUSE, SNELSMERGH,

KENDAL, CUMBRIA LA8 9AS. TEL: (05398) 3247.

Kimber's *AG* suffix (more correctly, *Ag*) emphasises the use of 99.99% pure silver. Once again seven strands of varying thickness are employed, in each of three conductor cores, each insulated in a high quality translucent PTFE dielectric. As in *PSB*, the screen core is connected at the destination-end only. Kimber use IAR *wonder solder* on all their cables, with tarnish-inhibiting silver-plate on the phono plugs instead of gold.

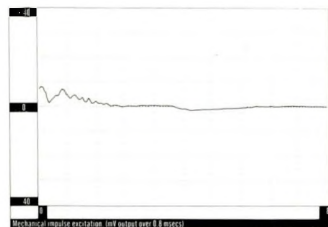
Parallel capacitance was the second lowest in this test group, while both resistance and loop inductance were moderate. Presented with x1 vertical scaling, *KC-AG* produced some +7.67mV output in reaction to the mechanical impulse, while the symmetry of the decay closely resembles that observed with *PSB*. Frequency components were measured at 4.75kHz (-83.5dB) and 15.1kHz (-99dB).

Again, a faintly 'twangy' coloration was audible, with treble detail resolution perceived in a

slightly abrupt if wholly controlled fashion. Spatial elements were faithfully preserved, though, and both depth recreation and lateral separation were excellent. Bass was neutral and tightly controlled too, ensuring a Recommended rating.

### TEST RESULTS

Resistance	117mohms
Inductance	0.9uH
Capacitance	46.2pF
Leakage	350 + Mohms
Q factor	100 +
Price (1m terminated pair)	£375



## MDM INTERCONNECT

PRESENCE AUDIO, THE OLD POST HOUSE, PLUMMERS

PLAIN, HORSHAM W. SUSSEX. TEL: (0403) 76777.

Produced by Swiss headphone manufacturer Jecklin, this attractive blue-coloured interconnect has been available from Presence Audio for some time now. The coaxial construction is fairly traditional with a solid central core and peripheral return braid neatly soldered onto a set of 'designer' phono plugs. Accounting for what must be a fair chunk of the overall cost, these gold-plated plugs are decorated with a detachable hard-plastic surround, coloured blue or white for channel identification.

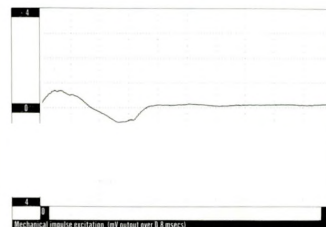
The use of a single signal core has pushed up resistance a bit, though the other lumped parameters have acceptable values. The impulse reaction was especially good, the controlled +666.4µV/-601.9µV output easily accommodated with x10 vertical scaling. Charge migration was completed by 3msecs, with principal components at 875Hz (-89.9dB) and 15.7kHz (-113.5dB).

In common with other asym-

metrical designs in this survey, the subjective performance of MDM cable did appear a little imprecise at the frequency extremes. In contrast the upper mid was slightly forward and occasionally became too brash or harsh for complete comfort. Nevertheless this cable does represent a worthwhile stepping stone between the budget interconnects and better, more expensive specialist designs.

### TEST RESULTS

Resistance	175mohms
Inductance	0.8uH
Capacitance	56.1pF
Leakage	350 + Mohms
Q factor	100 +
Price (1m terminated pair)	£15



## MIT PC-SQUARED

ABSOLUTE SOUNDS LTD., 318 WORPLE ROAD,

LONDON SW20 8QU. TEL: (01) 947 8160.

Latest in a long series of cables designed by Bruce Brisson (originally with Monster Cable), *PC-Squared* has apparently been developed with the aid of computer-modelling. Geometrically this cable is essentially a symmetric twisted pair, but each of the polypropylene-insulated signal and return conductors consists of a graded mixture of OFC strands, wrapped in a helix about a central core in an attempt to attain a coherent phase response.

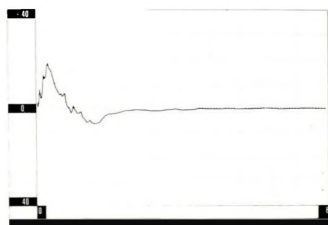
Foil screening is provided, with an inner drain wire connected to the destination-end of this directional cable. DC resistance is a little high but, more importantly, the polypropylene dielectric showed a leakage factor of 38.3Mohm. The impulse response (x1 vertical scale) seemed quite well-controlled, as full equilibrium was attained 2msec after the peak output of +18.37mV.

Sonically, this multi-gauge

cable produced a very open and buoyant midband, but sounded slightly 'peculiar' at the frequency extremes. Specifically, the far treble was a little 'metallic', and very low bass notes were not sufficiently clear-cut. On simple material this openness was a real boon, however, so cautious try-before-buy Recommendation is appropriate.

### TEST RESULTS

Resistance	178mohms
Inductance	0.65uH
Capacitance	157.5pF
Leakage	38.3Mohms
Q factor	39
Price (1m terminated pair)	£70



## MIT SPECTRAL MI330

ABSOLUTE SOUNDS LTD., 318 WORPLE ROAD,

LONDON SW20 8QU. TEL: (01) 947 8160.

This is an older but still popular MIT design that offers an extension of the 'Balanced Bandwidth' topology employed in Monster interconnects. Precise 'vari-lay' winding of different thickness strands results in the optimum transmission line for all frequencies - or so the story goes. In essence, the twin-axial construction, polypropylene dielectric, foil screen and drain wire are simply chunkier versions of those used in *PC-Squared*, *MI330* may be easily distinguished, however, by its rubber-like grey/yellow jacket.

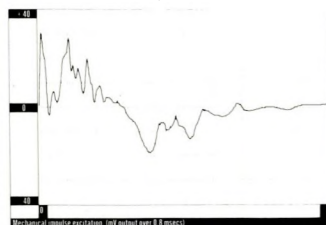
DC resistance has plummeted as a result of the thicker stranding, but at 332.2pF parallel capacitance has gone through the roof, implying some deficiency in the signal/return dielectric. This hypothesis is reinforced by the poor 9.8Mohm leakage figure and substantial +30.1mV impulse test output. Capacitance variation also leads to protracted charge migration and a high

noise floor of -56.4dB at 1.63kHz.

There are obvious subjective parallels with the newer *PC-Squared* cable, *MI330* displaying a marvellously open and enticing midband quality. The bass is warm and rich, but this character has a tendency to dominate, occasionally masking fine treble detail. Overall, the cheaper cable is the better buy.

### TEST RESULTS

Resistance	48mohms
Inductance	0.48uH
Capacitance	332.2pF
Leakage	9.8Mohms
Q factor	31
Price (1m terminated pair)	£193





# MONITOR PC 0100381

BANDRIDGE LTD., 1 YORK ROAD, LONDON SW9 8TP.

TEL: (01) 543 3633.

RECOMMENDED

Accessory distributor Bandridge has recently taken on board a massive range of speaker and interconnect cables from the West German producer In-Akustik. Dubbed *Monitor PC* and unimaginatively identified by catalogue number, *PC 0100381* is a fairly chunky coaxial cable with multiple strands of OFC insulated with polyethylene (internal) and soft transparent PVC (external).

The left and right cables run parallel to each other and are separated by a mid-running ground lead which is terminated in gold plated lugs for connection at either end of the cable. Electrically the lumped LCR parameters, leakage and Q-factor were of textbook standard, while the impulse reaction was similar to that observed with other asymmetrical cables: registering +4.37mV/-5.81mV on the x1 vertical scale, full charge balance was reached after 2.5msecs, and a -91.2dB noise floor was con-

stant from 300Hz-20kHz.

There is more than a hint of instrumental muddling with *PC 0100381*, the bass sounding slightly soft and the treble lacking precise clarity. For the price, however, the material value alone is quite excellent, while the faintly 'shut-in' sound quality can only be considered par for the course.

## TEST RESULTS

Resistance	81.3mohms
Inductance	0.4uH
Capacitance	79.3pF
Leakage	350+ Mohms
Q factor	100+
Price (1m terminated pair)	£17



# MONSTER INTERLINK 400

PORTFOLIO MARKETING, RIVER WALK, TONBRIDGE,

KENT TN9 1DT. TEL: (0732) 365071.

RECOMMENDED

Effectively usurping the older *Interlink 4*, *400* employs Monster's patented multiple-gauge stranding network, with fine 'micro-fibre' dielectric insulation underneath the conventional polypropylene jackets. Each of the symmetrical signal and return conductors is configured in the same way, with no less than *two* of these Vari-Lay windings. The conductors are damped with polypropylene foam and surrounded by a foil screen, grounded at the destination-end of the cable by a naked drain wire.

Technically, *400* offers a combination of low resistance and inductance with moderate capacitance, leakage is an acceptable 105Mohm. Viewed with x1 vertical scaling, the -26.37mV/+20.92mV reaction to an applied mechanical impulse is characteristic of other Monster cables. There are subsequent spurious charge migrations centred around 750Hz (-60.95dB),

which equilibrate after 4.5msecs.

*Interlink 400's* hefty balance certainly made an impression in the listening tests. Bass is solid and punchy, counterpointed by a slightly over-blown midband that tended to make vocalists sound larger-than-life, treble detail was muted in comparison. Nevertheless, *400* successfully builds on the well accepted qualities of *4*, and may be happily Recommended.

## TEST RESULTS

Resistance	89mohms
Inductance	0.6uH
Capacitance	128.3pF
Leakage	105Mohms
Q factor	75
Price (1m terminated pair)	£30



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Aiwa ADW707	£179
Aiwa ADF770 e/dem	£199
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Denon DRM 30X	£319
NAD 6220	£149
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AD200WXE/D	£189
Nakamichi BX300E	POA
Nakamichi BX 125	POA
Sansui D705	£299
Yamaha KX200	£139
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Marantz SD35	£159
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# MONSTER INTERLINK CD

PORTFOLIO MARKETING, RIVER WALK, TONBRIDGE,

KENT TN9 1DT. TEL: (0732) 365071.

Monster have apparently adapted their proprietary 'Band-width Balanced' geometry to produce a cable ideally suited for use between CD player and amplifier. As with the others, *Interlink CD* winds a multitude of thin enamel-coated strands around a thicker central core in an attempt to maintain some phase integrity. Two such conductors are symmetrically configured, insulated with polyethylene, foil screened and then grounded at the destination end with a naked drain wire.

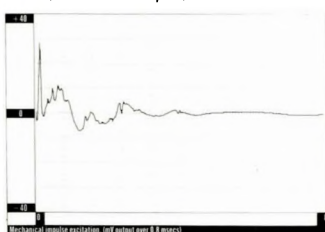
The 202.8pF parallel capacitance is considerably higher than those found in other Monster cables, while leakage is a highish 21.2Mohm and the reactive Q factor a low 27. The transient +28.5mV reaction to the broadband mechanical impulse (x1 scale) is followed by a succession of spurious peaks due to conductor vibration.

Monster certainly seem to

have mastered the ability to manipulate the sound of their cables efficiently, though in this case the result was not wholly consistent or appreciated. Specifically, the low frequency end of things is commendably weighty, but the top-end sounds vague and lacks image focus. This essentially peculiar cable is likely to suit some systems more than others.

## TEST RESULTS

Resistance	67 mohms
Inductance	0.7uH
Capacitance	202.8pF
Leakage	21.2Mohms
Q factor	27
Price (1m terminated pair)	£44



# MONSTER INTERLINK REFERENCE A

PORTFOLIO MARKETING, RIVER WALK, TONBRIDGE,

KENT TN9 1DT. TEL: (0732) 365071.

This flagship of Monster's range embodies up-to-the-minute 'Balanced Bandwidth' technology. Three multiple-gauge, stranded networks are used in both signal and return conductors, 'vari-lay' weave resulting in variable-length signal strands. Low absorption polyethylene insulates the symmetrical cores and a dense copper braid terminated at both ends of this directional interconnect forms a peripheral shield. Top-quality gold-plated phono plugs complement these beautifully constructed cables.

The LCR parameters are satisfactory, while the thicker insulation seems to have improved Monster's impulse response. Presented with x10 vertical scaling, the familiar positive transient (+3.78mV) is followed by a fairly symmetrical charge migration, due to a broad LF hump at 625Hz (-68.9dB).

At first this cable appeared to provide a warm, big and friendly

sound, but protracted listening indicated a certain lack of dynamic speed – a subjective sluggishness. Depth perspectives also seemed somewhat limited, making it more difficult to hear through the stereo soundstage, and mild veiling restricted the finest detail resolution. Monster *Reference* may prove well suited to up-front systems, but remains a little unbalanced for general recommendation.

## TEST RESULTS

Resistance	49 mohms
Inductance	0.7uH
Capacitance	138.1pF
Leakage	350 + Mohms
Q factor	100 +
Price (1m terminated pair)	£88



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# MYST Tm INTERCONNECT

MYST LTD., THE OLD SURVEYORS OFFICE, WEOBLEY,  
HEREFORD. TEL: (054431) 8811.

Although MYST first intended these for use with their own amplifier and tuner, the cables have since become generally available in stock 0.85m lengths. Construction is simple yet elegant, using seven PTFE-insulated solid-silver strands for both signal and return. The symmetrical conductors are colour-coded and sheathed in a further layer of translucent *Teflon*. A variety of terminations are available, EAR gold-plated phono plugs being the most popular.

Normalised for 1m, the loop resistance is a little too high, but the extremely low 40.8pF capacitance is a saving grace. Although the peak impulse reaction is a modest enough +6.28mV/-12.09mV, the unclamped cores continue to vibrate and so extend the variation in capacitance; full equilibration took 10.7msecs. Unfortunately, the -59.8dB (2kHz) noise floor is a little too

high.

Subjectively the *Tm* interconnect is fairly neutral with a pleasantly open and transparent midband. Some deep bass information is lost, but the treble is sharply focused and brimming with detail. On balance this is a very sensible interconnect that is very fairly priced, and definitely merits a Best Buy rating.

## TEST RESULTS

Resistance	296mohms
Inductance	0.5uH
Capacitance	40.8pF
Leakage	350+ Mohms
Q factor	100+
Price (1m terminated pair)	£15.60



# ORIGIN LIVE SOLI-CORE SUPER

ORIGIN LIVE, 87 CHESEL CRESCENT, BITTERNE,  
SOUTHAMPTON SO2 4BT. TEL: (0703) 442183.

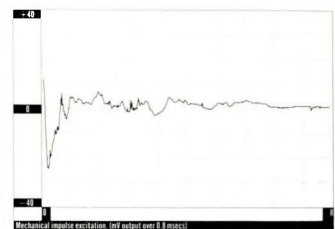
Previously marketed under the Cable Design banner, *Soli-Core Super* is a rather unwieldy interconnect. Featuring two eponymous thick copper cores for both signal and return, these are insulated in thick PVC, and twisted and interwoven with several thinner enamel-coated strands. An aluminium foil screen surrounds this array of conductors which are themselves terminated in good quality, gold-plated Audio Technica phono plugs.

Flux migration and an inconsistent dielectric gives a highish 25.9Mohm leakage together with a 38 Q-factor. The lumped LCR parameters are all fine, the low resistance especially, as might be expected considering the amount of copper used! Broadband noise at -57.8dB was measured during the impulse test, and the -24.18mV swing necessitates x1 vertical scaling.

Compared to earlier samples of *Soli-Core* this latest version is not only better built but also demonstrates improvements in detail resolution, stereo depth and bass weight. However, a characteristically 'loud' treble presentation remains, artificially enhancing some high frequency sounds without actually deserving accusations of brightness.

## TEST RESULTS

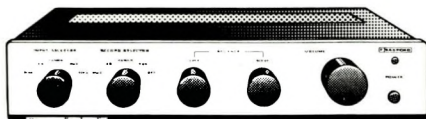
Resistance	21mohms
Inductance	0.7uH
Capacitance	117.9pF
Leakage	25.9Mohms
Q factor	38
Price (1m terminated pair)	£60



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Stereophile, U.S.A. September 87.



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# QED INCON P1-GOLD

QED AUDIO PRODUCTS LTD., UNIT 12, SHIELD ROAD,

ASHFORD IND. EST., MIDDX TW15 1AU. TEL: (07842) 46236.

BEST BUY

From the manufacturers of the famous 79-strand speaker cable, *Incon P1-Gold* forms the heart of four alternative QED interconnects. The *P1* version is distinguished by either gold or nickel-plated Deltron phono plugs, the latter variety costing a very modest £11. *Incon* comprises a symmetrical array of OFHC (High Conductivity rather than AudioNote's High Crystal) copper strands, insulated with hard polyethylene and gently wound to reduce inductance and provide a modicum of shielding. The entire array is covered with a relatively loose black PVC sleeve.

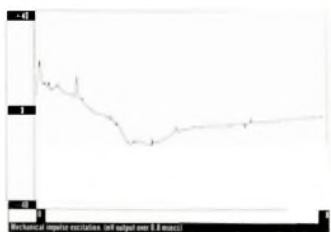
142.9µF capacitance is a little on the high side, while poor dielectric performance and flux migration gives a poor leakage resistance of 18.1Mohm. Charge migration during mechanical impulse tests (x1 scale, peak output +19.7mV) gives rise to an unusual series of peaks 1.5kHz apart up to 15kHz (-72.5dB to

-87.2dB).

Subjectively, QED *Incon* gives a good account of itself, with a lively, open presentation that just borders on the lean side of neutral. Mercifully, the thick and ponderous LF colorations that so often plague budget cables were missing, and *Incon's* quick and lucid delivery affords considerable musical insight. Both versions represent excellent value.

## TEST RESULTS

Resistance	37mohms
Inductance	0.65µH
Capacitance	142.9pF
Leakage	18.1Mohms
Q factor	16
Price (1m terminated pair)	£15



# SONY RK-C310ES

SONY UK LTD., SONY HOUSE, SOUTH ST., STAINES,

MIDDX. TEL: (0784) 67000.

RECOMMENDED

Launched to complement Sony's prestigious *ES* range of hi-fi separates, this new interconnect has a straightforward coaxial geometry. The central signal conductor is composed of seven tightly twisted 0.18mm LC-OFC strands, while the return braid is woven from 0.12mm wire, providing about 95% shielding density. Since Sony appear to be one of very few companies who appreciate the potential degradation caused by vibration, the centre conductor and the periphery of the braid are clamped with a hard polyethylene dielectric, and the whole ensemble is compressed by an elastic PVC sheath. Furthermore, the conductors are spot-welded onto the sealed non-magnetic phono plugs.

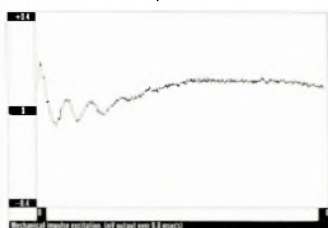
Technically only the moderate resistance need give cause for concern, while the efficacy of Sony's vibration-free construction is demonstrated by an impulse reaction whose presentation needs x100 vertical scaling. Charge migration of only +

198µV/-65µV and a -125dB HF noise floor would actually approach -185dB under representative conditions!

Subjectively this is also an excellent cable, possessing deep, firm bass and a sparkling top-end, albeit slightly less transparent than some of the more specialist designs. Nevertheless, it offers a balanced perspective with negligible coloration, and is confidently recommended.

## TEST RESULTS

Resistance	143mohms
Inductance	0.6µH
Capacitance	80.8pF
Leakage	350+ Mohms
Q factor	100+
Price (1m terminated pair)	£40



# QED INCON GP1-GOLD

QED AUDIO PRODUCTS LTD., UNIT 12, SHIELD ROAD,

ASHFORD IND. EST., MIDDX TW15 1AU. TEL: (07842) 46236.

RECOMMENDED

*Incon GP1-Gold* is essentially a shielded version of QED's standard *Incon* interconnect. A symmetrical, twisted pair of multi-strand OFHC conductors is again used, with an additional naked, parallel-running drain wire that terminates at the source-end of this directional interconnect. Both gold- and nickel-plated plug versions are available, the latter for a fiver less.

Surrounding these three conductors, QED have incorporated a graphite-impregnated polymer sleeve which provides excellent shielding. It also clamps the cores rather more effectively, as seen in the impulse graph's double-peak residual vibration output at a lower level than *Incon* at +14.38mV. More worrying, however, is the huge parallel capacitance of 353.4pF which implies a dielectric inconsistency - potentially sufficient to degrade the subjective bass performance

This was corroborated in listening test findings of a slight 'thickening' at both frequency extremes. The top-end sounds coarser and more out of focus than *Incon P1* - analogous to the results obtained between the shielded and unshielded Kimber cables. Nevertheless, for very long lengths, QED's *GP1* still represents an efficient and very cost-effective option.

## TEST RESULTS

Resistance	42mohms
Inductance	0.6µH
Capacitance	353.4pF
Leakage	7.9Mohms
Q factor	18
Price (1m terminated pair)	£19



# STERLING INTERCONNECT

PRESENCE AUDIO, THE OLD POST HOUSE, PLUMMERS

PLAIN, HORSHAM, W. SUSSEX. TEL: (0403) 76777.

Supplied for last minute inclusion, this is a pre-production sample from a virtually unknown company whose first product is being distributed by Presence Audio. It is a symmetrical and directionally marked cable using two 99.9% solid silver strands per conductor, one strand being a lot thinner than the other. A thick black polyethylene dielectric surrounds the apparently unshielded conductors (copious) quantities of a mastic-silicone prevented close inspection). This stereo pair was terminated with WBT plugs though Odyssey terminations will be substituted in the future.

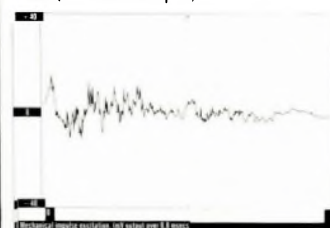
Sterling has low parallel capacitance, but the DC resistance is a little high. It reacted very unusually to the mechanical impulse test; an initial +15.15mV transient is followed by a shock of -70dB broadband/HF noise.

With a neutral if faintly rich overall balance, Sterling supplies a pleasantly open and transpa-

rent perspective. The bass is clean and extended, stereo depth is faithfully revealed, but some midband detail could appear larger-than-life. Overall, this is a good result, but the cable remains rather expensive, and firm judgement must await a proper production sample.

## TEST RESULTS

Resistance	165mohms
Inductance	0.6µH
Capacitance	64.2pF
Leakage	326Mohms
Q factor	100+
Price (1m terminated pair)	£250



# STILTON AUDIO SYSTEMS

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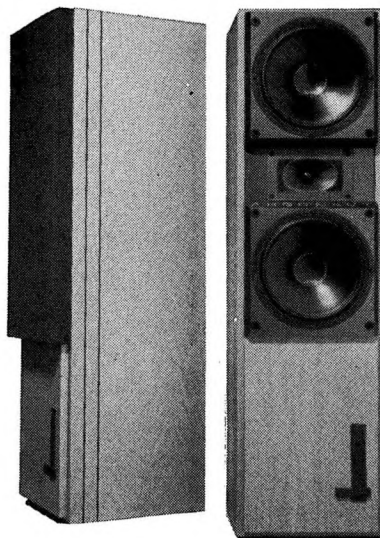
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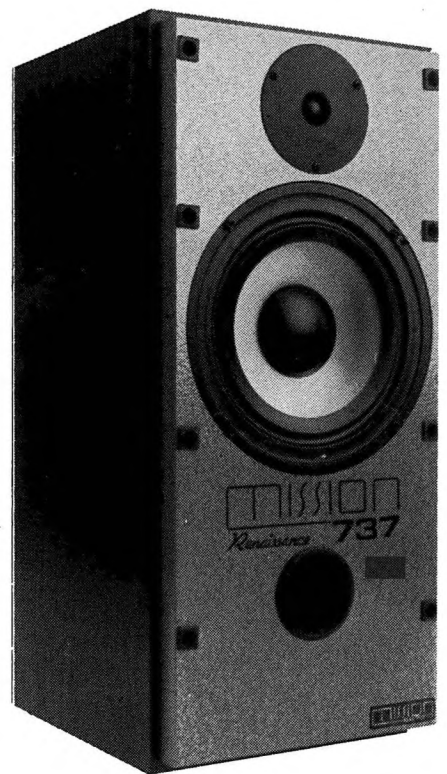
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# THORENS SAC 100

PORTFOLIO MARKETING, RIVER WALK, TONBRIDGE,

KENT TN9 1DT. TEL: (0732) 365071.

Thorens launched a considerable number of cables some time ago as part of their *Restek* range, though the *SAC 100* seems to be the only survivor available in the UK at the moment. Swiss-made using many fine silver-plated OFC strands, the asymmetric coaxial geometry is fairly conventional. A polypropylene dielectric is used for the centre insulation, and a transparent PVC sheath forms the outer jacket. Gold-plated phono are fitted, similar to those used by SME.

Presented with x1 vertical scaling, the impulse reaction was typical of a coaxial cable, showing a broad +19.34mV peak followed by gentle (5.5msecs) charge equilibration. There was some additional HF noise though, registering -77.64dB at 11kHz. In contrast, the lumped LCR parameters were absolutely ideal!

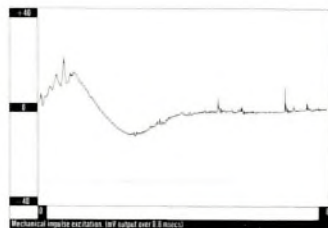
This attractive and very flexible interconnect's subjective per-

formance is undermined by a slightly coarse and splashy treble. It's not necessarily bright, simply rather confused and very fine detail lacks resolution.

Extremely open and articulate with simpler tracks, it rapidly 'saturated', taking on a muted air when handling complex signals - beautifully built but sonically disappointing.

## TEST RESULTS

Resistance	70mohms
Inductance	0.38uH
Capacitance	92.7pF
Leakage	350+ Mohms
Q factor	100+
Price (1m terminated pair)	£50



# VAN DEN HUL MC-D300II

VIPER, P.O. BOX 13, LONDON E18.

RECOMMENDED

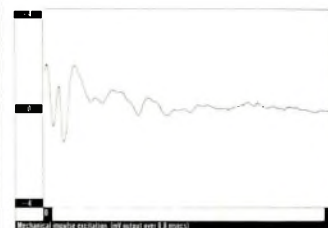
One of the cheaper cables in Van den Hul's prolific range, the *MC-D300II* has recently been updated by a more flexible internal polyethylene foam dielectric. Asymmetrically coaxial in construction, a solitary silver-plated signal core is surrounded by a dense return braid also composed of silver-plated strands. These conductors are soldered onto (Tiffany-derived) VdH plugs, and sheathed in a soft brown PVC jacket.

Whereas series inductance is just about the lowest in the test group, loop resistance is just about the highest! 405ohms is simply excessive, and will encourage HF noise if used with poorly grounded equipment. Presented with x10 vertical scaling, *MC-D300II* reacted acceptably on the mechanical impulse test, albeit with some spurious output at 625Hz (-79dB) and 1.38kHz (-81.4dB).

Subjectively this cable tended to highlight some upper mid detail but a generally open and spacious acoustic proved its saving grace. Stereo images were tightly focused throughout the upper octaves, though a slight softening was evident at very low frequencies. This is one of the better VdH cables in value for money terms.

## TEST RESULTS

Resistance	405mohms
Inductance	0.15uH
Capacitance	67.9pF
Leakage	350+ Mohms
Q factor	100+
Price (1m terminated pair)	£59



# VAN DEN HUL MC-D102II

VIPER, P.O. BOX 13, LONDON E18.

RECOMMENDED

This brightly coloured and cheerful looking interconnect has a very distinctive yellow/cream silicone-rubber jacket. A symmetric twin-axial geometry uses seven silver-plated copper cores per conductor. Colour-coded high density polyethylene insulates the individual conductors, while surrounding aluminium foil and 120-strand silver-plated braid provides peripheral screening, terminated at one end of the cable only.

The lumped LCR parameters are all moderate in value, only the above average inductance giving any cause for concern. The mechanical impulse was similarly well controlled, though the double +7.25mV/+8.46mV pulse indicates some residual vibration in the unclamped cores. The peak HF noise floor was at a very low -100dB at 15kHz.

In many respects *MC-D102II* possesses the same endearing qualities as the cheaper *D-300II*.

Soundstages are open and transparent, while image focus and timbral resolution is still further improved. Some criticism may be levelled at the very low frequency performance, however, where the cable failed to recreate the full weight and impact of bass transients. Nevertheless, it does more than enough to justify Recommendation.

## TEST RESULTS

Resistance	131mohms
Inductance	0.88uH
Capacitance	99.5pF
Leakage	350+ Mohms
Q factor	100+
Price (1m terminated pair)	£69



# VAN DEN HUL MC-D502

VIPER, P.O. BOX 13, LONDON E18.

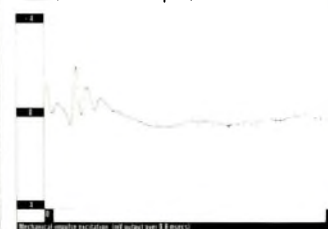
Based around the popular *D-501* tonearm cable, *D-502* provides symmetric twin-axial geometry with seven 0.17mm silver-plated strands per conductor. Colour-coded *Teflon* insulation surrounds these twisted cores which are packed into an outer PVC jacket with a fibrous filling. A dual-layer screen uses both a foil covering and peripheral silver-plated copper braid terminated at one end of the cable. Extra mechanical reinforcement is provided by a mid-running steel wire.

Dielectric absorption is implied by the above average 89.2Mohm leakage and Q-factor of 47, though the remaining lumped LCR parameters seem perfectly adequate. A protracted core resonance may have given rise to the staggered output reaction in the mechanical impulse test, the small +1.934mV peak decaying to a -564µV charge displacement.

Subjectively *MC-D502* did not live up to the promise of the cheaper VdH interconnects. Specifically the tonal balance sounded 'tilted' by a strong and authoritative bass line, which had the knock-on effect of muting treble detail. Considering the loss of sparkle and clarity, this cable is too expensive.

## TEST RESULTS

Resistance	287mohms
Inductance	0.75uH
Capacitance	108.9pF
Leakage	89.2Mohms
Q factor	47
Price (1m terminated pair)	£72



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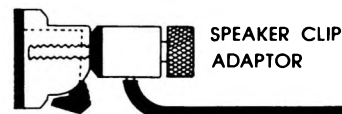
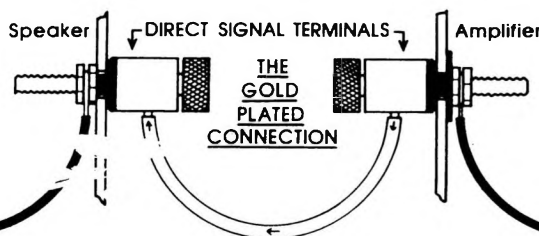
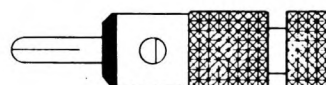
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# VAN DEN HUL THUNDERLINE

VIPER, P.O. BOX 13, LONDON E18.

An up-to-the minute entry complete with marketingspeak moniker, this new VdH cable adopts a construction method broadly similar to *D102II*, though higher grade materials apparently justify the disparity in price. Seven silver-plated 'matched crystal' copper strands in each of the signal and return cores are insulated with a high density polyethylene. An aluminium foil screen and peripheral braid are terminated at the destination-end, though an excess of flux does little to inspire confidence.

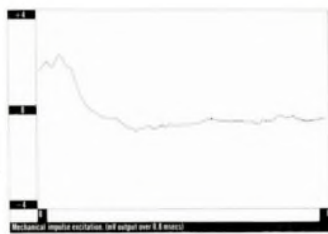
Capacitance was a little high, perhaps indicating some dielectric weakness while DC resistance was some 11mohms better than that measured with *D-102II*. Subject to the impulse test, *Thunderline* bettered *D102II* by a significant margin, the +2.196mV output being presented with x10 vertical scaling. The

principal frequency component is -95.9dB at a high 3.38kHz.

With its transparent midband but slightly lean tonal balance, *Thunderline* essentially parallels the sonic performance of the cheaper *MC-D102II*. Higher frequencies are occasionally tainted by a 'tizzy' coarseness, while the bass is tightly focused if lacking in rib-pounding weight.

## TEST RESULTS

Resistance	120mohms
Inductance	0.5uH
Capacitance	147.9pF
Leakage	350+ Mohms
Q factor	100+
Price (1m terminated pair)	£142



# VAN DEN HUL MC-SILVER

VIPER, P.O. BOX 13, LONDON E18.

Ridiculously priced, VdH attempt to justify the exorbitant cost of this cable by reference to 'special treatments' adopted in its manufacture - a marinade of snake oil perhaps? In essence this is a conventional asymmetric coaxial design, with 19 strands of silver-plated copper forming the signal core, and a braided, peripheral return composed of 168 x 0.04mm silver-clad copper strands. This is separated from a ribbon-like screen by tape wound PTFE, while the braiding is insulated in a light fluoro-polymer and encased in a transparent PVC jacket.

Presented with x1 vertical scaling, *MC-Silver's* reaction to the mechanical impulse was peculiar, the multiple +7.57mV/+7.25mV peaks indicating a non-linear charge displacement. Capacitance and inductance are fine, but resistance is a little high.

Compared to an older sample of *MC-Silver*, this product not only looked slightly different

(tighter jacket), but also unfortunately sounded rather worse. Although remarkably transparent for an asymmetrical design, a hint of grain and coarseness in the upper treble could become fatiguing after a while. At these sort of prices nothing less than the state of the art is acceptable, and regrettably there are plenty of cheaper cables that offer better overall subjective performance.

## TEST RESULTS

Resistance	160mohms
Inductance	0.42uH
Capacitance	65.8pF
Leakage	350+ Mohms
Q factor	100+
Price (1m terminated pair)	£742



# VAN DEN HUL MC-GOLD

VIPER, P.O. BOX 13, LONDON E18.

*MC-Gold* appears to be yet another version of the *MC-D102* interconnect, further still up the price scale. In this case the seven silver-plated 'matched crystal' copper strands are also coated with a thin layer of gold (gold migrates directly into copper so the silver plate acts as an inert base). As before, a colour-coded high density polyethylene insulates the symmetrical conductors, and an aluminium foil and braided screen, terminated at the destination end of the cable, surround the conductors.

Technically, *MC-Gold* proved to be an oddball, with exceedingly high inductance and resistance but very low capacitance. Poor soldering (messy flux) led to an impaired leakage of 150Mohm. The impulse charge displacement trend was very similar to that observed with *MC-D102II*, albeit at a significantly lower amplitude of +1.672mV/-

1.249mV.

Quieter and cleaner-sounding than *Thunderline*, for example, *MC-Gold* possesses a rich and beguiling treble balance that matches a weighty, slightly warm bass character. This cable is very expensive in relation to its material value, but the seductive balance may prove worthwhile in some circumstances.

## TEST RESULTS

Resistance	305mohms
Inductance	1.8uH
Capacitance	58.2pF
Leakage	150Mohms
Q factor	55
Price (1m terminated pair)	£242



# VECTEUR 8045

PRESENCE AUDIO, THE OLD POST HOUSE, PLUMMERS

PLAIN, HORSHAM, W. SUSSEX. TEL: (0403) 76777.

RECOMMENDED

This well established French interconnect has two individually-insulated LC-OFC cores for both signal and return paths, separated from an LC-OFC screening braid by a light polymeric film; the braid itself is protected by a thin transparent outer jacket. Unfortunately, our sample showed signs of outer surface oxidation, presumably through ingress of air. The screen is terminated at the source-end of this directional cable.

The lumped LCR parameters are quite acceptable, although the parallel capacitance is a little on the high side. Using a x10 vertical scale, Vecteur's impulse reaction is well controlled, a symmetrical +1.065mV/-1.02mV output reaching full equilibration by 4.1msecs.

Subjectively this cable sounds solid and forthright. It might seem slightly cold or even bright in some systems, but the treble 'edge' is mercifully clean. Vocal projection and articulation is aided by a transparent midband,

but very low frequencies are a little lacking in 'slam' and energy. Overall, this relatively precise-sounding cable can be happily recommended.

## TEST RESULTS

Resistance	57mohms
Inductance	0.37uH
Capacitance	189.1pF
Leakage	226Mohms
Q factor	100+
Price (1m terminated pair)	£49



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### INTERCONNECTS Stereo pair terminated gold plated RCA phono plugs

DESCRIPTION	0.5m	0.75m	1.00m	1.5m	2.0m	3.0m	per metre
QED INCON	13.95	-	14.95	16.50	18.00	21.00	1.20
QED INCON (screened)	17.95	-	18.95	19.95	21.95	25.95	1.75
DNM Solid Core	22.90	23.90	25.00	27.25	29.50	34.00	2.30
Deltec Slink	29.00	30.50	32.00	35.50	39.00	46.00	-
Monster Interlink 400	24.00	27.00	30.00	36.00	42.00	54.00	-
Kimber PSB	30.60	33.70	36.80	43.00	49.20	61.60	-
Monster Interlink CD	31.00	37.50	44.00	57.00	70.00	96.00	-
AQ Livewire FMS Gold	33.00	-	45.00	57.00	69.00	93.00	-
Kimber KC1	39.25	46.70	54.20	69.00	83.95	113.75	-
Vecteur	39.00	-	49.00	59.00	69.00	79.00	-
Van den Hul D102 Mk 2	53.00	59.50	66.00	79.00	92.00	118.00	12.95
Monster Reference	62.00	-	88.00	114.00	140.00	192.00	-
AQ Livewire FMS Blue	63.00	-	98.00	133.00	168.00	238.00	-

### SUPER INTERCONNECTS

Length	Monster M1000	Deltec Black Slink	Van den Hul MC-Gold	Siltech MC4-24	Siltech MC4-56	Mandrake Silver	Van den Hul MC-Silver
0.5m	119.00	126.00	175.00	152.00	232.00	327.00	425.00
0.75m	137.00	139.00	225.00	194.50	314.50	452.00	600.00
1.0m	154.00	152.00	275.00	237.00	397.00	577.00	775.00
1.5m	189.00	178.00	375.00	322.00	562.00	-	-
2.0m	224.00	204.00	475.00	407.00	727.00	-	-

*N.B. Super interconnects have to be custom made and you should allow up to four weeks for delivery. All leads are terminated with gold phono plugs.*

### SPEAKER CABLES Stereo pair terminated 4mm plugs

Description	2m	3m	4m	5m	7m	10m	per metre
AQ Livewire BC.4	18.90	22.90	26.90	30.90	38.90	50.90	2.00
AQ Livewire Type 6	31.00	39.00	47.00	55.00	71.00	95.00	4.00
AQ Livewire Black	85.00	115.00	145.00	175.00	235.00	325.00	15.00
QED 79 Strand	12.50	14.30	16.10	17.90	21.50	26.90	0.90
QED 79 Strand (Flat)	13.70	16.10	18.50	20.90	25.70	32.90	1.20
NAIM NACA 4	19.95	24.42	28.90	33.38	42.34	55.78	2.24
LINN LK20	18.90	22.90	26.90	30.90	38.90	50.90	2.00
DNM Solid Core	19.70	24.30	28.90	33.50	42.70	56.60	2.30
RS Solid Core	12.50	14.30	16.10	17.90	21.50	26.90	0.90
Monster Powerline 3	93.00	120.00	147.00	174.00	228.00	309.00	-
Monster Powerline 2	135.00	183.00	231.00	279.00	375.00	519.00	-
MIT MH750	491.00	641.00	791.00	941.00	1241.00	1691.00	75.44
Musical Fidelity Lifeline	56.00	79.00	102.00	125.00	171.00	240.00	11.50
Supra 2.5mm	17.90	21.40	24.90	28.40	31.90	42.40	1.75
Supra 4.0mm	21.90	27.40	32.90	38.40	43.90	60.40	2.75
Supra 10.0mm	46.00	61.50	77.00	92.50	123.50	170.00	7.75
Van den Hul CS122	37.00	48.00	59.00	70.00	92.00	125.00	5.50
Van den Hul CS352	67.00	93.00	119.00	145.00	197.00	274.70	12.95
Vecteur 9040	35.00	45.00	55.00	65.00	85.00	114.94	4.99
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# INTERCONNECT CABLES TECH TALK

*Paul Miller delves into the structure of matter in an attempt to throw light on the causes underlying interconnect sound quality differences, and outlines a radical yet rational test programme.*

Back in the good old days, the perfect amplifier was often envisaged as 'a straight wire with gain'. Like most succinct and idealistic concepts, this one does not bear close scrutiny. Delving deeper, it soon becomes clear that even a straight wire has its foibles!

Nowadays most experienced enthusiasts acknowledge that interconnects and speaker cables do influence sound quality, but the whys and wherefores of the phenomenon remain a continual source of debate. This particular comparative review is primarily concerned with the performance of interconnect cables. These are the leads casually strung between CD player and pre-amp, pre-amp and power amp for example, often without a second thought.

The characteristics of any cable are determined by the various materials and topologies utilised in its construction. These may determine the 'lumped' resistance, capacitance and inductance parameters, but viewing it as a simple RCL network reacting to a source's output impedance will not explain all the *subjective* discrepancies. The purity of the conductor, nature of the insulator dielectric, mechanical construction, physical geometry, Radio Frequency characteristics, efficiency of screening and finally the connectors themselves, all play vital roles.

An interconnect's resistance is often incorrectly considered inconsequential. In fact where circulating earth currents are present (between poorly grounded amplifiers for instance), thin cables with a high resistance may generate noise, leading to HF intermodulation distortion and impaired treble quality.

Traditionally, interconnects have adopted an unsymmetrical

coaxial construction, with the central signal conductor separated from the surrounding return braid by an insulating polymer; both conductors are then covered with a polymeric sleeve.

One popular deviation is the symmetrical array of nominally identical, separately insulated signal and return conductors (often incorrectly termed 'balanced'). The pair is tightly twisted to provide limited shielding and reduce the overall inductance.

The mechanical isolation of these symmetrical conductors may be improved by a secondary dielectric, itself supporting a peripheral screening braid which may be terminated at one or both ends of the cable; alternatively, some use a conducting polymeric screen with attendant drain wire terminated at one end of the cable. Such a grounded screen dramatically reduces the susceptibility of the signal conductors to extraneous electromagnetic fields and RF noise.

To grasp the subjective relevance of conductor purity, crystal structure and the stability of the surrounding dielectric, we need to employ delocalised travelling wave solutions of the Schrodinger equation. This explains the method of *conduction* far better than stationary-wave models derived from conventional solid state theory.

Molecular Orbital theory is often employed to study electron delocalisation in metal crystals, although for a real-life 3-D structure this is more appropriately termed 'energy band theory' describing the state of an electron in a molecule, the Molecular Orbital (MO) is polycentric, unlike the monocentric Atomic Orbital (AO). For any given MO the relative overlap of the AOs is

defined by a set of coefficients that produce a sinusoidal wavefunction referred to as a Bloch Orbital

The various AO energies give rise to associated Bloch Orbital energy bands. Each AO in a unit crystal cell (copper is face-centred cubic) is represented by a set of these Bloch Orbitals whose respective band energies may begin to overlap and merge mixing Bloch Orbitals of *different* AOs. These mixtures are then distinguished mathematically by looking at the density of energy in levels over a particular range or band. Two discrete energy bands are separated by 'forbidden zones'.

An element's full quota of electrons is used to fill these energy levels from the lowest to the highest, but in a conductor like copper the uppermost band remains incomplete. Therefore an electric field will excite some electrons to higher (previously unoccupied) levels, enabling current to flow. The partially filled bands of all transition elements, of which copper resides at the end of the first series, accounts for their high conductance. These electrons may also be excited by heat (mechanical) and photoelectric means; the former demonstrating that cables can indeed be microphonic

In contrast, the top valence band of an insulator is completely filled with equal numbers of electrons moving in all directions; the application of an electric field has no net effect and no current flows. If, however, there is a very narrow gap between two energy bands (one filled and one empty) then the material may exhibit the properties of a semi-conductor. It is clear then that the presence of semi-conducting impurities, either at the grain boundary between adjacent metal crystals or within the surrounding

insulator, can only compromise the performance of both. Copper II Oxide is known to exhibit strong diodic properties, for example.

Polycrystalline oxygen free copper (OFC) has randomly distributed grain boundaries just as linear or long-crystal (LC) copper will have laterally-orientated boundaries. These discontinuities will result in a variation of current distribution with signal level across the individual crystals, a degradation analogous to the non-linear conduction (and generation of RF noise) across surface strands in multi-core cables. The directional preference of some interconnects may be explained by this phenomenon, and the rationale for *plating* the copper conductor made more plausible.

The re-emergence of skin-depth theory and the relationship between increasing frequency and current density towards the periphery of a conductor adds further significance to the stability of both conductor and insulator at their interface. The superior dielectric properties of PTFE distinguish this material from cheaper insulators such as polypropylene, polyethylene, PVC and enamel.

In this test all the cables were terminated with phono plugs. However, the metallic purity of both plug and solder remains a salient factor in the overall quality of the interconnect.

## PUTTING THEORY INTO PRACTICE

A high resolution databridge and digital multimeter were used to measure the basic LCR parameters of each cable. All numerical results have been normalised to a standard 1m length. The series loop inductance is quoted in  $\mu\text{H}$  units

*Continued on page 123*

# KIMBER KABLE

A painstaking precision family of cable products for an exacting application. **Kimber Kable**, by RKB Industrial Inc., is designed to preserve maximum performance of the amplifiers and loudspeakers it connects. The amplifier to loudspeaker link carries the most complex array of signals that exist in an audio system. Kimber Kable is engineered and manufactured by RKB Industrial Inc. to be the best possible cable to use as loudspeaker wire.

All the cables share important performance features. Specifications for capacitance, resistance and inductance are all on the leading edge of the state of the art. Kimber Kable also rejects outside interference, it has low or no pickup of RF, power line, ignition or other noise. Kimber Kable will also not induce crosstalk into nearby low level cables. In addition, it has little crosstalk or loss to metal. Right and left channels can be run together for hundreds of feet without interaction.

Kimber Kable can be safely used with all amplifiers, valve or transistor, high or low power; in addition, all cables are 100% tested at 1500 volts to ensure the integrity of the insulation. (Note: only 4TC or 8TC are suitable for use with Naim amplifiers - 4VS and 4PR may lead to instability.)

**Directionality** — Like other cable, Kimber Kable is directional and is supplied with a label on the signal output end. The arrow on the label indicates the signal direction - so that on a speaker cable it would be at the speaker end and point to the speaker. On a source component, it would point to the amplifier. Spare labels are provided.

**RF and mains borne interference** — We have observed a very obvious reduction in mains borne noise, clicks, buzzes and hums when a system is wired up with Kimber Kable. We take this as tangible proof of the claims Kimber make for the RF 'dumping' ability of their cables.

**AB comparisons** — When comparing speaker cable types, always change left and right cable together. Do not connect a different type of cable to each channel and then compare them by swinging the balance control from side to side — Kimber Kable deals with RF pickup so effectively that its presence in only one channel will unbalance the amplifier and render the comparison meaningless.

The advantages of Kimber Kable are not confined to top-end hi-fi systems. In fact, the owner of a modest Japanese receiver based system will derive the greatest benefit because his amplifier needs more help and gets it from Kimber Kable. The reasons for this are described in full in the Kimber literature, so I won't reiterate them here. One owner of just such a modest receiver said that the 4TC Kimber Kable speaker leads made about four hundred pounds worth of improvement to the sound of his system. Not a bad return on a fifty pound investment!

**8TC** is the latest and best of the Kimber speaker cables. It is of woven construction with 8 blue and 8 black conductors. Each conductor is Teflon insulated and consists of 7 strands of OFC copper specially treated to increase surface conductivity. Each strand is of different thickness to a ratio 1:10.

**4TC** is the same as 8TC in every respect except for there being only 4 conductors of each colour.

**4VS** is as 4TC but with PVC insulation rather than Teflon. Colours are black and grey.

**4PR** is as 4VS but with untreated copper strands of equal thickness. Colours are black and brown.

**Kimber PSB Interconnect** is the cleanest, most neutral and quietest interconnect cable we have found and partners the TC speaker cables in a system perfectly. The TC speaker cables are very revealing and hitherto acceptable inter-connects may well be revealed as being noisy, 'splashy' or muddy.

**New: KCAG** — A solid, pure silver (99.9999%) version of PCB Interconnect, with Teflon insulation. Utterly gorgeous!

**Kimber Single Strand** wire is available in red, blue and black. TC grade for internal wiring of amplifiers, preamps, etc. The leading American amplifier and loudspeaker manufacturers are now using Kimber Kable for internal wiring. SiderealKap capacitor leads are Kimber TC single strand wire.

**Kimber Mains Lead** is made of 4TC or 8TC cable with an earth wire down the centre, this cable utterly outperforms standard mains cable, solid core and other 'specials' now available.

**In-car Kimber Kable** — If you have never tried Kimber Kable in a car stereo installation, then you are really missing out. No ignition noise pickup, no loss to the steel surfaces, and higher power transfer.

We have chosen to distribute Kimber Kable because it is the best. As Nick Taylor, Managing Director of Tan Audio (UK) Ltd (distributors of Tandberg HiFi) put it: "Kimber Kable is three times better and one third the price of my previous 'best' cables." (MIT, Monster, Siltech, Van den Hul and Vecteur.)

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( $10^{-6}$  Henrys) to a basic accuracy of  $0.05\mu\text{H}$ ; parallel capacitance in pF ( $10^{-12}$  Farads) to  $0.1\text{pF}$ ; and DC series resistance in mOhm ( $10^{-3}$  Ohm) to a level of  $1\text{mOhm}$ . Leakage resistance is quoted in MOhms ( $10^6$  Ohms) and represents the DC resistance across the insulator separating signal and return conductors.

The subjective relevance of DC resistance has already been discussed in terms of circulating earth currents. By contrast, a higher than average parallel capacitance ( $>100\text{pF}$ ) implies a dielectric instability, particularly absorption. Such absorption places more stress on the dielectric (especially if the insulating layer is very thin) and

may be found to influence low frequency resolution audibly. Both a high capacitance and inductance ( $>1\mu\text{H}$ ) will tend to lower the primary RF resonance and thereby affect the treble quality (grittiness and coarseness in particular) through higher-order HF intermodulation. Some CD players will have pronounced RF earth currents which may interact with the cable's inductance, perhaps causing a sensitivity difference between electronic components.

The mechanical susceptibility (piezo-effect) of each cable was also assessed. A  $1\text{m}$  length of cable was correctly terminated with  $100\text{ohm}$  and  $47\text{kohm}$  and clamped across a vibration jig (it

was important to ensure the connections were not subject to the same vibration). A broadband mechanical impulse was then applied across the surface of the cable some  $60\text{dB}$  greater than that experienced by the cable under normal listening conditions. The plots denote the real output of the cable over eight milliseconds (the frequency domain transformation is not shown).

Note that the vertical (voltage) scale has been reproduced with  $\times 0.1$ ,  $\times 1$ ,  $\times 10$  and  $\times 100$  magnification where appropriate. These fluctuating voltages are caused by pressure (compression) waves travelling through the cable and subsequently encouraging

charge displacement through the dielectric from one conductor to the other. Time lags and residual vibrations in unclamped cores may result in a sporadic, protracted outputs.

To appreciate the subjective relevance of the quoted outputs, each voltage should be divided by  $1000$  ( $60\text{dB}$ ) to obtain a domestically realistic level of microphony. Similarly, the HF noise floor should also be reduced by  $60\text{dB}$ . With both figures suitably normalised, it is simple to determine for instance, whether a cable is suitable for tonearm use, this type of cable traditionally handling the lowest mean voltage levels in the system.



## INTERCONNECTS: CONCLUSIONS, BEST BUYS AND RECOMMENDATIONS

*Paul Miller concludes with summaries of the best interconnect cables under review.*

The prices people are prepared to pay for interconnects appear to know no bounds; the fact that you can be charged nothing or £800 for something that does (arguably) the same job is certainly a sobering fact. However, as with all things hi-fi, some products are simply more efficient than others at their allotted tasks, even though there is no strict relationship between cost and performance.

Try not to be fooled by the crazy prices charged for some cables. If in doubt try carrying out blind listening before choosing between alternatives.

Most new cables actually benefit from a short 'running in' period. Quite often, a cable's preferred orientation will depend on the direction in which it is first used, if this is then reversed, the cable may sound worse. If in doubt follow the manufacturer's suggestions.

Cables that offered both excellent material and sonic value for money were awarded Best Buy status; those above £50 are restricted to Recommendation where appropriate.

### BEST BUYS (UNDER £50)

**QED Incon** cable represents an ideal upgrade from budget 'hook-up' leads, while the price is more than reasonable considering the build quality and bright packaging. For £2-3 more the elegant **MYST Tm** interconnect is a real snip, and offering more than a taste of the high life at this bargain basement level.

At slightly higher cost both **Kimber PSB** and **Deltec Slink** lead the field in their respective territories, with very transparent and uncoloured reproduction. (It is probably no coincidence that each adopts a similar topology with high grade PTFE dielectrics.)

### RECOMMENDED (UNDER £50)

At the very bottom end of the price scale the graphite screened **QED Incon** interconnect is joined by a newcomer from **Monitor PC**. Both cables are under £20, and their material worth outweighs their subjective value in the context of a recommendation. **DNM solid core** fares well on listening,

provided short lengths are used, though it does seem a little expensive in terms of its construction. This is especially true when one considers that both the **Audio Note Copper** and **Monster Interlink 400** are pitched at the same price point.

Nearer the top-end, both the **Audioquest Livewire Ruby** and the excellent **Sony RK-C310ES** offer fine value with a commensurately fine sound. **Vecteur** also squeezes in below the £50 barrier with well deserved Recommendation.

### RECOMMENDED (OVER £50)

The PTFE insulated **Audioquest Quartz** shows this new entrant can also compete in the upper echelons of the cable market. Successfully building on the qualities of the cheaper cables, this particular range shows a gratifyingly pronounced sonic hierarchy. **Audio Note** are one of the few companies that have succeeded in producing a very flexible interconnect (the **Flexible Silver**) that also possesses the right electrical qualifications for tonearm duty. Moving beyond the UK briefly,

**Aural Symphonics AS-One** may currently be restricted to US availability, but a considered Recommendation might help encourage UK distribution.


Other Recommended designs include the two **Van den Hul** cables, **MC-D300II** and **MC-D102II**, which represent a fair compromise between cost and quality - unlike the more costly VdHs. **Kimber KC-AG** utilises a fair amount of solid silver, so its high cost is to some extent justifiable, though the sound quality could still be improved slightly. **MIT PC-squared** is very new on the scene; forget the marketing hype, because this cable can make a favourable enough impression simply through listening.

Top of the pile, however, must be the unwieldy, though not unattractive, **Deltec Black Slink**, which offers unsurpassed neutrality and transparency at a very fair price considering its material content. But always remember, high prices do not necessarily mean top sound quality.

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
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ASTON AUDIO, 4 West St, Alderley Edge (0625) 582704. Wide selection of equipment in N.W. Two year guarantee. Dem facilities: 3 dem rooms, appointment required. Open 10.6 Tues-Sat. Home trial facilities, free installation. Instant credit up to £1,000. Credit cards: Access, Amex, Diners, Visa. Service dept. BADA MEMBER 

DOUG BRADY HI FI, Kingsway Studios, Kingsway North, Warrington (Padgate 0925) 828009. 1986 Sony/Hi-Fi News Best Dealer in N.W. England and Wales. Largest choice of specialist Hi-Fi in N.W. \$100-\$20K. All credit cards, 3 Dem Rooms, Dem facilities. BADA MEMBER 

HI FI CENTRE, Green Lane, Wilmslow SK9 1JQ. Tel: (0625) 522112/524766. B&O, Technics, Sony, Panasonic, Nakamichi, Quad, Revox, Teac, Harman Kardon, Marantz, Demonstration facilities - no appointments required, Open 9-1, 2-5.30 (closed Wed), Open all day

Sat. Home trial facilities, free installation, credit facilities. New customers up to £500 credit. Credit cards: Access, Visa, American Express, Diners Club, Wilmslow Card. Service dept. available.


NEW DAWN HI-FI, 1-3 Castle St, Lower Bridge St, Chester (0244) 24179. Linn, Quad, Technics, National Panasonic, Denon, Rotel, Dual, Meridian, Aiwa, Philips. Dem facilities: 2 dem rooms. Open 9.00-5.30 Mon-Sat, closed Wed. Free installation, instant credit. Credit cards: Access, Visa, Trustcard. BADA MEMBER 

SWIFT OF WILMSLOW, 4-8 St Annes Parade, Wilmslow (0625) 526213. A&R, Aiwa, Denon, Dual, Marantz, Mission, Monitor-Audio, Pioneer, Trio, Yamaha, NAD. Dem facilities available. Open Mon-Sat 9.15-5.45. Closed 1-2 Lunch. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa. Service dept. BADA MEMBER 

## CORNWALL

TRURO HI-FI & E.T.S. Ltd, 25 King St, Truro (0872) 79809. A&R, Denon, Dual, Heybrook, Linn, Mission Cyrus, Nad, Quad, Rotel, Thorens. Dem facilities: Single speaker studio. Open Mon-Sat 8.45-5.30. Home trial facilities, credit up to £1,000. Credit cards: Access, ETS Visa. Service dept.


## DERBYSHIRE

ACTIVE AUDIO, 12 Osmaston Rd, The Spot, Derby (0332) 380335. Meridian, Mission, Denon, Yamaha, Rotel, A&R Cambridge, Monitor Audio, Trio, Marantz Demonstration facilities. Open 9.30-6.00 - early closing Wednesday. Home facilities: credit up to £1,000. Credit cards: Access, Barclaycard, Diners, American Express. Service dept. BADA MEMBER 

## DEVON

PETER RUSSELL HI-FI ATTIC, 58 New George St, Plymouth, Devon (0752) 669511. Quad, Linn, Mordaunt-Short, A&R Cambridge, Revolver, Heybrook, Denon, Harmon-Kardon. Dem facilities - no appointment required. Open Mon-Sat 9.30am-5.30pm. Home trial facilities. Free installation. Credit facilities: Credit cards: Visa, Access. Service dept.

## ESSEX


AT LABS, 442/4 Cranbrook Rd, Gants Hill, Ilford (01) 518 0915. Open Mon-Sat, 10-6. Two single speaker dem rooms. Credit cards: Access, Amex, Visa. BADA MEMBER 


RAYLEIGH HI-FI, 44a High Street, Rayleigh, Essex (0268) 779762/747571. 216 Moulsham St., On-the-Parkway, Chelmsford, Essex (0245) 265242. A&R, Audiolab, Beyer, Blq, Cyrus, Celestion, Denon, DNM, Epos, Gale. Access and Visa 3 years parts and labour guarantee on hi-fi systems.

BRENTWOOD MUSIC & HI-FI CENTRE, 2 Ingrave Rd, Brentwood (0277) 221210. Alphason, B&W, Cambridge Audio, Denon, Harmon Kardon, Marantz, QED, Quad, Yamaha. Dem facilities available. Open Mon-Sat 9.30-5.30 (Thurs from 10am, Sat from 9am). Home trial facilities, free installation, credit facilities. Credit cards: Access, Visa, Hi-Fi Markets. Service dept.

LYON AUDIO, 16 Peartree Business Centre, Peartree Road, Stanway, Essex CO3 5JN. (0206) 560259. QED, Rogers, Denon, Systemdek, Nad, Rotel, Pink Triangle, J.A. Michell, Quad, Gale Marantz. 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. BADA MEMBER 

ROBBS OF CHELTENHAM 3 Clarence St Cheltenham (0242) 584404. Sansui pure hi-fi, Kenwood, Sony ES Dual, Technics QED, Heybrook. Dem facilities: Open 9-5.30 Mon-Sat. Instant free credit. Credit cards: Visa, Access. Service dept.


## HAMPSHIRE

ABSOLUTE SOUND AND VIDEO, 4 Feathers Lane, Basingstoke, Hants RG21 1AS. (0256) 24311. A&R, Audiolab, Denon, Dual, Linn Mission, NAD, Rotel, Technics, Yamaha. Dem facilities: Open: Mon, Tues, Thurs, Fri 9.30-6.00. Sat 9.30-5.30. Closed Wed. Home trial facilities. Free installation. Credit facilities. Credit cards: Access, Barclaycard, Connect, Amex. Diners. Service dept.

HAMPSHIRE AUDIO Ltd, 2-12 Hursley Rd, Chandlers Ford (0703) 252827/265232. 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.

## HERTFORDSHIRE

ACOUSTIC ARTS Ltd, 101 St Albans Rd, Watford, Herts (0923) 45250. A&R, Audiolab, Denon, Magneplanar, Quad, Rogers, Meridian, TDL, Jadis, Krell. Dem facilities: 2 dem studios, ring for appointment. Open Mon-Sat 9.30-5.30. Home trial facilities, free installation. Instant credit up to £1,000. Credit cards: Access, Visa. Service dept. BADA MEMBER 

THE AUDIO FILE, 40 Hockerill St, Bishops Stortford, Herts (0279) 506576. Linn, Roksan, Rega, Naim, A&R (Camb), Heybrook, Rotel, Denon, Epos, QED. Demonstration facilities, no appointment required. Open 9.30-5.30 Mon-Sat. Home trial facilities. Free installation, credit facilities up to £1,000. Credit cards: Access, Visa, Diners, Amex. Service dept. available.

W DARRY & CO Ltd, St Peter's St, St Albans (0727) 50961. B&O, Sony ES, Quad, A&R Cambridge, Revex, 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.

## KENT

JOHN MARLEY HI-FI CENTRES, 2 Station Rd West, Canterbury (Canterbury) 69329. Also at Dover - (0304) 207562. B&W, Heybrook, Magnum, M.Y.S.T., Nakamichi, Pink Triangle, Rotel, Sansui, Technics, Quad. Dem facilities available. Open Mon-Sat 9.00-5.30 closed Thurs. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa, Creditcharge. Service dept.

## LANCASHIRE

CLARTONE 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. BADA MEMBER

## LONDON

A.T. LABS, 159 Chase Side, Enfield, Middlesex. (01) 367 3132. Open Mon-Sat 10-6. Two single speaker dem rooms. Export worldwide. Service dept, car park. Amex, Visa, Access. BADA MEMBER

AUDIO T, 190 West End Lane, London NW6. (01) 794 7848. Open Mon-Sat, 10-6.00. Two single speaker dem rooms. Access, Amex, Visa. BADA MEMBER

CORNFLAKE SHOP, 37 Windmill Street (just off Tottenham Court Road), London W1. (01) 631 0472. 10am-7pm, Mon-Sat. Cambridge, DNM, Epos, Koetsu, Naim, PS Audio, Roksan, SME, Van den Hul. Excellent demonstrations, 2 demo rooms, full delivery and installation service. Full credit facilities. Credit cards: Access, Visa.

COVENT GARDEN RECORDS, 84 Charing Cross Road. (01) 379 7635/7427. Quad, B&W, Meridian, Mission, Yamaha, Sony, Philips, A&R Cambridge, Nakamichi, Rotel. Dem facilities - no appointment required. Open Mon-Sat 10am-7.30pm. Home trial facilities, free installation - to suit the customer. 7.30am-11.30pm weekdays, 9am-9pm weekends. Credit cards: Access, Visa, American Express, Diners Club. Service dept.

DOUG BRADY HI-FI, 18 Monmouth St, London WC2H 9HB. (01) 379 4010. Wide range of top specialist hi-fi from Britain, America and Japan. Dem facilities. 3 Dem rooms. All credit cards. BADA MEMBER

GRAHAMS HI-FI, 86-88 Pentonville Rd, London N1. (01) 837 4412. 'FBA Dealer of the year 1985'. Linn, Naim, Rega etc. £300-£3,000-£13,000. BADA MEMBER

H.L. SMITH & Co Ltd, 287-289 Edgware Rd, London W2 1BE. (01) 723 5891. Aiwa, B&W, Denon, Dual, KEF, Ortofon, Panasonic, Sony, Technics, Yamaha. Dem facilities available. Open Mon-Sat 9-5.30, Thurs 9-1, instant credit up to £1,000. Credit cards: Access, Visa, Diners. Service dept.

KJ WEST ONE, 26 New Cavendish St, London W1M 7LH. (01) 486 8262. A&R Cambridge, Audio Lab, B&W, Audio Res - Krell, Rogers, Gale, Musical Fidelity, Linn, Magnea Pan, Nakamichi. Dem facilities available - appointment required. Open Mon-Sat 10am-6pm. Limited home trial facilities. System Design & Installation. Credit facilities - Credit cards: Visa, Access. Service dept available. BADA MEMBER

SUBJECTIVE AUDIO LTD, 12 Park Avenue, Palmers Green, London N13 5PF. (01) 882 4975. Air Tangent, Apogee & Alphasound, Audio Research, Koetsu, Krell, Magneplanar, Meridian, Nakamichi, Oxford Acoustics, Tandberg. Dem facilities: 2 single speaker dem rooms, appointment required. 10-6 Tues-Fri, 9-5 Sat. Home trial facilities. System design & installation service. All major credit cards. Service dept.

TELESONIC Ltd, 92 Tottenham Court Rd, London. (01) 636 8177. A&R, B&O, B&W, Hafler, 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

## MANCHESTER

CLEARTONE HI-FI, 62 King St, nr Kendals. (061) 835 1156. Best makes, Linn, Creek, NAD, Naim, etc. Dem studio, Compact Disc centre, video and TV. BADA MEMBER

## MERSEYSIDE

ABOUT SOUND, 116 Bold St, Liverpool L1 4JA. (051) 709 4865. Mordaunt-Short, Musical Fidelity, Myst, Quad, Revox, Sansui, Sugden, Thorens, Walker, Yamaha. Dem facilities, single speaker room. Ring for appointment. Open Tues Sat 9-5.30. Free installation, instant credit up to £1,000. Credit cards: Access, Diners, Visa. Service dept.

WA BRADY & SON, 401 Smithdown Rd, Liverpool. (051) 733 6859. Largest choice of specialist Hi-Fi in N.W. £100-£20K. All credit cards. 3 dem rooms.

BADA MEMBER

## NORFOLK

SOUND APPROACH, 161 Unithank Road, Norwich (0603) 622833. Ariston, AR, Claymore, Castle, Elite Rock, Haybrook, Matra, Musical Fidelity, Revolver, Yamaha. Dem facilities. Open 9-6.30 Mon-Sat. Home trial facilities. Free installation. Credit up to £1,500. Credit cards: Visa, Access, Diners Club. Service dept available.

## WEST MIDLANDS

SOUND ADVICE, 182 Alcester Road, Moseley, Birmingham B13 8HS. (021) 449 3328. A&R, Creek, Linn, Epos, Mission Cyrus, Naim, Rega, Roksan, Rotel, Yamaha. Dem facilities, domestic size and furnished studios. Callers welcomed. Demonstrations by appointment. Open 9.30-6pm Tues Sat. Free installation. Credit facilities. Credit cards: Access, Amex, Visa. Service Dept.

BADA MEMBER

ALTERNATIVE AUDIO LTD, 93 95 Hobs Moat Rd, Solihull. (021) 742 0254 (sales), 0248 (service) A&R, Audiolab, Denon, KEF, Marantz, Meridian, Mission, M.A., The Source, Philips. Dem facilities available, appointment required. 10-6 Tues-Sat, closed Mon. Home trial facilities, 3 demo rooms, service dept, free installation, instant credit. Credit cards: Access, Visa, Amex.

FIVEWAYS HI-FIDELITY LTD, 12 Islington Row, Edgbaston, Birmingham. (021) 455 0667. A&R, Denon, Dual, KEF, Meridian, Musical Fidelity, Nakamichi, Philips CD, Quad, Revox, etc. Dem facilities. Single speaker dem room. Open 9.30-6 Tues Sat. Home trial facilities, free installation, credit facilities. Credit cards: Access, Visa. Service dept.

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

NORMAN H FIELD LIMITED, 35-37 Hurst Street, Birmingham B5 4BJ. (021) 622 2323/3619. AR, B&W, Denon, Dual, Monitor, Audio, Kenwood, Mordaunt Short, NAD, Technics, Yamaha. Dem facilities available. Open 9.15-6.00, Saturday 9.00-6.00. Closed Weds. Home trial facilities on selected systems. Credit up to £1,500. Credit cards: Access, Visa. Service dept.

## OXFORDSHIRE

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

ASTLEY AUDIO LTD, 3 Market Place, Wallingford. (0491) 39305/34349. A.R. Dual, Kenwood, Mordaunt-Short, Mission, Monitor Audio, Philips, Technics, Tannoy, Yamaha. Open Tues-Fri 9-5.30, Sat 9-5. Records, tapes and 1000+ CDs. Service dept. Access, Visa, Diners.

WESTWOOD AND MASON, 46 George St, Oxford (0865) 247783. Linn, Naim, Rega, A&R, Heybrook, Dual, Mordaunt Short, Spondor, Tannoy, Quad, etc. BADA MEMBER

WITNEY AUDIO, 28 High St, Witney, Oxford. (0993) 2414. A&R, Aiwa, Akai, Dual, KEF, Mordaunt Short, Pioneer, Philips, Sony, Yamaha. Dem facilities. Open Mon Sat 9-5.30. Free installation, instant credit up to £1,000. Credit cards: Access, Visa. Service dept.

## SHROPSHIRE

AVON HI-FI Ltd, 12 Barker St, Shrewsbury. (0743) 55166. A&R, B&W, JBL, Dual, NAD, Nakamichi, Revolver, Trio, Quad, Yamaha. Dem facilities available. Open Mon Sat 9-5.30, closed Thurs. Home trial facilities, free installation, instant credit up to £1,000. Credit cards: Access, Visa. Service dept.

## 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, 163 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

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, Magnum, NAD, Pt. Quad, Revox. BADA MEMBER  
TRU FI SOUND AND VISION, 2 Cromwell Rd, Redhill, Surrey. (0737) 66128. Akai, Aiwa, Band W, Nakamichi, Hitachi, JPV, Mission, Mordaunt Short, Nagaoka, Sony, Technics. Dem facilities available. Open Mon-Sat 9.30-6.00. Free installation, instant credit up to £1,200. Credit cards: Access, Visa. Service dept.  
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

## SUSSEX (EAST)

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.

BADA MEMBER


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-

# SELECTED DEALER DIRECTORY

5.30, Weds 9-1. Home trial facilities free installation, instant credit up to £1,000. Credit cards: Access, Visa. Service dept.

**CHICHESTER HI FI**, 40 Little London, Chichester PO19 1PL. Tel: (0243) 776402. Linn, Naim, Rega, Creek, Nakamichi, A&R, Denon etc. Demonstration facilities available - no appointment required. Open Tues-Sat, 10-1, 2-5.15 (closed Mon.) Free installation. Credit cards: Access + Visa. Service dept. BADA MEMBER 

## 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 dem rooms. 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)

**AUDIO PROJECTS**, 45 Headingley Lane, Leeds. (0532) 304565. 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 

**ERRICKS**, Hi-Fi Experience, Fotosonic House, Rawson Square, Bradford. (0274) 309266. Dem facilities. Sales/service agents for A&R, Linn, Quad, Naim, Nakamichi, Mission etc. BADA MEMBER 

**HUDDERSFIELD HI-FI CENTRE**, 4 Cross Church St, Huddersfield. (0484) 544668. V.W. Loudspeakers, Kenwood, Harman Kardon, Denon, Duo, A&R Cambridge, Musical Fidelity, Quad, NVA, Audio Lab, and many more. Dem facilities - appointment required. Open Mon-Sat 9.00-5.30. Thursdays 9.00-8.00. Closed Wednesday. Free installation. Credit facilities. Credit cards: Access, Barclaycard. Extended guarantee facilities.

**IMAGE HI-FI Ltd**, 8-10 St Annes Rd, Headingley, Leeds. (0532) 789374. AR, Audio Lab, Denon, Linn, Marantz, Meridian, Mission, Monitor Audio, NAD, Quad. Three dem rooms. Open times: Mon-Fri 9.30-6.00. Sat 9.00-6.00. Home trial facilities. Free installation. Instant credit up to £1,000. All major credit cards accepted. Service dept. BADA MEMBER 

## IRELAND

**CLONEY AUDIO**, 34 Main St, Blackrock, Co. Dublin. 0001 889449. Linn, Roxan, Naim, Rega Research, Rogers, Spondor, Musical Fidelity, Cambridge Audio. Open Tues-Sat 10-6.00pm. Thurs & Fri open till 9.00pm. Free installation. Credit cards: Visa, Access. Service dept.

## SCOTLAND

### ANGUS

**ROBERT RICHIE HI-FI**, 102 Murray, Montrose, Scotland.

(0604) 73765. A&R, Creek, KEF, Linn, Naim, Quad, Rega, Sony, Technics, Wharfedale. Dem facilities available, ring for appointment. Open 9-1, 2-5 Mon-Sat, Wed 9-1. Home trial facilities, free installation, instant credit. Credit Cards: Access, Visa. Service dept.

## EDINBURGH

**BILL HUTCHINSON Ltd**, 43 Clarke St, Edinburgh. (031) 667 2877. AR, Aiwa, Denon, Dual, JVC, Mission, Mordaunt-Short, Omar, Technics, Yamaha. Dem facilities available. Open Mon-Sat 10-6. Free installation. Instant credit. Credit cards: Access, Visa. Service dept.

## GLASGOW

**BILL HUTCHINSON Ltd**, 43 Hope Street, Glasgow. (041) 248 2857. A.R., Aiwa, Denon, Dual, JVC, Mission, Mordaunt-Short, Omar, Technics, Yamaha etc. Dem facilities available. Open Mon-Sat 10-6. Free installation, instant credit. Credit cards: Access, Visa. Services dept.

## WALES


### CLWYD

**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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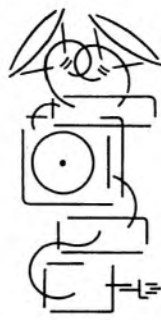
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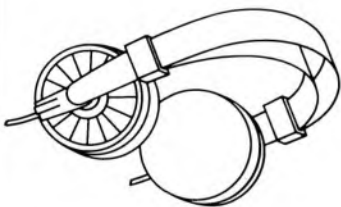
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Pre-packaged one-make systems have been commercially very successful, with advantages like cosmetic consistency, competitive pricing, and (assumed) technical compatibility. However, despite the mass market clout of the consumer electronic giants, the 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

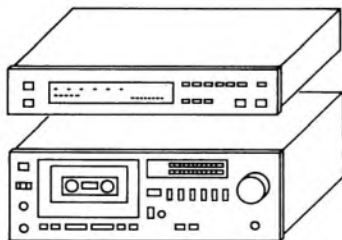
The key advantage of separates is

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.

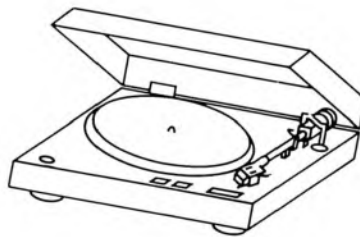
There will always be controversy over the relative qualities of LP, CD and cassette, with earnest protagonists often trying to advance their prejudices by rubbishing rivals. LP is still the choice for ultimate sound quality – particularly for those prepared to



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.

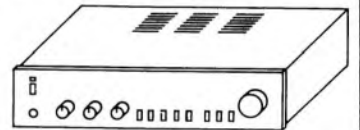
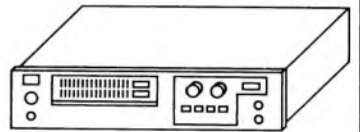
Cassette has never really challenged vinyl's potentially superior quality, but it is a multiple role format, offering 'go anywhere' flexibility, a uniquely useful recording capability, plus a broad catalogue of pre-recorded musicassette material. Although there are several potential rivals for recording 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.

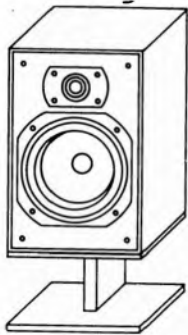


## A MATTER OF PRECEDENCE

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.

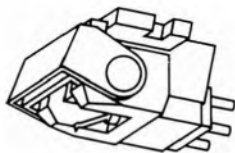
## MAXIMISING POTENTIALS

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

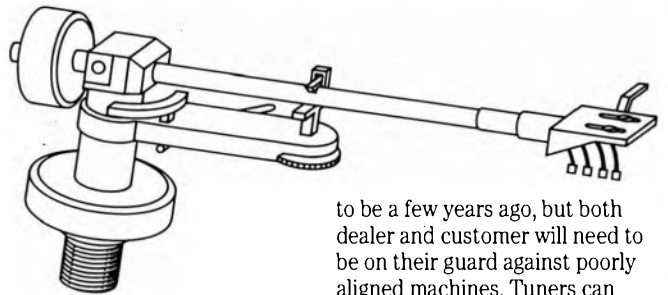
placed wall-hanging, say above a fireplace, can work wonders in removing an unpleasant 'flutter echo' effect, while a decent carpet is almost mandatory. 'Live' rooms are usually those that are sparsely furnished with hard wall coverings, so the overall live/dead acoustic balance can often be modified 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

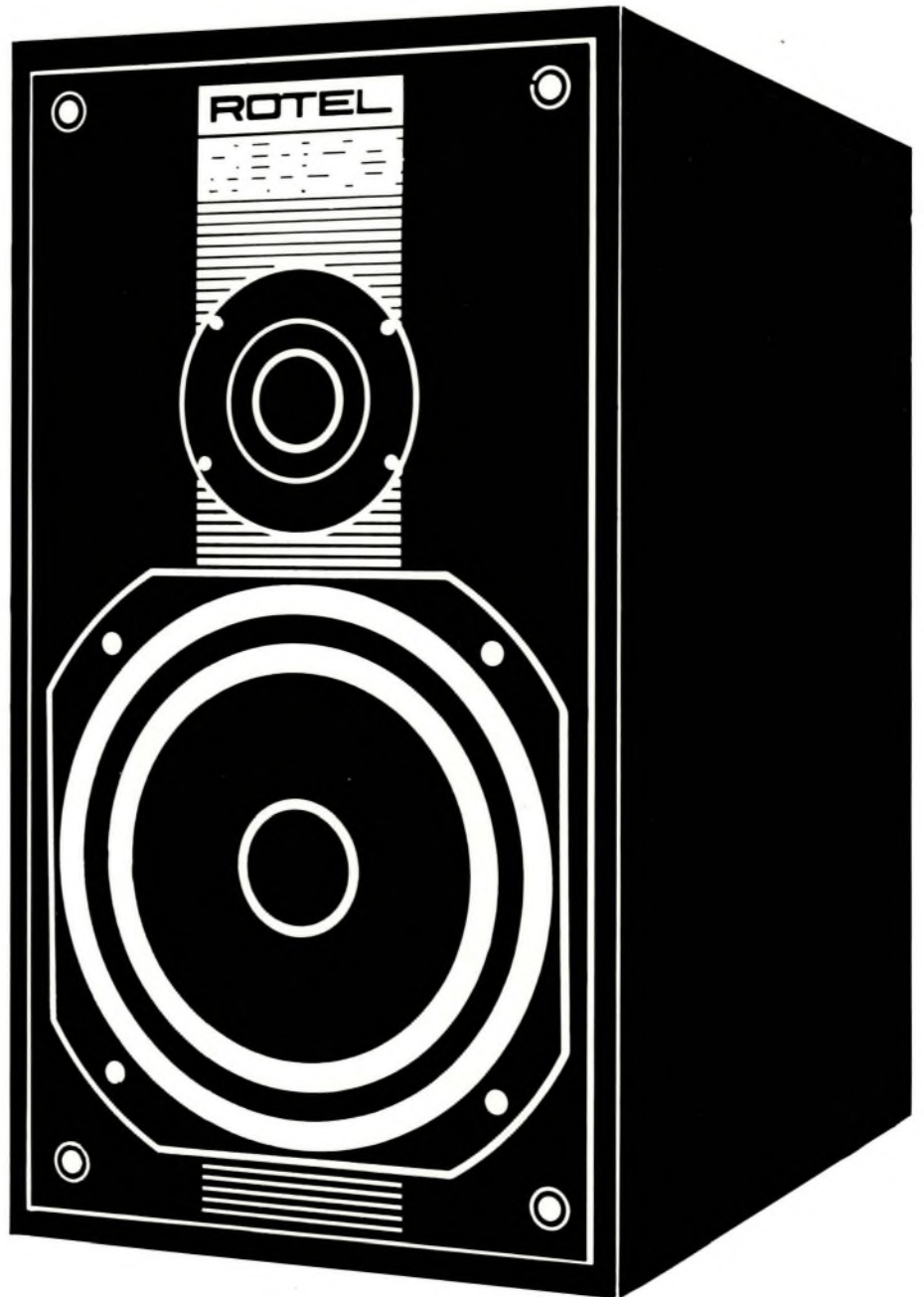
to be a few years ago, but both dealer and customer will need to be on their guard against poorly aligned machines. Tuners can occasionally suffer similar problems, though this is even more unusual; most radio difficulties are likely to come from an inadequate or inappropriate aerial, after skimping 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.

# RECOGNITION



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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 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).

BB = Best Buy  
R = Recommended

### INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research EB101 £230	Good Good	This genuine high fidelity product offers an impressive package at a competitive price	Subchassis, manual, 13.5g	BB	48
Akai APA201 £80	Poor Average –	It 'lived down' to our expectations sounding 'dead' and 'smeared', with little depth and poor bass	Solid, auto return, 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	55
Ariston Q-Deck £140	Good Average +	Well engineered and good sounding low cost package which is both easy to set up and to use	Semi-auto, belt drive, solid	BB	55
Ariston RD60 £219	Good Good	With the Enigma arm, this balanced and communicative turntable falls only slightly short of the RD90 on sound quality	Manual, belt drive, subchassis, 11.5g	BB	48
Ariston RD40 Q/Enigma £388	Average + Good	Worth considering for stylish appearance and decent performance, but undermined by RD60 in value for money terms	Man/electronic, belt drive, subchassis, 11.5g		48
Bang and Olufsen TX2 £288	Average + Average +	Fully automatic, it can interface to B&O's remote control system, is attractively styled and even sounds respectable!	Automatic, belt drive, subchassis, 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	55
Dual CS5000 £200	Average Average +	The rare 78 facility may give grandma's collection a new lease of life but the player did not merit recommendation on price vs sound	Electronic, belt drive, subchassis, 10g		48
Heybrook TT2 turntable & arm £279/£249	Average Good +	A gradual process of informed evolution and a sensibly designed arm combine to make this a good sounding middle of the road package. Well supported by dealers	Manual subchassis motor with arm, belt drive, 14g	R	55
Linn Axis £345	Good + Good +	Setting new performance-for-price standards this cleverly engineered and competent deck has many of the qualities of the Sondek LP12	Electronic, belt drive, semi subchassis, 13g	BB	48/Col
Linn Sondek/Ittok (Troika) £471/£399 (£625)	Excellent Excellent	Superb sound – the best LP12 combination yet. The Troika gives the system real solidity and strength, stretching the deck and arm qualities to the full	Manual subchassis player, belt drive, 14g	R	55
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
Manticoire 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/Col
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, 5g	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 'wellie'	Manual, solid, belt drive, unipivot, 11g		55
Rega Planar 2 £135	Average + Good	A remarkable product at the price, surprisingly articulate and confident	Integrated turntable, manual, 11.5g	BB	48
Rega Planar 3 £188	Good Good	A long time leader in its price category, the '3' (with its excellent RB300 arm) scudded 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, prefitted cartridge		55
Rotel RP-830 £160	Average Average	Reasonable sound, but nothing to get excited about. Bass quality not well integrated, but control OK. mid/top are fine	Manual, integrated, belt drive, solid, inc cartridge	R	55
Source/Odyssey RP1 From £1,884	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, onboard PSU, 15g		55
Systemdek II £199	Good + Good	Rating above average for its price the II sounded open and clear, if a bit soft in the bass	Manual/electronic, belt drive, subchassis, 15g	BB	48
Systemdek IIX £199	Good + Good	The more conventional appearance of the IIX has made it popular, performing competently, but essentially sounding similar to the II	Manual/electronic, subchassis, 15g	BB	48
Technics SLBD-22 £90	Average – Average –	Not bad for the price and a great improvement on the L20, it performs reasonably when not stretched	Semi-automatic, solid plinth, electronic, 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-DD33 £140	Average Average	The quartz speed controlled version of the DD is short on sound quality but not features. But it did have fair focus and some depth	Automatic, Quartz, direct drive, solid plinth, 7.5g P-mount	R	48
Thorens TD280 £159	Average Average	Not impressive in the context of other Thorens models. The sound was considered lively if somewhat coarse and brash	Electronic, solid plinth, 12.5g		48
Thorens TD166III £179	Good Good	Old turntables never die, this revived 166 yet again takes its place near the top of its class	Auto lift, subchassis, 7g	BB	48

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 52

# DIRECTORY

## INTEGRATED TURNTABLES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES ARM EFF. MASS	VALUE	BACK ISSUE FULL REVIEW
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 pro quo is a certain lack of pace, energy and resolution	Belt drive, subchassis, electronic		55
Audio Labor Konstant £2,560	Good+ + Very Good	The space-station-like solid alloy frame needs a substantial shelf, but absolute stability renders a confident, neutral sound	Belt drive, subchassis	R	48/Coil
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 balance	Manual, belt drive, solid, arm damping, various optional extras	R	55
Goldmund Studio £2,350	Very Good Excellent	A reference point for high end audio, only exceeded by the even more extravagant Reference. Currently being reworked into a more competitive (!) package	Electronic, direct drive, solid subchassis	R	Coil
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	55
Michell Gyrodec £595	Good Good	Sweet and natural sounding player, well exploited by the Rega RB300 arm. Aesthetics, and the acres of acrylic, are unique	Manual, belt drive, suspended motor unit		55
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/Coil
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	55
SEE Revolver £127	Average Average	Nicely balanced, but unimpressive timing and lightweight bass made this deck rather average for the price. Manufacturer has since made several changes, but not re-submitted for review	Manual, belt drive, solid plinth		48
Systemdek IV £448	Good+ Good+	Clarity and definition in the midrange and treble were outstanding. It was better for firm support; less happy on floor tables	Electronic, belt drive subchassis	R	43
Thorens TD160S Mk IV £225	Average Average+	Good value suspended sub-chassis turntable which doesn't need specialist setting up, and which performs consistently and well. Bass is a little over-warm	Manual, belt drive, subchassis motor unit	R	55
Thorens TD521 £625	Average Average+	Nice product. Unexciting, rather undynamic and insubstantial sound quality, but facilities compensate	Manual, belt, suspended motor unit, 78rpm, pitch control, 12" arm/16" records		55

## 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/Coil
Alphason Opal £110	Good Average	This is a straightforward adequate sounding low cost arm, priced just above where it rightly belongs	10g		55
Alphason Delta £165	Good Average+	A highly competent design from Alphason gives good sound quality but with slight blurring and treble fizz	16g	R	48
Alphason Xenon £210	Good Good+	A trimmed down HR100S, the Xenon has inferior bearings and a simpler finish, but sounds crisp and coherent. Fits any Linn cutout	12.75g	R	55
Alphason HR100S £395	Good+ + Very Good	This S-shaped arm sounds smooth, but nevertheless reproduces transients with fine attack	10g	R	48/Coil
Ariston Enigma £99	Average Average+	Good but not the best in its class: mid-band sounds a little uneven; treble a trifle "brash"	11.5g		48
Audio Technica AT1120 £132	Good Average+	This low effective mass (5g) arm suits fairly high compliance MM cartridges; gives pleasant tonal balance with good stereo imagery	5g		35
Decca International £49	Average+ Average+	This uni-pivot design gives a rather rich tonal balance and some bass muddling. Could be good with Decca cartridges, but not well built	12g		48Summary
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/Coil
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	Coil 2
Grace G707 £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/Coil
Linn LV Plus £129	Good+ Good	The fixed headshell provides an improvement over the LVX resulting in better clarity, detail and punch	13g	BB	48
Linn Ittok LVII £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/Coil
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/Coil
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		55
Moth Arm £65	Good Good+	The ultimate budget arm? Refined, detailed, sweet and natural – performance improves in line with the rest of the system	12g	BB	55
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/Coil
SME 3009 Series IIS £156	Good Average+	A simplified less flexible (as regards adjustment) Series III with a similarly 'soft' sonic character	5g		48

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

# DIRECTORY

## TO NEARMS

NAME PRICE	LAB SOUND	COMMENTS	ARM EFF. MAS	VALUE	BACK ISSUE FULL REVIEW
SME 3009 Series III £216	Good Average+	Comprehensively adjustable and very well made, suited to MM and high compliance MC cartridges	5g		48
SME 3009R £272	Average+ Average+	A higher mass version of the Series III designed for low compliance MC cartridges	12g		48
SME Series IV £675	Excellent Very Good	Superb engineering and finish with a finely balanced sound giving impressive stereo focus and low coloration	10.5g	R	55
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/Coil
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/Coil

## 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).  
BB = Best Buy  
R = Recommended

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 gangs. 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 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	Priced 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 + Good +	Technically and subjectively this cartridge represents a new dawn for AT, in the twilight of analogue audio	6-13g Low	R	54
Azden YM10VE £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&O MMC5 £21	Average + Average	Cheapest in the family – smooth treble and good focus, but the bass was left in the wings	5-15g Normal		38 (Summary)
B&O MMC4 £33	Good Average +	Solid and well balanced in the midrange, the '4 lacks bass impact	5-15g Normal		48
B&O MMC3 £50	Good Average	Slightly "laid back" sound quality but a good performer for the price. Best suited to B&O equipment	5-15g Normal		48
B&O MMC2 £75	Good Average +	Only a modest improvement on its cheaper brothers (and sisters)	5-15g Normal		48
B&O MMC1 £97	Very Good Good	Great clarity and detail at high frequencies but a slightly plodding bass. It may appeal more to the classical enthusiast	5-13g Normal		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/Coil
Clear Audio Gamma £285	Average Average +	Brimming over with enthusiasm, the unusual-looking Gamma is more than an audio oddity, but it lacks a little subtlety at times	4-11g Low		54

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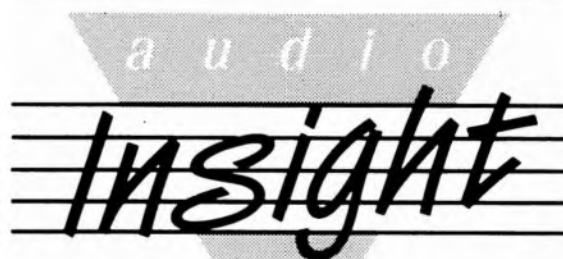


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# DIRECTORY

## CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM AMP MATCHING	VALUE	BACK ISSUE FULL REVIEW
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
Clear Audio Pradikat £1225	Average+ Very Good	Sounded absolutely glorious, creating a full sense of scale and a large well-focused soundstage – but watch for record wear	8-18g		Coll
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 a 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 DVI0X IV £60	Average Average+	Fine sounding and realistically priced, damping is recommended to ensure successful tracking ability	8-18g R Normal £		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–	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 generally satisfactory sonic delivery – consider this model	5-10g Normal		48
Grado XTE + £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	Downtilting 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 £395	Average+ Good	Solid performance from a very solid cartridge but lacks some of the magic of other Kisekis. Compliance too high	5-12g Low		54
Kiseki Purpleheart Sapphire £675	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 fizz. Listen before deciding	6-18g Low	R	48/Coll
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/Coll
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 £69	Average Good	Linn threw this model into the leading pack by beefing up the Basik's bodywork, adding a super stylus, and keeping the price fair	6-15g Normal	BB	48/Coll
Linn Asaka £279	Good+ Good+	Disciples of Linn who are trying to realise their true “Karma” may find that saving money is not a short cut to heaven	9-18g Low	R	48/Coll
Linn Karma £435	Very Good Very Good	A specialist which is strongly recommended for Linn-based systems; results may be less predictable in more general application	9-18g Low	R	48/Coll
Linn Troika £625	N/A Very Good	Ex-Karma users have been seen with glazed expressions indicating smug self-indulgence the morning after fitting a Troika	8-18g Low		Coll
London Maroon £109	Poor Average+	Utterly different from other cartridges, the Maroon combines Heaven and Hell with good bass and midband but poor top-end control	8-16g + damping Normal		48
London Super Gold £248	Average– Good+	Sometimes a bit fierce in emphasising record surface faults, it is perhaps best at revealing the excitement and tension in music	8-20g + damping Normal	R	48/Coll
Madrigal Carnegie One £685	Average+ Good	Looks like a duck but sounds much better, certainly worth auditioning. Compliance too high	5-11g Low		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/Coll
Milltek Olympia £298	Average+ Good+	Warm and detailed sound – packs the punch of the best m-cs 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

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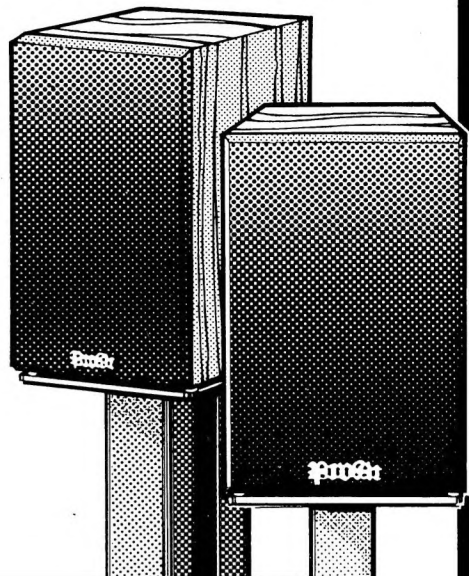
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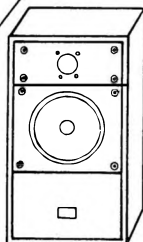
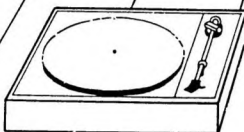
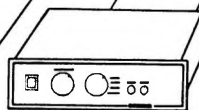
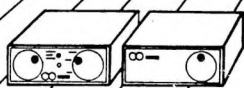
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## CARTRIDGES

NAME PRICE	LAB SOUND	COMMENTS	ARM AMP MATCHING	VALUE	BACK ISSUE FULL REVIEW
<b>Nagaoka MP10</b> £17	Average Average	High frequencies sounded "shut-in" with this spherical-stylus model, but mid and mass were energetic, bouncy and punchy	5-13g Normal	R	48
<b>Nagaoka MP11 Boron</b> £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
<b>Nagaoka MP10SB</b> £40	Average Average +	Stilton's mods have improved the fine detail resolution of this popular budget model	5-15g Normal	R	54
<b>Nagaoka MP11 Gold</b> £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
<b>Nagaoka MP11 Gold SB</b> £70	Average - Average	Excessive price loading for a blob of aluminium	2-6g Normal		54
<b>Ortofon VMS5E II</b> £14	Average Average	Sound quality was thought fair for the price, though a little 'untidy'	8-18g Normal		38 (Summary)
<b>Ortofon OM5E</b> £16	Average - Average -	The OM10 is a hi-fi cartridge - the OM5E is not	5-16g Normal		43
<b>Ortofon OM10</b> £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
<b>Ortofon VMS 10E II</b> £21	Average - Average -	Some of its stablemates fared rather better, and showed less evidence of tracking problems to boot	Normal		38
<b>Ortofon VMS20E II</b> £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
<b>Ortofon OM20</b> £45	Average Average +	This turned out to be the listening panel's favourite among Ortofon's moving magnet models	5-16g Normal	R	48
<b>Ortofon X1</b> £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
<b>Ortofon VMS30E II</b> £52	Average + Average	Rather an old soldier in relation to turntable technology, it will perform undemandingly in demanding circumstances	5-13g Normal		38
<b>Ortofon MC10 Super</b> £65	Average Good	"What a delightfully sweet-sounding cartridge this is..." we said	5-15g Low	BB	48
<b>Ortofon OM40</b> £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
<b>Ortofon X3</b> £75	Average Average	A lack of bass power, definition and a "zitty" top end makes this competent but uninvolving	5-15g Normal		48
<b>Ortofon MC20 Super</b> £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
<b>Ortofon MC30 Super</b> £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		Coil
<b>Ortofon MC2000</b> £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
<b>RATA RP20</b> £22	Average - Average	Good integration, a clear dynamic midrange and the beginnings of fine stereo imagery merits clear recommendation	6-14g	R	48
<b>RATA RP40</b> £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
<b>RATA RP70</b> £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
<b>Rega RB100</b> £38	Average Average +	Remarkable mechanical performance in the right system context, but "try before you buy"	5-12g Normal	R	48
<b>Shure M92E</b> £15	Average - Average	Though lacking depth, the overall sound quality was competent, but treble was not its forte	10-15g Normal		43
<b>Shure M99E</b> £24	Average - Average -	Sister to the 92E this is a solid but not particularly exciting cartridge	5-10g Normal		38 (Summary)
<b>Shure ME75ED</b> £24	Average Average -	Rather bright and splashy in the high frequencies but nevertheless a competent model	5-10g Normal		38
<b>Shure M104E</b> £32	Average - Average	Capable in many ways, but giving no substantial improvement over the 92E in our view	5-15g Normal		38
<b>Shure ME97HE</b> £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
<b>Shure M105E</b> £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)
<b>Shure M110HE</b> £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)
<b>Shure M111HE</b> £67	Average Average	Early reviews of this cartridge complained principally of the price - which has since come down	5-10g Normal		38 (Summary)
<b>Shure ML120HE</b> £95	Average + Average +	Quite decent sound quality and a generally fine balanced performance	6-18g Normal		48
<b>Shure ML140HE</b> £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
<b>Shure V15 VMR</b> £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
<b>Shure Ultra 500</b> £452	Good Good	There was no doubting the accomplishments of what could well be the finest moving magnet cartridge around	6-14g Normal		48
<b>Supex SM100E</b> £115	Average Average +	Delivers as much musical information as many moving coils - the bass in particular having an attractive bounce	6-15g Normal		38
<b>Supex SD900IV</b> £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		48/Coil
<b>Supex SD901IV</b> £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
<b>Supex SDX2000</b> £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
<b>Van Den Hul MC10</b> £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
<b>Van Den Hul MC One</b> £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

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# DIRECTORY

## AMPLIFIERS

The amplifier sits at the heart of the system, processing the outputs from all the various music sources as necessary and then driving the loudspeakers. These two (quite separate) functions are integrated into a single box at the low-to-middle price points; separated pre- and power amplifiers become increasingly common as one moves upmarket. At the upper end of the specialist market, valve amplifiers provide a popular alternative to the transistor types amongst enthusiasts.

There is a substantial difference between specialist (sound quality oriented) amplifiers and the consumer electronics style models. The former

are bleakly simple, avoiding all unnecessary features to provide the most direct signal path in the interests of best sound quality. The latter range from models with just basic tone controls and tape recorder switching, to those with elaborate facilities such as graphic equalisers, remote control (including volume), surround sound options etc. etc.

Lab measurement provides some useful data, particularly in regard to an amplifier's ability to drive a wide range of different types of loudspeakers, but this is only obliquely related to sound quality. We also include our measured power output (RMS, 8ohm load, 1 channel driven) – but

again, paradoxically, this doesn't necessarily correspond to the loudness capability of the amplifier, which has as much to do with the elegance of the overload characteristics within a given system (valve amplifiers invariably sound more powerful than their rating would suggest). The listing of features provides some indication to the complexity of an amplifier: many users prefer to retain the option of tone controls to 'shape' the overall sound according to taste; many others have found living without tone controls surprisingly easy, with additional benefits in terms of transparency.

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>A&amp;R Arcam Alpha</b> £149.90	Average+ Fair	This good all-rounder sounds musical if slightly softened. Good build and presentation	5 inputs hdph MM/MC tone controls 30W	R	50
<b>A&amp;R Arcam Delta 90</b> £329.90	Good Fair	Well balanced and sweet-natured in any given system with MC capability, but pricey	70W MM/MC 5 inputs tone controls		50
<b>Albarr M408 II</b> £595 pr.	Good+ Good+	Unusually styled transistor monoblok power amplifiers reintroduced with improved performance and sound quality. Needs good warm-up for best sweetness and clarity	40W Power amp only	R	56
<b>Audio Research SP9</b> £1700	Very Good Very Good	This new high performance valve FET hybrid preamplifier sets a high standard for versatility, build quality and sound	5 inputs, MM/MC	R	57
<b>Audio Research SP8</b> £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	39
<b>Audio Research M100</b> £2850 each	Good+ Excellent	These high end valve monoblok power amps justify their cost by providing near state of the art sound quality. Our reviewer was so excited he bought them	100W	R	50
<b>Audio Research SP11</b> £5250	Very Good Excellent	Current state of the valve pre-amp art. A reference point	Straight line MM/MC Disc + phase invert	R	50
<b>Audiolab 8000C</b> £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
<b>Audiolab 8000A</b> £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	50
<b>Audiolab 8000P</b> £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
<b>Beard P35</b> £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
<b>Beard 506</b> £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
<b>Beard M70</b> £1595 pair	Good Good+	A substantial British monoblok power amplifier, but not a great deal more impressive than the P35 at half the price	70W	R	50
<b>Burmester 838</b> £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
<b>Burmester 846</b> £1599	Very Good Good+	Usually coupled with the 838 this high-level pre-amp provides many and versatile input facilities	6 inputs	R	Collection
<b>Burmester 850</b> £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
<b>Cambridge Audio P40</b> £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
<b>Cambridge Audio C75</b> £279	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
<b>Cambridge Audio A75</b> £299	Very Good Very Good	This strong power amplifier sounded open and effortless, with fine bass drive and dynamics, albeit a touch grainy and harsh at high frequencies	100W	R	50
<b>Cello Audio Suite</b> £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
<b>Conrad Johnson PV7</b> £799	Very Good Good	This beautifully finished quality preamplifier performed well, delivering a musically relaxed sound though not offering especial value for money	5 inputs, MM disc		57
<b>Conrad Johnson MV50</b> £1795	Good+ Good+	Coupled with the PV5, this CJ power amp performed well on audition	50W	R	Coll
<b>Conrad Johnson PV5</b> £2010	Good+ Good+	The PV5 is a classy sounding valve pre-amp, and natural partner to the MV50	5 inputs MM	R	Coll
<b>Conrad Johnson Motif MC-8</b> £2500	Very Good Very 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
<b>Conrad Johnson Premier Three</b> £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
<b>Conrad Johnson Premier Four</b> £3900	Good+ Very Good	Ambience was the Four's forte – this power amp proved exceptionally revealing of instrumental locations	100W		Coll
<b>Copland Pre and power amps</b> £649 each	Good+ Fair	At £649 each this simple Danish valve pre/power combination is expensive, though the power amplifier sounds very easy on the ear	3 inputs MM, 12W		50
<b>Counterpoint SA7</b> £747	Average+ Good	Simple valve Californian pre-amp offering inspiring transparency for the price	4 inputs straight line MM/MC	R	Coll
<b>Counterpoint SA12</b> £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
<b>Creek 4040</b> £145	Average+ Fair	This simple integrated model had a controversial sound, liked by some, plus an acceptable lab performance	4 inputs MM 12W	R	50
<b>Creek CAS 4140</b> £199	Good+ Good	Redesigned for '88, this is a fine allrounder with good moving-coil input, plain presentation	40W MM/MC 3 line inputs	BB	56
<b>Croft Micro</b> £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
<b>Croft Super Micro A</b> £500	Average+ Very Good	The looks are somewhat improved, while this 'hot rod' version with tuned components performed very well indeed. There is still no gain on the line inputs	4 inputs, MM, straight line	R	57
<b>Croft Series IV(S)</b> £730	Good Good	The original IV is still available now supplemented by the higher price and power (S), both are fine performers	40(60)W channel	R	57

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

# DIRECTORY

## AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Croft Series IVSA</b> £1000	Good Very Good	Featuring tuned components chosen for their sound quality, the 'A' variant is an impressive example of Croft's technique in valve design	60W special supply regulation	R	57
<b>DBX CX3/DX3</b> £1500	Good Fairly Good	Versatile separates majoring on 4-channel surround sound and high power. Garish presentation and unexceptional sound	125W MM/MC 7 inputs, tone, 4-channel surround		56
<b>Deltec DPA 100S</b> £1900	Very Good Very Good	A top-quality transistor power amp, sounding fast, articulate and well controlled, though maybe a touch clinical for some tastes	80W	R	50
<b>Denon PMA-250</b> £125	Good Fair	As a "budget-plus" integrated amplifier the '250 gave an open sound with lively dynamics and should appeal to a wide range of tastes	30W MM hdph	R	50
<b>DNM 3</b> £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
<b>Exposure VIII</b> £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
<b>Exposure VII</b> £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
<b>Grant G60AMS</b> £948	Good Very Good	This neat and compact 60W valve monoblok gave good sound on the 8ohm tap, better still on 4ohms. The midrange was particularly natural	60W monobloks 41 8ohms	R	57
<b>Hafler DH120 kit form</b> £295	Fair	We didn't build one, see below	60W		44
<b>Hafler DH120 assembled</b> £360	Very Good Fair	Sound quality results were decent enough, but this power amp won't set the world on fire at this price	60W		44
<b>Harman Kardon 640 Vxi</b> £225	Good+ + Good	Moderately priced but built to HK's high standards, good value and good load tolerance	50W MM, 5 line inputs tone controls	R	55
<b>Harman Kardon 655 Vxi</b> £449	Very Good Good	Plenty of well built integrated amplifier for the money, with lots of power to drive almost anything, plus versatile inputs	100W MM/MC 6 line inputs tone controls	R	56
<b>Hitachi 007</b> £299	Good+ Fair	Decent but unexceptional performance and sound quality, plus good facilities, represents a worthwhile improvement from Hitachi	75W MM 6 line inputs tone controls		56
<b>Inca Tech Dirk</b> £215	Good+ Good+	This tiny, minimalist model is effectively a power amplifier with volume control, providing inputs for CD player and tape recorder but not tuner!	50W, 2 line inputs, straight line		56
<b>Inca Tech Claymore</b> £345	Good+ Good+	Limited facilities but a strong, clear, well-focused sound results in auspicious Choice debut for this relatively young company	50W MM/MC 3 line inputs straight line	R	56
<b>JVC AX-22</b> £110	Average Poor	Serves a market that buys on features rather than sound quality. Includes special "flashing light" power meter	55W MM tone controls		50
<b>Kenwood KA-550</b> £130	Good Fair	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 hdph Tone controls MM/MC	R	50
<b>Krell PAM5</b> £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
<b>Krell KSA50 Mk2</b> £2540	Very Good Good+	This power amp still holds its own with good depth and ambience and excellent stereo focus	50W	R	50
<b>Krell KMA-100 II</b> £5996 pr	Excellent Excellent	A genuine reference standard power amp, capable of justifying a wildly extravagant price tag in an appropriate system	100W, Monoblok	R	Call
<b>Le Tube</b> £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
<b>Linn LK2</b> £373	Good+ Fair	This pre-amp was marginally less successful than the LK1 but the pair (of Linn's) worked well together and are well worth considering	5 inputs MM/MC		50
<b>Linn LK1</b> £425	Good+ Fair	A durable tolerant power amp, setting a respectable standard on both lab test and audition	60W		50
<b>Linn Stratos</b> £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
<b>Luxman LV100</b> £205	Good Fair	Nicely finished modern integrated amplifier, generally competent though not exceptional	45W MM 4 line inputs tone controls		55
<b>Luxman LV-105</b> £599	Very Good Fair	Superbly finished and built, in a sense this model managed to capture the "valve" sound with an easy musical quality and good bass register	35W MM/MC		44
<b>Lux LV105u</b> £585	Very Good Good	This very well equipped and beautifully finished Japanese integrated amplifier has two valves in the early section of the power amplifier. Pleasant and musical it sets no value for money record here	9 inputs 30W, MM/MC tone controls		57
<b>Magnum A100</b> £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
<b>Marantz PM26</b> £110	Average Poor	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
<b>Marantz PM35</b> £160	Very Good Good	This new generation Marantz is a good allrounder, and shows that extra care is being taken over sound quality, well equipped and versatile	45W MM/MC 3 line inputs tone controls	R	55
<b>Marantz PM45</b> £200	Good+ Fair	Generally pleasant and polite with above average clarity, there was some softening in the bass, restricting dynamic output somewhat	40W MM/MC tone controls	R	50
<b>Meridian 201/205</b> £550/£395 each	Very Good Good+	A fine pre-amp with additional luxury option of full system remote, plus competent and attractive monoblok power amplifiers with generally good performance	100W MM/MC 6 line inputs remote capable straight line	R	55
<b>Mission Cyrus One</b> £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	B3	50
<b>Mission Cyrus Two</b> £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	B3	50
<b>Mission Cyrus Two with PSX</b> £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
<b>Musical Fidelity A1</b> £249	Good Good+	Fine-ranking in terms of overall sound quality for money, the excessive heat output could be hazardous to your vinyl if you're careless	20W MM/MC 4 inputs straight line	B3	56
<b>Musical Fidelity B200</b> £299	Very Good Good+	Running cooler than other MF's, the B200 delivered fine musical and dynamic sounds with plenty of power	30W MM/MC 4 line inputs straight line	B3	56
<b>Musical Fidelity A100</b> £439	Good+ Very Good	This is another one recommended for fine sound with which you could keep your Chinese carry-outs warm	50W MM/MC 5 inputs straight line	R	56
<b>Musical Fidelity Pre 3/P140</b> £299/£299	Very Good Very Good	Delivering true audiophile sound quality well ahead of their price, both components shine in their own right	70W MM/MC 4 line inputs straight line	R	56
<b>Musical Fidelity P170</b> £499	Very Good Very Good	Acquitted itself well, later samples showing steadily increasing refinements	85W	R	50

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# Sound us out.

Let me begin this month's dissertation by clarifying a point of confusion that has arisen amongst some readers due to our address. Both Alan Abbott and myself are dedicated music and audio enthusiasts. We aim to bring a quality of advice and service to the customer that is quite often unavailable in the high street shops. We have many years in the audio business both as customers and salesman on which to base our advice and well remember what it is like to be bombarded by the confusing and often conflicting advice of magazines and hi-fi sales people.

Both of us pursue other occupations and we pride ourselves on the fact that we are not under pressure to sell to the customers simply to earn a living. Here in our quiet, rural surroundings you will have the opportunity to audition a wide range of equipment in a relaxed and unhurried home atmosphere. No one will try and speed a sale along just to get at the next customer. When you arrive you are the ONLY customer and therefore deserving of our fullest attention. Take as long as you like, we would rather you came back two or three times before making your choice rather than let you leave with the vague feeling you may have made a mistake.

At the time of writing we are the only UK dealers to have the full range of Spica Speakers in stock from the giant killing TC 50 and the bi-wired TC 50 SE to the mighty Angelus. (At last a truly outstanding speaker of sensible domestic proportions). We are the first dealers to stock these fine transducers and within days of their arrival have already sold the first pair. Demand is going to be big, why not book your home demonstration with us now, or alternatively pay us a visit (by appointment only). We can offer the finest demonstration facilities available with completely honest and unbiased advice. (If we cannot fulfill your requirements then we are happy to suggest others who can).

Some recent additions to our range are the legendary Albarr Monoblock power amplifiers, the YBA pre and power combination. And let's not forget the magnificent LFD pre amplifier and Air 2:11 valve amplifier, the latter Alan's reference power amplifier against which all others are judged.

For those who must have their cake and eat it, we have a full SAE system comprising CD player, tape, pre amplifier, power amplifier and tuner. Together they offer superb sound quality and harmonious aesthetics. The pre-amplifier is of special note demanding serious consideration as an audiophile unit in its own right. This unit will shake your faith in the minimalist approach to pre amplifier design! Priced at only £795. SAE could easily ask twice the price judged on sound quality alone, and comes highly recommended by the American audio magazine The Stereophile.

Kind regards,  
BRIAN VOCE

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# DIRECTORY

## AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Musical Fidelity MVT Mk 3</b> £1199	Very Good Excellent	The MVT pre-amp was "simply a knockout in its class", providing competition for £2000-plus amplifier systems	MM/MC 5 inputs	R	50
<b>Musical Fidelity P270</b> £1199	Very Good Excellent	If the hot-box aspect is not a deterrent, this is something of a bargain. A big amplifier scale of sound which is just a little rough-edged	135W	R	50
<b>Musical Fidelity A370</b> £2199	Very Good Excellent	Arguably the finest sounding power-amplifier manufactured in the UK	185W	R	50
<b>Myst TMA3</b> £288	Very Good Fair	This excellently-constructed, no-frills, dependable amplifier should offer long life with above average sound quality	35W MM/MC 4 inputs		50
<b>NAD 3020e</b> £110	Good Fair	A little light in balance and "weight" but superior to run-of-the-mill budget amplifiers	20W MM/MC 4 inputs	BB	50
<b>NAD 2210</b> £339	Good + + Fair	Not recommended on grounds of sound quality, but worth serious consideration for its exceptional power output	100W		44
<b>Naim NAIT</b> £258	Average + Fair	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
<b>Naim NAC 32</b> £425	Very Good Good	A natural partner to the Naim power-amps, with power supply options offering a spread of sound quality at different prices	MM/MC, 5 inputs	R	50
<b>Naim NAP 250</b> £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
<b>Nakamichi CA7E/PA7E</b> £2500/£1700	Very good Good/Good +	Exceptional build and finish, plus good general performance, remote control and versatility, but expensive	200W MM/MC 6 line inputs, remote, tone controls		56
<b>Nikko NA700</b> £189	Good + + Poor	Disappointing sound quality at an above budget price. Inescapably old fashioned	60W MM/MC 4 line inputs tone filters		56
<b>Nuance</b> £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
<b>Orell SA-040</b> £359	Good Good	This promising newcomer from a brand new company sounded pretty good and should improve as production settles	45W MM/MC, 4 line inputs, straight line	R	56
<b>Pereaux SA3</b> £690	Very Good Fair	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
<b>Perreaux 1850</b> £990	Very Good Fair	This power amp's musical qualities were disappointing, though powerfully delivered. Build and finish were exemplary	180W		44
<b>Philips FA860</b> £249	Very Good Fair	Well balanced model from Philips' Japanese factory, with versatility, good build and finish	70W MM/MC 5 line inputs tone controls		56
<b>Philips FA960</b> £299	Very Good Good	Japanese built high quality integrated model with versatile features and plenty of power	110W MM/MC 8 line inputs tone controls		56
<b>Pioneer A331</b> £150	Good + + Fair	A new face for Pioneer, with improved standards of sound quality and value alongside traditional strengths of build and finish	50W MM 4 line inputs tone controls	R	56
<b>Plenitude</b> £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
<b>PS Audio PS4.5</b> £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
<b>QED A240 CD II</b> £169	Good + Good	Latest 240CD is fine value for CD and has competent MM disc input as well	45W MM 5 line inputs straight line	BB	56
<b>QED A240 SA II</b> £219	Good + + Good +	Redesigned 240SA represents a significant allround improvement over its predecessor, and provides a good moving-coil disc input in a competitive price	45W MM/MC 5 line inputs straight line	BB	56
<b>Quad 34</b> £269	Very Good Fair	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
<b>Quad 405</b> £329	Very Good Fair	Not an impressive power amp but easy on the ear if not pushed and very reliable	100W		44
<b>Quicksilver Mono</b> £1495	Good Good +	Moderately improved for '88 the Quicksilver still rates well despite up and coming competition	60W monoblock 4/8chms		57
<b>Radford SC25</b> £598	Very Good Very Good	A very fair price for a solid, well built valve pre-amp, combining good allround performance and a neutral sound	5 inputs, MM, straight line	R	57
<b>Radford MA75</b> £776	Good Very Good	A fine quality valve monoblock with good load tolerance and a neutral accurate sound, offering significant gains in power and focus over the STA25	75W monoblocks	R	57
<b>Radford STA25 Renaissance</b> £897	Good Good +	Offering superb midrange performance if not quite as good at the extremes, the Renaissance valve power amp is a genuine audiophile product	25W	R	50
<b>Revox B250</b> £1128	Very Good Good	With much improved sound over its predecessors plus amazing remote control facilities, this could form the heart of a round-the-dream-house system	150W MM/MC system/house remote tone controls		56
<b>Robertson Forty Ten</b> £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
<b>Rotel RA820A II</b> £125	Good + + Good	This series II version of an established budget favourite delivers the goods sonically and is fine value for money	35W MM 4 line inputs tone controls	BB	56
<b>Rotel RB/RC850</b> £130/£119	Good + + Good +	Quality separate pre- and power amplifiers at near budget integrated amplifier prices. A notable achievement	60W MM/MC 4 line inputs tone controls	R	56
<b>Rotel RA870BX</b> £325	Very Good Good +	A powerful blockbuster with solid and well focused sound, good versatility and fine load tolerance	85W MM/MC 7 line inputs tone controls	BB	56
<b>Sansui AU-G11X</b> £139	Good + Fair	Tightly controlled if somewhat congested and lightweight, but a reasonable compromise between features and sound quality	25W MM hdph 4 inputs, tone controls	R	50
<b>Sansui AU-G30X</b> £199	Good + + Fair	A very competent amp with no glaring faults, performing well with phono and compact disc inputs	4 inputs MM 45W tone controls Hdph	R	50
<b>Sansui B2301</b> £1880	Very 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
<b>Sansui C2301</b> £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
<b>Sony TAF 500ES</b> £349	Good + Fair	Not too hot at the price, lacking in bass action, rating poorly on vinyl, and only marginally improving on CD	75W hdph tone controls MM/MC		50
<b>Sony TAF 700ES</b> £500	Good + + Fair	Scoring higher than the 500 but still not offering the sort of standards set by the competition. But many buttons to push	100W MM/MC tone controls		50
<b>Tannoy SR-840</b> £1713	Very Good Good	A "muscle" power amp, capable of impressive levels into difficult loads while remaining quite subtle and revealing	250W	R	50
<b>Technics SU-500</b> £100	Average Poor	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
<b>Technics SUV55A</b> £200	Very Good Good	A typically well built modern allrounder, with good versatility and sound quality	65W MM/MC 6 line inputs tone controls	R	56

# DIRECTORY

## AMPLIFIERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Technics SUV85A £350	Very Good Good	Similar to '55 but with more power and better sound quality still	110W MM/MC 9 line inputs tone controls	R	56
Vacuum State FVP £999	Good Very Good	This well thought out valve preamplifier is designed for optimum musicality and transparency, a goal which is handsomely achieved	5 inputs, MM, straight line	R	57
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 monoblok power amps sounded a little slow and unrevealing	50W 3 inputs	R	50
Yamaha AX-300 £120	Good Fair	A lively and dynamic performer, offering a credible if bright sound at a competitive price	30W hdph tone controls (MM)	R	50
Yamaha AX500 £200	Very Good Good	A well built versatile performer with generous power, decent sound	90W MM/MC 5 line inputs tone, var. loudness	R	56
YBA 2 pre & pwr £1395/£1695	Good++ V Good/Excellent	Superbly finished French audiophile separates, with very good space and transparency, slightly softened bass. Needs extra transformer (£300) for MC cartridges	70W MM (MC extra) straight line	R	56

## LOUDSPEAKERS

Last item in the hi-fi chain, to some extent the loudspeaker is merely the slave of what has gone before, capable only of reproducing a signal as good as it is fed. Nevertheless the distortions (colorations and stereo effects) introduced by loudspeakers (and rooms) tend to be more immediately obvious than those anywhere else in the chain, so careful choosing according to taste is very important.

The average loudspeaker consists of a smallish enclosure, much of which may have begun life as

part of a tree, plus a couple of drive units hidden behind a removable grille. Inside the box lurks a simple electrical circuit known as a crossover, which divides the incoming (full range) signal into the right bits for the drivers to handle. Variations on the above formula are specifically identified in the entries. The designer's primary task is to balance the **sensitivity** of the loudspeaker (how loud it goes for a given electrical input) against the **bass** extension (how low does it go) for the given box **size**. After that such subtleties as coloration and

dispersion come into the equation.

Careful **placement** of the loudspeakers within the room is as important as the initial choice of model. For good stereo they need to be more or less the same distance from nearby walls, and preferably on similar rigid stands. The listener should be about the same distance from and listening angle to each loudspeaker. The ideal **placement** depends on the way a particular model has been balanced (not to mention a number of other factors), and our recommendation is given in the entries.

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
Acoustic Energy AE1 £700	Good Very Good	To the author's knowledge, the most awesomely dynamic and articulate miniature ever made	29.5 x 18 x 25cm semi-open space	88dB/W 60Hz	R	This
Acoustic Research 8BX £100	Average Average—	Spacious and informative sound quality with bass well under control. Not that there was much bass to control	40 x 25 x 19cm shelf or 50cm stand near wall	88.5dB/W 70Hz		53
Acoustic Research 22BX £200	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	This
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		This
A&R Arcam One Plus £359	Good Average	Provides a solid, weighty and rich sound, but is a little raw in the treble and indefinite in the midband	22.3 x 28.1 x 37.8cm open space, on stands	88.5dB/W 60Hz		This
Ariston QLNI £350	Very Good Good+	This very sophisticated loudspeaker has much of the euphony of a LS3/5A but with rather more 'oomph'. A little 'romantic' for some tastes - Schubert and Sting rather than Stockhausen or the Stones perhaps?	35 x 25 x 26.5cm free space, 24 inch stands	84.5dB/W 65Hz	R	This
Audiostatic ES200 £1495	Average Average+	Sounding forward and unbalanced with limited bass power, these excelled in transparency and detail, and might suit some tastes	150 x 53 x 23cm low stands, free space	79dB/W 45Hz		46
Audiostatic ES300 £1995	Average+ Good	Marred by similar problems to its cheaper ES200 stablemate, this line source electrostatic was superb in the upper-mid and treble but lumpy in the bass	44 x 5 x 93cm free standing	82.5dB/W 30Hz		46
Advance 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 DM100i £120	Good Average	Not universally liked on test, but the consensus view was positive, the best feature being a sharp, clear midband.	37 x 22 x 22.6cm free space or near wall, on stand	88.5dB/W 90Hz	R	This
B&W DM110i £159	Very Good Average	On the hard and aggressive side of neutral, this is a tactile and detailed transducer that remains musically adequate, if slightly intrusive.	48.7 x 26 x 27cm open space, on high stands	88dB/W 60Hz		This
B&W LM1 Mk II £249	Average+ Average	Probably one of the best "micros" ever made, worth considering for special applications (boats or vehicles). Upgraded since our review	24 x 15.5 x 20cm shelf or flush mount	86.5dB/W 80Hz	*	31
B&W DM1600 £399	Good Good	Crisp, dynamic loudspeaker with tight but not especially deep bass and a tweeter that sometimes sounds overcooked	49 x 23.6 x 30cm free space, open stands	87.5dB/W 60Hz	R	This
B&W Matrix 1E £595	Very Good Good+	There was enthusiastic and consistent praise for these speakers with their "revealing and seductive" midrange	41 x 23 x 32cm free space on 35cm stands	85.5dB/W 50Hz	R	53
BBC LS3/5A £265	Good+ Average+	As a working tool it does its job but as a piece of value engineering this old-timer is beginning to look a bit grey-haired (recent revisions not yet checked)	30 x 18.5 x 16cm open stands, free space	81.5dB/W 57Hz	R*	Coll
BLQ Q2 £275	Average— Average	Nearly a good loudspeaker, the basic balance is good, but the midband is very uneven and there are severe losses of resolution, 'space' and dynamics	43 x 25.1 x 24.5 semi open on stands	87.5dB/W 70Hz		This
Bose 6.2 £570	Average— Average—	Wishy-washy (but not unpleasant) sound and vague imagery are the hallmarks of this unusual design	25.4 x 50.8 x 24.4cm free space, on stands	87.5dB/W 55Hz		This
Boston A4011 £110	Average Average—	Competent performance for size and price but below average relative to the UK competition	34 x 21 x 20cm on stands near wall	88.5dB/W 63Hz		41
Castle Clyde £139	Average+ Average	A tidy little performer packing punch, but beginning to show its age in the light of new competition	37 x 21.5 x 22cm open space on stands	89.5dB/W 64Hz	R	46
Castle Durham £189	Average+ Average	Listening results were encouraging, well engineered and finished, but lean on treble and a bit weak on bass; still recommended	41 x 21.5 x 25cm near rear wall	89dB/W 67Hz	R	46
Castle Pembroke £289	Good Average+	Comfortably recommended, a sweet smooth sound with good overall balance of engineering-based performance	55 x 37.5 x 30.5cm open space on stands	88dB/W 46Hz	R	31

# THE WORLD'S NO 1 GUIDE TO BUYING HI-FI



# DIRECTORY

## LOUDSPEAKERS

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
<b>Celestion DL6 Series Two</b> £149	Good Average	Good tonal colouring and plenty of bass for the enclosure size, the metal dome tweeter is excellent, but bass and mid lack clarity and 'bite'	45.4 x 24.5 x 26.2cm near wall, on stands	87dB/W 65Hz		This
<b>Celestion DL8</b> £199	Very Good Good	A refined middle market speaker has a smooth but slightly dull quality, with good definition and deep, if slightly boxy bass	50 x 27.5 x 27.8cm open, stands	87.5dB/W 60Hz	R	This
<b>Celestion SL6S</b> £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
<b>Celestion SL600</b> £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
<b>Celestion 6000</b> £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
<b>Chameleon 500</b> £349	Average— Average—	Sounding badly coloured, dull and compressed, it is also amateurishly constructed, despite using good quality materials	38 x 25.3 x 31.3cm free, stands	89.5dB/W 75Hz		This
<b>dbx 1000</b> £450	Average— Average—	This system sounds soft and woolly, with an effusive bass, an occasionally sharp treble, and a recessed midband. Stereo positioning is poor.	78.7 x 35.6 x 27.9cm against rear wall	91dB/W 60Hz		This
<b>Diesis Sapphire</b> £329	Average— Average—	Poor driver integration and a thin, wispy treble spoil this otherwise neat and solid sounding design	35 x 20 x 24cm open space, on high stands	90dB/W 90Hz		This
<b>Gale 301</b> £279	Average Average+	Of unusual, distinctive appearance this produced a mixed response, being lively but lacking depth	44 x 23.5 x 22cm on stands quite near wall	86.5dB/W 63Hz		46
<b>Gale GS402</b> £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
<b>Goodmans Maxim Two</b> £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	This
<b>Goodmans Point 3</b> £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
<b>Goodmans Point 7</b> £170	Average+ Average	Basically competent performance-mix and a lot of speaker for the money, but a certain lack of refinement nonetheless	69 x 33 x 26cm free space on 35cm stand	89dB/W 47Hz		53
<b>Harbeth HL Compact</b> From £455	Very Good Average	The clean and neutral sound lacks resolution and gives rather unobtrusive though well differentiated stereo. Can be bi-wired to advantage	52 x 27.2 x 28.1cm open space, on high stands	87.5dB/W 65Hz		This
<b>Harbeth HL Mk 4</b> £525	Good+ Good+	Recommended for the good results at its price, and only mildly criticised for heavy bass and a mild 'chestiness'	64 x 33 x 30cm free space on 46cm stand	89dB/W 40Hz	R	53
<b>Heybrook Point Five</b> £139	Average Average	Disappointingly prosaic performance on listening tests, wooden and hollow, with restricted dynamics and 'space'. Earlier samples sounded better	37.5 x 23 x 23cm near wall, on matching stands	86dB/W 65Hz		This
<b>Heybrook HB1</b> £189	Good Average+	No longer an over-bright character, a strikingly clear sound and fine transient performance now merits recommendation	47 x 29 x 23cm on stands near wall	88dB/W 61Hz	R	46
<b>Infinity RS2000</b> £130	Good Good+	Fast, detailed and assured miniature with quick but not very deep bass. The top end is detailed but sometimes jangly	36.2 x 22.5 x 20cm near rear wall, high stands	91.5dB/W 70Hz	BB	This
<b>JBL TLX-3 CI</b> £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
<b>JBL L 60T</b> £399	Good+ Good	Well balanced and offering realistic value for money, the fine treble and extended bass make it suitable for larger rooms	78 x 30.5 x 26.5cm low stands or floor	88dB/W 40Hz	R	46
<b>JBL L80T</b> £549	Good Average	Large scale, dynamic if rather unwieldy sounding, this is a performer of integrity, if not much subtlety	85.1 x 35.6 x 30.3cm floorstanding, open space	89.5dB/W 55Hz		This
<b>JBL 18Ti</b> £599	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
<b>JBL 250Ti</b> £3599	Good+ Good+	In general this speaker did not show the required level of dynamic presentation transparency and stereo depth expected of a pricey flagship model	132 x 57 x 36cm free space on floor	89dB/W 53Hz		46
<b>JPW P1</b> £125	Good Average+	Honest and basically articulate if not very sophisticated, resolution is good but it can sound a little wearing in bright systems or with rough sounding material	44 x 25.9 x 26.1cm free space on stands	89dB/W 60Hz	R	This
<b>JPW AP2</b> £145	Good Average+	Few grounds for criticism but purchasers should check out the treble qualities to avoid hammering the ear anvils	46 x 26 x 25cm 40cm from wall on 45cm stands	89dB/W 65Hz	R	53
<b>JPW AP3</b> £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
<b>KEF C10</b> £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
<b>KEF C40</b> £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
<b>KEF R102</b> £335	Very Good Very Good	High class near-miniature with expressive, articulate midband and clean, accurate bass and top. The sound quality of the Kube circuitry, however, is suspect, what would an audiophile Kube sound like?	33 x 20.7 x 26.3cm near wall or open on stands	89.5dB/W 60Hz	R	This
<b>KEF T03/3</b> £630	Good+ Good	Technically impressive, excellent bass/power handling for size, but not for the audiophile system. Better among cheaper competitors, and good in a large room	56 x 27 x 30cm supplied stands free space	90-95dB/W 35Hz		53
<b>KEF 104/2 (inc. KUBE equaliser)</b> £806 (£905)	Very Good Good++	A reference point for dynamics, preferred without KUBE, suited to many rooms. Good stereo, high sound levels	90 x 28 x 41.5cm floor standing in free space	92dB/W 50Hz	R	53
<b>KEF 107</b> £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
<b>Linn Nexus</b> £350	Good Average	Good features include a solid, meaty bass plus good imagery and tonal balance. The catch is that Nexus lacks resolution and timing	49 x 23.5 x 30.4cm near rear wall supplied stands	89dB/W 60Hz		This
<b>Linn Isobarik</b> £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
<b>Magneplanar SMGa</b> £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
<b>Magneplanar MGIIla</b> £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
<b>Marantz LD20 DMS</b> £140	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
<b>MB Quart 390</b> £499	Below Average Poor	An aggressive, messy sounding design whose uncouthness undermines the positive level of detail	52 x 31 x 30.5cm open space, on stands	89.5dB/W 60Hz		This
<b>Meridian M30</b> £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
<b>Mission 70 II</b> £110	Good Average	Lively and transparent, the 70 II was favoured for its speed, though the sound had a mildly 'thin' tonal balance	35 x 21 x 21cm on stands or shelf near wall	89dB/W 68Hz	BB	46

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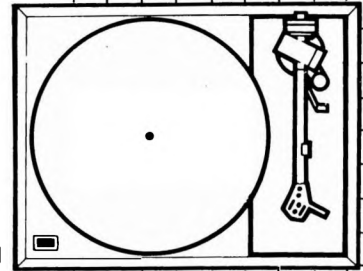


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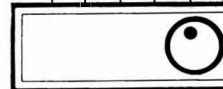
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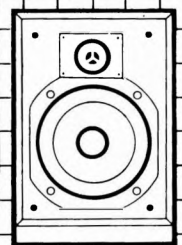
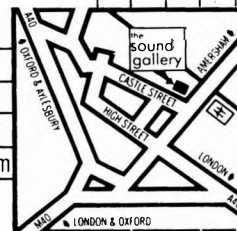
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# DIRECTORY

MODEL PRICE	LAB SOUND	COMMENTS	SIZE PLACEMENT	SENSITIVITY BASS FROM	VALUE	BACK ISSUE FULL REVIEW
<b>Mission 700LE</b> £140	Good Average	Mission re-submitted this popular model and again got a positive review – which proclaims their (and our) consistency	38 x 21 x 21cm straight ahead stand near wall	89dB/W 66Hz	R	This
<b>Mission R737 Renaissance</b> £250	Average Average	Effusive, over-the-top bass and obtrusive treble get in the way of a marvellously lucid and transparent midband. Inconsistent on audition – wonderful piano, bloated orchestras etc	54 x 25 x 27cm near wall on dedicated low stands	88.5dB/W 60Hz		This
<b>Mission Argonaut</b> £700	Good Good	Perhaps not the most subtle or sweet these were recommended for their excitement, drama, power handling and... good looks	95 x 23 x 31cm floor-standing near wall	91dB/W 40Hz	R	53
<b>Monitor Audio R100</b> £139	Average+ Average-	Tonally quite neutral, but with small box character, negligible low bass and a rather 'hard' midrange	40.5 x 25 x 21cm free space on stands	87.5dB/W 70Hz		46
<b>Monitor Audio R252</b> £159	Average+ Average	Rating well for its price this model displayed a rather rough top end and a generally character helped by good detail and focus	47 x 25 x 24cm stands quite near rear wall	89dB/W 62Hz	R	46
<b>Monitor Audio R352</b> £250	Good Average	Well-built and finished, 'sensitive' speaker which is easy to drive and capable of extracting good results from good amplifier	64 x 25 x 32cm on stands in free space	90dB/W 50Hz	R	46
<b>Monitor Audio R700 MD</b> £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
<b>Monitor Audio R352 MD</b> £299	Good Average+	Better suited to CD than vinyl perhaps, this is clearly good value for money. But some found it coarse while others praised its cleanliness	64 x 25 x 32cm 25cm stands in free space	89dB/W 42Hz	BB	53
<b>Monitor Audio R452/MD</b> £350	Average Average	This big, efficient, dynamic sounding loudspeaker has a clean, open treble but a pinched, two-dimensional midband. Can be tiring in the long run	64 x 25 x 31.8cm open space, low stands	89dB/W 53Hz		This
<b>Monitor Audio R652 MD</b> £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	85.5dB/W 45Hz		53
<b>Monitor Audio R852/MD</b> £380	Good+ Good	This finely crafted design has a sharp and clear if occasionally rather rough sound quality. Bass is light but qualitatively very good – an intriguing performer	45 x 25 x 27.5cm open space or near rear wall, high stands	89dB/W 68Hz	R	This
<b>Mordaunt Short MS10 II</b> £90	Average Average-	One of the best miniatures around. A borderline Best Buy because of the bass limitations, which may depend on your taste	29 x 20 x 17cm wall bracket	86dB/W 75Hz	R	53
<b>Mordaunt Short MS100</b> £189	Average+ Average+	A 'mid forward' tonal balance is its main drawback but other aspects such as ambience, transparency and stereo depth compensate	32.5 x 22.5 x 21.5cm stands near wall	85dB/W 80Hz	R	46
<b>Mordaunt Short 45Ti</b> £230	Good Average	A sensitive tandem-bass number that can be driven loud but loses its balance a bit and can be unsubtle	63 x 26 x 30cm low (20cm) stand near wall	90.5dB/W 52Hz		53
<b>Mordaunt Short MS300</b> £319	Average+ Average+	Not considered particularly competitive in its class, though it has good power handling and stereo focus	54 x 22.5 x 25cm on stands near wall	89dB/W 55Hz		46
<b>Mordaunt Short 442</b> £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
<b>Musical Fidelity MC-2</b> £300	Very Good Very Good	This exceptionally clean and clear design offers real subtlety and finesse. Bass quality is light but exceptionally clear; the treble is smooth if slightly shallow	48.5 x 25.5 x 16.5cm open space and stands	87.5dB/W 65Hz	BB	This
<b>Musical Fidelity MC-4</b> £499	Very Good+ Very Good	Achieving a very high standard, the MC-4 sounds detailed and coherent like the MC-2, but with more bass depth and solidity, and large image scale	56.5 x 26.9 x 29cm open space on stands	87.5dB/W 60Hz	R	This
<b>Quad ESL-63</b> £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
<b>Rogers LS2</b> £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
<b>Rogers LS6</b> £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
<b>Rogers LS7i</b> £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	This
<b>Roksan Darius</b> £1285 inc. stands	Average Poor/Very Good	A controversial speaker which when set up right can deliver impressive performance, but with a far from neutral balance	98 x 31 x 51cm integral stands near side walls	88dB/W 50Hz		53
<b>Rotel RL850 II</b> £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	This
<b>Royd A7 Series 11</b> £99	Average+ Average	Lively clear sound; good upper bass and dynamics, but treble "ramp" made vocals sound shut in before	31 x 20 x 17cm shelf or 50cm stands near wall	85dB/W 75Hz	R	53
<b>Royd A25</b> £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
<b>Sony APM 10ES</b> £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	This
<b>Sony APM 22ES</b> £249	Good+ Good	Sounding notably clear, the 22ES scored well on listening tests was easy to drive and achieved high sound levels	51.5 x 29 x 30cm free space on 40cm stands	83.5dB/W 46Hz	R	46
<b>Sony APM 66ES</b> £700	Average+ Average+	Powerful heavyweight sound with a brilliant midband – clear articulate and transparent. But the bass is on the boomy side and the treble can sound grainy	66 x 38 x 36.5cm open space, low stands	89dB/W 60Hz		This
<b>Spendor Prelude II</b> £350	Good+ Good	Good clarity and detail were evident everywhere in this speaker. Though a little boxy or muddy in the midrange it is strongly Recommended	50 x 26 x 28cm open stands in free space	88dB/W 52Hz	R*	46
<b>Spendor SP2</b> £450	Very Good Good+	Conceding little to the SP1, this 30 litre model displayed good tonal balance with a highly articulate midrange, only slightly marred at frequency extremes	50 x 25 x 30cm free space, stands	87dB/W 45Hz	R	This
<b>Spendor SP1</b> £680	Very Good Good	A very subtle and musical performer that works particularly well with digital material. An exceptional allrounder	63.5 x 29.5 x 30.5cm stands in open space	87dB/W 41Hz	R	46/Coll
<b>Spendor SA3 Passive</b> £1400	— Good+	Same as Spendor SA3 active	85 x 38 x 46cm low	89dB/W 32Hz	R	46
<b>Spendor SA3 Active</b> £2708	Good+ Very Good	Substantial speakers designed to deliver high sound levels and killer bass. Suited to larger rooms and power hungry ears	85 x 38 x 46cm low rigid stands in free space	89dB/W 32Hz	R	46
<b>Spica TC-50</b> £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	This
<b>Tannoy Eclipse</b> £120	Average+ Good	Although a little bright, the essentials are right: hear-through clarity at all frequencies, good dynamics, firm bass	38.8 x 22.6 x 21cm semi open on stands	87dB/W 65Hz	BB	This
<b>Tannoy Mercury II</b> £160	Good Average+	This genuine allrounder represents an exceptionally accurate free-space system for the money. Recent modifications as unchecked	50 x 25 x 23.5cm open space 45cm stands	88dB/W 53Hz	BB*	53
<b>Tannoy Westminster</b> £3500	n/a Good+	These awesome horn loaded speakers are remarkably controlled and impressive, if only suited to a few pockets and rooms	Huge, flat against rear wall, away from corners	96dB/W (manuf.)	R	Coll
<b>Technics SBC 250</b> £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
<b>Technics SB-RX50</b> £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	85dB/W 40Hz	R	46

# DIRECTORY

## LOUDSPEAKERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Wharfedale Delta 30 £80	Good Average	Very clear and surprisingly neutral for the price, with good dynamics and stereo within limited volume ceiling	37.9 x 20 x 16.9cm near wall on high stands	88.5dB/W 80Hz	BB This
Wharfedale Delta 50 £99	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 Diamond 111 £100	Below Average Average-	This latest version of the long running Diamond sports a better tweeter, but bass, though deep, is soft, and the midband is indistinct and uneven	24 x 18.5 x 20.5cm near wall, stands	86.5dB/W 75Hz	This
Wharfedale 504 £139	Average+ Average	Acquitting itself well on audition, the 504 produced a clear, reasonably balanced sound with above average treble	21 x 18.5 x 20cm stands, near wall	85dB/W 75Hz	R 46
Wharfedale Super Diamond £140	Average Average-	Although there are improvements on the basic "legendary" model, listening panelists did not get airborne about this upgrade	24 x 19 x 19cm close to wall at head height	88dB/W 57Hz	53
Wharfedale 510.2 £299	Average Average-	Even in it's latest guise, this loudspeaker still sounds hard, cluttered and lacking innate clarity. The bass is uneven and midband coloured	61.5 x 28 x 29.6cm near wall, high stands	89dB/W 50Hz	This
Yamaha NS 1000M £900	Good Good+	Living up to its monitor label, and tonally well suited to digital material, the NS 1000M is superbly crafted and capable of high levels	67.5 x 37.5 x 32.5cm 30cm from wall, stands	90dB/W 40Hz	R 46

\* rating refers to original, tested model.

## CASSETTE DECKS

The bad odour of copyright theft hangs around the compact cassette, but there is no doubt it is the world's most versatile and ubiquitous music storage medium. Hi-fi buffs may wrinkle their noses pointedly, but are still happy to use cassette decks to make up tapes for the car or personal - at the same time complaining loudly about the quality of pre-recorded material. (In fact the very best decks can do a surprisingly good job with musicassettes.)

There is no problem in connecting a cassette deck to any normal amplifier, but some care needs to

be taken in choosing the best tapes for a specific machine. (Trial and error is one effective technique, but many decks have manual bias adjustment and some match up to the tape automatically.) Lab performance and sound quality often go hand in hand, and are frequently somewhat 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		52
Aiwa AD-F360 £110	Good Average	Soft, somewhat amorphous sounding deck which is, however, very easy to use	Dolby B & C, bias adjust, 2 Head		57
Aiwa AD-R460 £149	Average Average-	Some worthwhile features but sound quality was not especially liked	Auto reverse, Track search, Dolby B, C, bias adjust		52
Aiwa AD-WX707 £180	Poor Average	Not bad value for a twin deck, but marginal from the high fidelity viewpoint. The review sample was poorly set up.	Dual deck, auto-reverse, Dolby B & C, bias adjust		57
Aiwa AD-WX909 £400	Good Good	Convenience meets sound quality, and both win. An essentially clean, positive recorder which works alongside an auto-reverse player of lower standard - a sensible compromise	Dual deck, auto-reverse, track search, Dolby B/C/HX Pro, bias adjust, 3 Head	BB	57
Akai GX-52 £249	Very Good Very Good	Well finished and a pleasure to use this well specified deck sounds clean and defined with all tape groups, with or without Dolby	Dolby B, C, HX Pro, track local features	BB	57
Akai GX-6 £329	Good Good	There is a strong sense that someone has really thought this one through; it has an indefinable 'specialness'	Real-time counter, track search, Dolby B, C, bias adjust	R	52
Denon DR-M07 £140	Average+ Excellent	Despite minor operational and measured shortcomings, sound quality is excellent for the price	Dolby B, C, bias adjust	R	52
Denon DR-M12HX £220	Good Good+	Well constructed and pleasant to use, a lack of true pitch constancy kept it from sounding superb	Track search, Dolby B, C, HX Pro, bias adjust	R	52
Denon DR-M24HX £290	Good Good+	This deck will slot into many high grade systems without disgracing itself - or the cassette medium. Very presentable high resolution sound with good stereo with or without Dolby	Dolby B, C, HX Pro, bias adjust, 3 Head	BB	57
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	Dolby B, C, HX Pro, bias adjust, 3 Head, remote control	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	Real-time counter, Dolby B, C, HX Pro, tape alignment adjust, remote control, 3 Head	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"	Real-time counter, auto reverse, track search, Dolby B, C, HX Pro, bias adjust		52
Hitachi D-003 £199	Average- Average-	Dry, slightly 'wobbly' sound quality but suitable for many non-critical applications. The manual tape direction switch is poorly designed	Dual deck, auto reverse, Dolby B		57
Hitachi D-007 £300	Average- Poor	This double 'dubbing' deck proved a mixed bag - good in parts but disappointing overall	Dual deck, auto reverse, track search, Dolby B & C		52
Kenwood KX550HX £150	Average Average+	This well-laid-out and attractive deck ultimately lacks the edge to stand out in a competitive field	Track search, Dolby B, C, HX Pro		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, remote control		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 reverse, track search, Dolby B & C, remote control		52
Luxman K-112 £349	Average Average	Build quality is not truly consistent with the price. Nor is sound, which veers on the warm, lossy side of neutral	Dolby B, C, HX Pro, bias adjust, 3 Head		57
Marantz SD-35 £169	Good Good+	Rock steady tape transport gives very competitive sound quality for the price, but the slightly bright replay may not appeal to some	Dolby B & C, bias adjust	BB	52
Marantz SD-4511 £209	Good+ Good+	Well built and dynamic sounding player, working better as a recorder than with musicassettes	Dolby B & C, bias adjust Auto selection	R	52
Marantz CP230 £260	Average Average	This is a competitively priced portable recorder though not suited to replay of musicassettes	Dolby B, bias adjust	R	52
Marantz SD-55 £349	Good Very Good	Slightly tacky feel and restricted signal/noise performance are the main shortcomings of an excellent sounding piece of kit	Real-time counter, track search, Dolby B/C/HX Pro, bias adjust, 3 Head	R	57

TO ORDER BACK ISSUES OF HI-FI CHOICE SEE PAGE 52

# DIRECTORY

## CASSETTE DECKS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Nakamichi CR-1E</b> £345	Very Good Good	Modestly equipped by any standards, the CR-1E stands or falls by its build quality, which is high and sound which is highly competent	Dolby B & C		57
<b>Nakamichi CR-2E</b> £395	Very Good Good+	Ordinary to look at, in some respects rather awkward to use (tape switching especially), the CR-2E sounds very slightly better than the CR-1E, and therefore ranks well. But it doesn't come cheap	Dolby B & C, bias adjust, remote control	R	57
<b>Nakamichi CR-3E</b> £595	Very Good Very Good	The user interface is a little clumsy, though conceptually straightforward. Sound quality approaches the CR-4E, and is amongst the best at the price.	Dolby B & C, bias adjust, remote control	R	57
<b>Nakamichi CR-4E</b> £745	Very Good+ Very Good+	High class deck with a reasonably full range of features and superb sound at a slightly unlikely price	Dolby B & C, bias adjust, remote control, 3 Head	R	57
<b>Nakamichi CR-7E</b> £1500	Excellent Excellent	Remarkably this deck is not only ergonomically but also sonically superior to the Dragon, particularly on record/replay	Real-time counter, track search, Dolby B & C, tape alignment adjust, bias adjust, remote control, 3 Head	R	52
<b>Nakamichi Dragon</b> £1750	Excellent Excellent	Previous to the birth of the CR-7E, this machine stood head and shoulders above the rest. It is still the ultimate for musicassette replay	Auto reverse, Dolby B & C, tape alignment adjust, bias adjust, remote		52
<b>Nikko D-8011</b> £309	Average Average	Easy and rewarding to use (apart from the mannered aesthetics), but sound quality is below par for the price, especially with dbx	Real-time counter, auto reverse, track search, Dolby B, C and dbx, bias adjust		57
<b>Onkyo TA 2130</b> £140	Average+ Average+	Rating fairly well on both pre-recorded and record/playback, ergonomics were a little poor but overall performance was generally consistent	Track search, Dolby B & C, bias adjust	R	52
<b>Philips FC566</b> £179	Average+ Average+	Mostly well equipped, though some tape search facilities fail to exploit the auto-reverse capability. Sounds clean and stable - with prerecorded tapes too	Auto reverse, track search, Dolby B & C		57
<b>Philips FC567</b> £279	Average Poor	Well equipped but ergonomically substandard, sound quality is messy and lacking in clarity and dynamics	Dual deck, auto reverse, track search, Dolby B & C		57
<b>Pioneer CT-880</b> £130	Average+ Average	Fair sound quality, veers in direction of maximising information, not sophistication. But output varies with tape-to-head contact and speed stability is iffy	Track search, Dolby B & C		57
<b>Pioneer CT-1380WR</b> £400	Good Good	Impossibly clumsy ergonomics are the main snag. There are plenty of features, some quite useful, and sound quality is detailed and lively	Dual deck, auto reverse, track search, Dolby B & C, remote control	R	57
<b>Proton AD-200</b> £139.50	Poor Poor	Sound quality is essentially on a par with many portables, and has nothing to do with high fidelity. The main problems are an unrelenting harshness and an almost total lack of detail	Dolby B & C		57
<b>Proton AD-300</b> £249.50	Average- Poor	High levels of flutter give sound a roughness and coarseness that rules it out for high quality work. The record and replay electronics certainly deserve better	Auto reverse, Dolby B & C		57
<b>Revox B215</b> £1461	Good Average+	Superb engineering and good sound, but lacking the subjective qualities that characterise the very best hi-fi equipment	Real-time counter, Dolby B & C, tape alignment adjust, remote control		52
<b>Rotel RD-830</b> £110	Average- Poor	A pretty fundamental if slightly dated design with little sonic merit but an attractive enough price	Dolby B		52
<b>SAE C102</b> £549	Average+ Good	Looking most unlike a cassette deck designed in the States and proving competitive in its price group. Not sonically that outstanding, however	Real-time counter, track search, Dolby B & C		52
<b>Sony TC-FX 150</b> £90	Average+ Average+	Recording and playing back on this deck itself gave acceptable results, whereas prerecorded stuff was a joke. But it's a good £90 worth	Dolby B & C	R	52
<b>Sony TC-W250</b> £149	Average- Average-	Rather rough and ready but a nonetheless honest and tolerably transparent sounding deck. Acceptable sound at the price	Dual deck, Dolby B & C		57
<b>Sony TC-R303</b> £179	Good Good	Bright, detailed but not especially refined sound quality, makes excellent Dolby recordings, but has slightly suspect pitch stability	Auto reverse, Dolby B & C, remote control		57
<b>Sony (WMD6C) ProWalkman</b> £249	Good+ Excellent	"One of the finest sounding cassette decks on the market today. A mandatory Best Buy, which also fits in your pocket"	Dolby B, & C	BB	52
<b>Sony TC-R503ES</b> £299	Good Good+	High grade auto-reverse cassette deck with a very clean, articulate sound. What might it have been like with a more stable transport?	Real-time counter, auto reverse, track search, Dolby B, C, HX Pro, bias adjust, remote control	R	57
<b>Sony TC-K444ESII</b> £349	Good Average	Even the best this deck has to offer is not truly commensurate with the price	Real-time counter, Dolby B & C, bias adjust, remote control		52
<b>Sony TC-K700ES</b> £499	Excellent Excellent	Firmly in the esoteric league, this is easy both to operate and to listen to. Best points: first class imagery, focus and stability	Auto reverse, track search, Dolby B & C, tape alignment adjust	R	52
<b>Tandberg 3014A</b> £1650	Good Very Good	Very exactly engineered but excessively complex to use. Test sample had poor response for prerecorded tapes, but recordings were unusually stable and clean	Real-time counter, track search, Dolby B & C, bias adjust, remote control, 3 Head		57
<b>Teac V-200</b> £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
<b>Teac V-210C</b> £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
<b>Teac W300</b> £115	Poor Average-	Sonically a mixed blessing, it does well with pre-recorded tapes but home-made recordings sound a little rough	Dolby B		52
<b>Teac W-310C</b> £129	Average- Average-	Dubbing performance is poor, especially using the high speed mode but normal record and replay performance standards are not too bad	Real-time counter, Dolby B, C, Hx Pro, bias adjust		52
<b>Teac R-515</b> £299	Average+ Average+	Expensive, this deck is basically a competent but pedestrian performer which will not fully satisfy the critical user	Real-time counter, auto reverse, Dolby B & C, bias adjust		57
<b>Teac V-970X</b> £499	Very Good Very Good	An excellent sounding deck with useful features (tape calibration etc) that fully justifies the price	Real-time counter, track search, Dolby B/C/dbx & Dolby HX Pro, bias adjust, remote control, 3 Head	R	57
<b>Technics RS-B305</b> £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	R	52
<b>Technics RS-T22</b> £150	Excellent Average	Good value for a twin deck machine, and fairly simple to use, but sonically no competition for single transport machines	Dual deck, auto reverse, Dolby B & C		52
<b>Technics RS-B505</b> £160	Average+ Average+	Neatly made recorder with Dolby HX Pro that sounds precise and stable, though sometimes a little processed and grainy too	Track search, Dolby B/C/HX Pro		57
<b>Technics RS-B605</b> £180	Good Average+	Mixed but generally good sound. Weakest points are dbx and prerecorded sound, best are Type IV (metal) recordings which sound sharp and precise	Track search, Dolby B/C/HX Pro & dbx	R	57
<b>Technics RS-B705</b> £250	Average Average-	3 heads for the price of two, but not the sound quality to go with them	Track search, Dolby B, C, HX Pro, bias adjust, 3 Head		52
<b>Technics RS-B905</b> £350	Good Good	Good, well set up cassette deck with a clean, accurate sound but some compression. dbx circuit sounds poor	Dolby B, C, HX Pro, dbx, bias adjust, 3 Head		57
<b>Technics RS-T80R</b> £400	Poor Poor	Flexible and pleasant to use but poor transports led to poor sound on our latest sample	Dual deck, auto reverse, track search, Dolby B, C, dbx		52

THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

# IN HI-FI

## AUDIOPHILES ONLY ?

*How often do you feel that hi-fi shops discriminate against you? You are someone who enjoys music and does not know the first thing about hi-fi equipment, but the "assistant" makes you feel that you live on a different planet. You cannot hear the difference between MegaAmp One and Thor Turbo III because they destroy your enjoyment of music. The assistant points to the 30 band graphic equaliser as the solution to all that's wrong with your ears.*

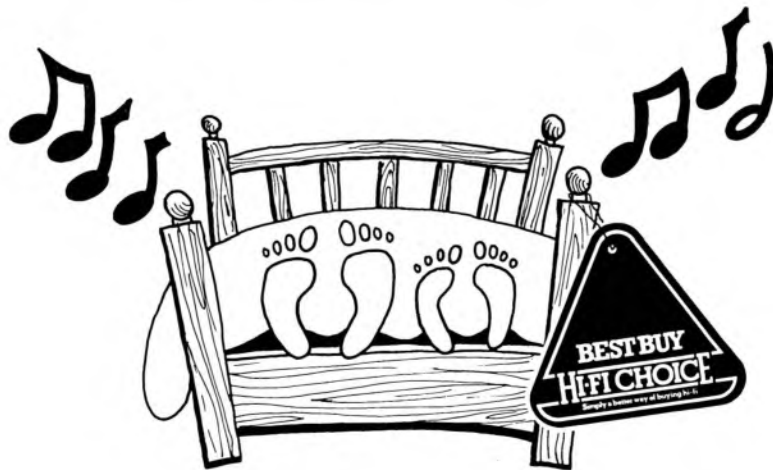
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# DIRECTORY

## CASSETTE DECKS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Yamaha KX-200 £140	Good— Good	Cheap, well-equipped and workmanlike with the sound quality less obviously processed than most – the whole is more than the sum of the parts	Track search, Dolby B & C, remote control	BB	52
Yamaha KX-300 £150	Average+ Average—	Uncommonly well equipped and adequately made and presented, this model turned out to be a disappointingly uncertain proposition on audition	Track search, Dolby B, C, HX Pro with 'play trim', bias adjust, remote control		57
Yamaha KX-400 £200	Good Good+	A highly commercial package with every widget under the sun. Happily it sounds good too.	Auto reverse, track search, Dolby B, C, HX Pro, remote control	R	52
Yamaha KX-500 £210	Very Good Very Good	An accomplished performer, strongest in the areas of pitch and spatial stability, but slightly rough around the edges	Real-time counter, track search, Dolby B/C/HX Pro with play trim, bias adjust, remote control	R	57
Yamaha KX-800 £330	Good Average	The present Yamaha range seems oddly inconsistent. This sophisticated model sounds fine (almost) but came a clear second best to the KX-500	Real-time counter, track search, Dolby B, C, HX Pro with play trim, bias adjust, 3 Head		57
Yamaha KX-1200 £500	Excellent Average+	A veritable rats' nest of buttons and dials, albeit well laid-out. This is nearly a great recorder, but lacks simplicity of sound	Real-time control, track search, Dolby B, C, dbx, HX Pro, bias adjust, remote control		52

## CD PLAYERS

This 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, remote volume control, audio 'tweaks', plus improved build and component quality control

Compared with many hi-fi components, CD players give impressive lab performance, though there are differences between players nonetheless. **Sound quality** variations are even more marked, particularly in a good quality system. As it behaves very like a pre-amp, there are no problems connecting a player to a normal amplifier. BB = Best Buy R = Recommended

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Acoustic Research CD-04 £290	Good Fair	Stylish but basic player, based on Philips 14-bit 4 x oversampling with respectable sound and remote control	Remote Control, headphones		51
ADC CD-250X £230	Good+ Fair	Well made and engineered, and average soundwise; trumpets could sound 'thin' though violins were liked so it may prefer Stephan Grappelli to Miles Davis	Skip and search, manual, repeat and 16-track programming	R	58
Arcam Delta 70 £500	Good Very Good	This solidly built British player has attractively understated presentation with straightforward, simple ergonomics. The very good sound quality shows a steady improvement over earlier samples.	Simple remote, headphones etc.		58
Aiwa CD-001 £350	Good Good	Pretty close to Recommendation, delivering a respectable sound quality and lab performance from an ergonomically attractive package, but ultimately failed to excel in any particular respect.	Track entry/volume remote, direct recorder connection etc.		58
Akai CD93 £700	Good Very Good	Undoubtedly a CD player of real class in build, presentation, lab performance and sound quality, but also a shade expensive for formal Recommendation – though that's not to dissuade lovers of black lacquer wood finish.	Track entry remote, menu display etc.		58
Cambridge Audio CD2 £600	Fair Very Good	The finest midrange in digital audio is sufficient grounds for Recommendation, though there remains a tinge of disappointment that the CD2 didn't get closer to big brother elsewhere, notably in the bass.	16x oversampling, remote control	R	58
Cambridge Audio 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
dbx DX5 £640	Good Poor	Sound quality proved a signal disappointment, though it's refreshingly unique in providing semi-pro post-production facilities that some users will undoubtedly relish.	Track entry/volume remote, compression, impact recovery, ambience etc.		58
Denon DCD-800 £300	Good Good	A generally good subjective and objective performance, a comprehensive range of remote controllable facilities, plus Denon's good reputation for build quality and field reliability.	Track entry remote, menu display etc.	R	58
Denon DCD-1500II £500	Very Good Very Good	The extra build quality over cheaper Denons is justified in terms of sound quality and lab performance, while the feature list is comprehensive and quite nicely presented	Track entry/volume remote, menu display etc.	R	58
Denon DCD 1700 £650	Good+ Very Good	The overall sound was strong and coherent approaching reference standards. Fine build quality and facilities make this a firm contender	Remote, skip, scan, headphones, programmable	R	58
Denon DCD-3300 £1200	Good+ + Very Good	Sounding tight and coherent though not significantly better than the cheaper 1700. Very well built and comprehensively equipped	Remote control, with volume, keypad programme, scan, search, headphones		51
Goodmans GCD-500S £150	Average— Poor	User-friendly but flimsy build quality and second class sonics make this poor value even at the price	Audible scan and track skip, programming		51/45
Harman Kardon HD100 £399	Average Poor	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 Fair	Generally competent, especially considering the price, this was well built and styled if lacking in some facilities – a good budget starter	Memory and repeat, plus the basics	R	58
Hitachi DA7200 £220	Good Fair	Distinctly more competitive than the '009, the '7200 remains undistinguished in the current state of compact disc technology and sound quality	Simple remote etc.		58
Hitachi DA007 £300	Average Fair	Unusually fitted with wooden end cheeks and comprehensively kitted out, but only average in sound quality	Full remote control, adjustable headphone output keypad programming		51
Hitachi 009 £300	Good Fair	Despite a pretty clean bill of technical health and an extensive range of facilities, the 009 failed to inspire the subjective enthusiasm needed for recommendation at its £300 price level	Random, 'roulette' play, menu display, complex remote		58
JVC XL-V1100 £659	Average+ Fair	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 DP990D £299	Average+ Fair	A good all-round package, but comparable sound quality can be found more cheaply elsewhere	Headphones, remote control, (manual override)		51
Kenwood CDP990SG £400	Very Good Good	Falling just short of the required subjective standard for Recommendation at this price level, this is a doughty player nonetheless, with a build quality and technical performance that arguably justifies its premium price.	Track entry remote, menu display, sprung feet etc.		58
Luxman D-90 £300	Fair Good	Despite technical ingredients that do not seem particularly inspiring, this is a nicely judged package that is ergonomically neater than most, with decent sound quality for the price and distinctive finish and presentation.	Track entry remote, programming etc.	R	58
Luxman D-100 £399	Average Poor	Sparsely equipped with a slightly old fashioned sonic character, offering little but physical weight for a quite high price	Remote control, skip, scan, headphones (variable)		51

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# DIRECTORY

## CD PLAYERS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Marantz CD273</b> £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
<b>Marantz CD873</b> £240	Good Very Good	Putting many 'audiophile CDs' to shame in terms of sound quality this proved another winner, though there was slight criticism of control accessibility at times	No remote control, but the usual skip, scan etc	BB	53
<b>Marantz CD-273SE</b> £240	Good+ Very Good	The Euro-tweaked version of the standard 273, this model fulfils pretensions to audiophile standards at a budget price	Manual control, skip and scan (audible), 20 track programming, repeat	BB	51
<b>Marantz CD873LE</b> £250	Good Excellent	This is the outstanding sound quality bargain in the latest review project, with discreet if plastic presentation and rather lightweight build.	Manual repeat, skip, scan, programming	BB	58
<b>Marantz CD94</b> £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	58
<b>Mission PCM7000</b> £400	Good Very Good	Stylish with a large informative LCD display this deserves recommendation on the basis of sound quality alone	Remote volume control, digital filtering	R	51/Coll
<b>Nakamichi OMS-1E</b> £400	Good Good	This neat enough player doesn't really follow the Nakamichi tradition of providing exceptional sound quality while at the same time perpetuates that of selling at an above average price	Simple remote etc.		58
<b>Nakamichi OMS-3E</b> £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
<b>Nakamichi OMS-4E</b> £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		51
<b>Nakamichi OMS-5EII</b> £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
<b>Nakamichi OMS-7EII</b> £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
<b>NEC CD610</b> £250	Good Very Good	Although NEC's CD players may take a bit of hunting down, the sound/price/build equation comes down firmly in favour of the 610 despite unspectacular lab performance.	Track entry remote, menu display etc.	BB	58
<b>NEC CD810</b> £400	Very Good Very Good	While the lab performance might have been better still, sound quality, ergonomics and build quality all point towards Recommendation for this rare but attractive example of the CD player maker's art.	Track entry remote, menu display etc.	R	58
<b>Nikko CD200R</b> £250	Fair Fair	This player delivers fair overall performance at what is presumably a fair price, but is insufficiently distinguished to warrant Recommendation.	Simple remote, skip, scan, programming etc.		58
<b>Philips CD371</b> £180	Fair Good	Though the build and presentation may not be to every taste, this is a fundamentally honest basic player that delivers more than enough of the sonic goods to merit a Best Buy rating.	Skip, scan, programming	BB	58
<b>Philips CD472</b> £200	Fair Good	Once again one cannot argue with the fine sound quality Philips make available at a modest price - with remote control and extensive facilities besides.	Simple remote, programming etc.	BB	58
<b>Philips CD473</b> £250	Good Good	In the forefront as regards sound quality, this is one of the best sounding Philips players yet; we were unable to catch it out on classical through Jazz program	Favourite track selection, remote control with volume, headphones etc	BB	58
<b>Philips CD800</b> £500	Very Good Very Good	The '880 is an impressive blend of luxury build quality and features at a far from extravagant price, and also delivers the subjective goods.	Volume remote, FTS, menu display etc.	R	58
<b>Philips CD960</b> £700	Good+ Very 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
<b>Pioneer PD5050</b> £200	Good Fair	Though this is neither our favourite budget CD player nor our favourite Pioneer, the 5050 delivers a well judged combination of good build, plentiful features and decent sound.	Track entry remote, skip scan etc.	R	58
<b>Pioneer PD-6050</b> £230	Good Fair	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	R	58
<b>Pioneer PD-M50</b> £280	Fair Fair	This machine would justify its price on features, sound and build quality even disregarding the autochange system.	6-disc autochanger, disc/track entry remote etc.	R	58
<b>Pioneer PD7050</b> £280	Good Good	This mid-priced Pioneer offered significant sonic and lab performance advances over the cheaper models in the range, more than sufficient to justify the extra cost.	Track entry/volume/fade remote, menu display etc.	BB	58
<b>Pioneer PD-M70</b> £399	Average Fair	A remarkable catalogue of features justify the price. Soundwise it rated just about average overall	Remote control, 6-disc autochanger, 8 programme memory, headphones etc		51
<b>Revox B226</b> £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
<b>Rotel RCD820BX2</b> £300	Good Very Good	Start with a good base and then make it sound better, the '820BX2 CD player maintains the reputation established by its namesakes, and comfortably deserves Recommendation.	Direct track entry remote etc.	R	58
<b>SAE D102</b> £700	Good Good	Considering the high price of this player, most of the innards seem fairly prosaic. Sound quality and lab performance are both respectable enough, but hardly justify the price premium involved, though styling is unusual.	Remote (inc volume), skip, scan etc.		58
<b>Sanyo CP17</b> £200	Average— Poor	A no-frills midi-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
<b>Sanyo CP27</b> £220	Fair Fair	System remote apart, the CP27 offers no improvement over the cheaper CP17 offers no improvement over the cheaper CP17, and neither of these systems-oriented players really are the subjective musical	LCD display, skip, scan, programming		58
<b>Sharp DX-R700H</b> £225	Average— Poor	A workmanlike player that does not offer exemplary lab or sound quality but which is well-built with good facilities and should perform well in use	Remote control, track selection keypad, skip, scan repeat programming		53
<b>Shure Ultra 06000</b> £495	Average+ Fair	Ergonomically well thought out with full function remote control, but not really scoring sonically considering its price	Remote control (full function inc volume)		51
<b>Sonographe SD1 (by CJ)</b> £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
<b>Sony CDP-M35</b> £170	Fair Fair	There is no disguising the lightweight plastic construction of this player, but the technical performance, sound quality, aesthetics and ergonomics all deliver more than one has the right to expect for £170.	Skip, scan, programming etc.	R	58
<b>Sony CDP-M20</b> £179	Average+ Fair	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

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# DIRECTORY

## CD PLAYERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Sony CDP-M55 £190	Fair Fair	£20 buys a remote control handset to operate your M35. Sony call it an M55 (see CDP-M35 review).	Simple remote, skip, scan, programming etc.	R	58
Sony 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-M75 £230	Good Good	This mid version of the 750 saves £20 on the price (see CDP-750 review).	Track entry remote, menu display etc.	BB	58
Sony CDP-310 £250	Average++ Fair	Fine build, facilities and healthy enough sound quality – recommended, but look around the range.	Remote control (+ usual)		51
Sony CDP-750 £250	Good Good	A seductive blend of fine presentation and solid performance, all at a very realistic price that should ensure its success.	Track entry remote, menu display etc.		58
Sony D100 £300	Average Poor	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 Fair	Exceptional build quality and presentation plus respectably good sound quality but some of its kin were preferred.	Remote control, 20 digit keypad, track access, programming.		51
Sony CDP-333ESD £600	Excellent Excellent	Sony's new '333 represents a triumph for their development department, effectively bringing down the entry level price to 'high end' compact disc replay.	Track entry remote, menu display etc.	R	58
Sony CDP 555es £1000	Very Good Very Good	Extravagant build quality, sophisticated features and near state-of-the-art performance, it competes effectively with more expensive models.	Remote control, 20 digit keypad, track access, programming.	R	51
Tandberg 3015A £1250	Good Fair	Very classy presentation is not enough to compensate for subjectively and objectively faring no better than standard and modified Philips packages that cost a fraction of its price.	Simple remote, skip, scan, programming etc.		58
Teac PD135 £180	Fair Fair	Particularly easy to use, this lags a little behind the pack when it comes to sound quality, but it still represents a valid alternative for those who find the presentation attractive.	Skip, scan, programming, repeat.		58
Technics SL-P111 £179	Good Fair	An 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.	R	58
Technics SL-P220 £229	Average++ Fair	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	58
Technics SL-XP5 £250	Average— Poor	A contender for the "World's smallest" title, this beautifully crafted miniature falls short in terms of sound quality.	Headphones, "high cut" filter, skip, search.		51
Technics SL-P520 £350	Good+ Fair	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-P990 £450	Excellent Good	An obvious technical tour de force, with ample engineering and build quality to justify the price, but some subjective reservations nonetheless.	Track entry remote, menu display, search dial etc.		58
Technics SL-P1200 £800	Good++ Good	Looking more like a desk workstation than a stackable component, this will appeal to the creative recordist and semi pro user. Sounded pretty good.	Headphones, remote control, search dial cueing, etc.		51
Yamaha CD-X5 £180	Average+ Fair	Good build quality, respectable lab performance, and decent enough sound delivery for your money.	Skip, scan, manual only, etc.		58
Yamaha CDX-900 £450	Good Fair	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+ Fair	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

## 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

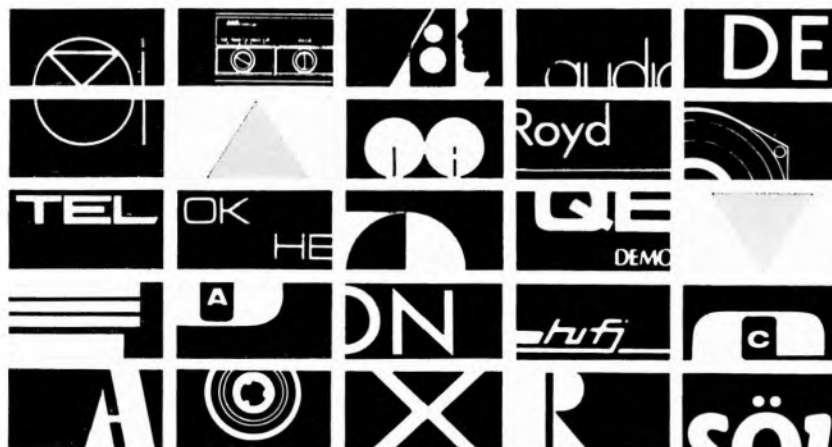
often selected merely to match a chosen amplifier cosmetically. However, the task they carry out is far from simple (or cheap), combining the skills of RF (reception) and audio (signal processing) engineering. The importance of the former will depend on local reception conditions, but money invested 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.

BB = Best Buy R = Recommended

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
A&R Arcam Alpha £149	Good Average++	Attractively classic British analogue tuner with sound quality comfortably better than most.	FM/AM Analogue.	BB	50
A&R Arcam Delta £270	Very Good Very Good	Hi-fi sound on FM, good on AM, a dependable British all-rounder.	6AM, 6FM presets FM/MW LW display manual tune.	BB	55
Creek CAS3140 £150	Very Good Good+	A true front-rank tuner, excellent ergonomics and audiophile sound quality albeit with the minor handicap of having FM only.	FM only.	BB	50
Denon TU 450L £130	Average+ Average+	Poor AM sound quality may be a deterrent but the FM performance fully merits recommendation.	FM/AM Digital.	R	50
Harman Kardon TU920 £299	Good Average	Rather weak sound quality for the price despite good lab test results.	16 presets, AM/FM, digital auto scan, active tracking.		55
Harman Kardon 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	55
Hitachi FT5500 II £230	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.		55
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.		55
Meridian 204 £495	Good+ Good	Pleasant sounding with a fine finish but does not make the grade at this price.	FM only, auto scan, digital, remote, clock timer.		55
Musical Fidelity TI £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	55

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# DIRECTORY

## TUNERS

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>NAD 4020B</b> £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
<b>Naim NAT 01</b> £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
<b>Nakamichi ST-7E</b> £750	Good++ Good+	Exceptionally good for weak-signal areas, and good all round	16 AM/FM presets, Schottz enhanced sensitivity, auto time digital		55
<b>Nikko NT-540</b> £154	Good Average	Lab report was promising but the sound was rather dated	8 presets, AM/FM, digital auto scan		55
<b>Onix B.W.D.1</b> £520	Good++ Good	Unexceptional sound despite the costly power supply option	FM only, manual digital, variable bandwidth		55
<b>Pioneer F551L</b> £100	Good+ Good+	High value budget tuner, very little to argue about (includes long wave)	12 FM, 12 AM presets, auto scan, digital and signal strength meter	BB	55
<b>Quad FM4</b> £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
<b>Revox B261</b> £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
<b>Rotel RT-830L</b> £110	Good+ Good	Fine sounding budget audiophile material, no frills, no fuss	Manual dial analogue, FM, MW, LW	BB	55
<b>Rotel RT-850L</b> £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
<b>Sansui TU-D99XL</b> £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
<b>Sony ST 500ES</b> £200	Good++ Average-	Disappointing sound quality but good lab performance. (Includes long wave)	10 AM/FM presets, auto scan digital		55
<b>Sony ST-S 700ES</b> £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
<b>Tandberg 3001</b> £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		55
<b>Technics ST-500L</b> £100	Average+ Average+	Fine RF performance and far FM sound at bargain price = Recommended tag. Alas the AM sounded as if it was coming "down a long furry tunnel"	FM/AM 16 station presets, scan	R	50
<b>Technics STG45AL</b> £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	55
<b>Technics ST-G7</b> £400	Very Good Good+	Muffled AM, but fine stereo FM quality and well built	16 presets, digital	R	50
<b>Yamaha TX-L400</b> £130	Good++ Good+	Good FM sound, let down by poor AM but otherwise good value	16 presets, auto scan, digital, FM, MW, LW	BB	55
<b>Yamaha TX-500</b> £150	Average+ Average	Under a gaudy coat, this sensitive tuner gave reasonable stereo results. However, the AM had again been thrown down a well	20 presets (10 buttons) digital		50

## CD MIDI SYSTEMS

So you want a hi-fi, but you don't want to make a fuss about it. A pre-packaged system with everything matching up and no aggravation may not rank with carefully chosen separates on **sound quality**, but there's no denying the attractiveness or popularity of this approach - the market for pre-packaged component hi-fi systems is at least as big as that for separate items, even ignoring the vast numbers of low-cost single unit stacker systems.

The arrival of compact disc led to a new fashion for shelf-standing compact systems, or 'midis' as

they are known in the trade, as a replacement for earlier floor-standing rack systems (themselves the upmarket development from music centres). Only some 330mm wide, midis can more or less match full-size (430mm) rack components for performance, and are certainly cheaper to make, ship, sell and buy.

Whereas specialist hi-fi is moving steadily towards ultra-simple 'no frills' components, midi systems tend to be sold on a feature count at a price point, usually with little opportunity for

demonstration and comparison. Our test programme includes extensive auditioning and lab testing, while making allowance for the different aspirations of designers and expectations of users. Key features valued highly by customers include system remote control, automatic switching, double 'dubbing' cassette decks, and elaborate equaliser tone controls. And the top end of the market is developing with surround sound audio/video-ready packages.

BB = Best Buy  
R = Recommended

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Aiwa V-990DX</b> £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
<b>Aiwa V1500DX</b> £939	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
<b>Akai 990</b> £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
<b>Binatone Laser CD System 2000</b> £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
<b>Ferguson HF03</b> £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
<b>Fidelity MS202</b> £340	Bad Bad-	Very cheap and poorly finished. Thin, raw sound to match appearance and build	Twin cassette, one-piece system		54
<b>Fisher Midi System M46CD</b> £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
<b>Fisher Midi System M56CD</b> £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
<b>Fisher 2400</b> £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
<b>Goodmans 5100</b> £350	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
<b>Goodmans 5200</b> £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
<b>Goodmans Maxim-Midi System</b> £520	Average Average+	De-luxe version of 5200 system - very good value for money and readily upgradeable. Somics rough but OK and speakers good; CD crude	All separates with twin cassette	R	54
<b>Hitachi MD280</b> £430	Average- Average-	Although the CD player tried to change our mind this system was felt too poor a contender for anything but thumbs down	Remote unit TT, twin cassette, no spare inputs		54
<b>Marantz Studio System</b> £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
<b>Marantz Concert System</b> £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

# DIRECTORY

## CD MIDI SYSTEMS

MODEL PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
<b>Marantz MX673CD System</b> £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
<b>Mitsubishi CD51</b> £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
<b>Mitsubishi E602CD</b> £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
<b>Mitsubishi 100R</b> £650	Average Average +	A pretty good package, flawed by 'tinny' loudspeakers, but having a far turntable - a rarity in this category of equipment.	Remote, Multidisc CD, Twin.	R	Systems
<b>Philips FCD 565</b> £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
<b>Pioneer S-7000</b> £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
<b>Pioneer System 10</b> £678	Average Average -	Loudspeakers sound cluttered, and cassette unstable and thin, but tuner and CD are fine.	All separates, twin cassette.		54
<b>Pioneer System 30</b> £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
<b>Sanyo W40CD</b> £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
<b>Sharp SA-CD800H</b> £700	Average Average -	A superficially high grade, high spec system, the SA-CD800H actually sounds clean but a little 'synthetic'.	One-piece, 6-disc CD, no T/T.		54
<b>Sony Compact 310</b> £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
<b>Sony Compact 510</b> £599	Average + Average +	Very good control layout. Shabby loudspeakers not up to otherwise uniformly good system.	Remote, twin cassette.	R	54
<b>Sony Compact 610</b> £700	Average Average -	Inconsistent. Same turntable used in much cheaper Sonys gave 'iffy' record reproduction. Cassette likewise.	Remote, 'shuffle' play CD, twin cassette.		54
<b>Sony FH1215CD</b> £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
<b>Sony Compact 710</b> £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
<b>Sony Compact Series 90</b> £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
<b>Technics X800CD</b> £400	Average + Good	Very unstable sounding cassette lets system down badly. Tuner a bit dull, but remainder OK.	No T/T, twin cassette.		54
<b>Technics X820</b> £580	Average Average	Tuner and CD player work well but the speakers sound ragged.	Remote, auto record starts.		54
<b>Technics X840</b> £730	Good Good	Expensive, but well made, good sounding system. Turntable, tuner & CD player similar to X820.	Full remote separates system.	R	54
<b>Technics X880</b> £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
<b>Toshiba V17CD</b> £399	Average Average +	Loudspeakers are the weak link, with cassette and turntable also indifferent. Tuner and CD worked well though, so reasonable value for money.	Twin cassette, semi-auto T/T.	R	54

## HEADPHONES

There are a variety of different approaches to headphone design, and examples of each turn up in this group. Amongst the more expensive esoteric models, electrostatic drivers are used in square open-backed phones such as the Jeklin and Stax models. The majority of these come with some form of transformer which takes the signal initially from the speaker terminals on the amplifier. The actual speaker cables then travel from this unit via a

bypass switch to the loudspeakers.

The more down to earth models feature dynamic drivers in circular open-backed designs. The advantage of open backs seems to be a correspondingly open sound and a less claustrophobic feel to the music. One can also of course hear external noises and irritate people on public transport.

The third category are closed-back designs,

which are useful in situations where it is necessary to block out background noise.

Another means of distinguishing different types is the way they sit on your head or ears. There are three styles: circumaural models enclose the ear and rest on the side of the head; supra-aural designs press on the outer ear (pinna), and intra-aural types rest inside the ear and are popular amongst users of personal stereos.

NAME PRICE	SOUND CDMFORT	COMMENTS	TYPE	VALUE	BACK ISSUE FULL REVIEW
<b>Audio Technica ATH 909</b> £54.95	Average Average	Quite impressive in the treble though a bit bass shy, the 909s worked well at highish levels.	Circumaural, semi-open, dynamic.		55
<b>Audio Technica ATH 910</b> £64.95	Good Average	The closed-back 910s are an improvement on the 909s with a nice rhythmic quality rarely found with headphones.	Circumaural, closed-back, dynamic.	R	55
<b>Beyer DT330 Mk II</b> £45	Poor Good	Not the most revealing 'phones encountered, the 330s were nevertheless enjoyable and rarely offended.	Circumaural, semi-open, dynamic.		55
<b>Beyer DT550</b> £69	Good Good	On their own the 550s sound articulate with a slightly 'gritty' treble and 'keen' midrange, not suitable for headbangers!	Circumaural, semi-open, dynamic.		55
<b>Beyer DT990</b> £130	Very Good Very Good	The 990s are definitely a significant pair of dynamic headphones; they have a smooth and yet revealing, neutral sound that is hard to criticise.	Circumaural, open-back, dynamic.	R	55
<b>Jeklin Float Model One</b> £75	Very Good Good	Whilst very unusual in appearance the Floats give remarkable sound quality and openness at a reasonable price.	Circumaural-ish, open-back, dynamic.	BB	55
<b>Jeklin Float Electrostatic</b> £375	Excellent Good	One version of the state-of-the-art, these electrostatics have an openness of sound rarely found in the breed, with good dynamic range to boot.	Circumaural-ish, open-back, electrostatic.	R	55
<b>Quart PMB 25II</b> £40	Good Good	Despite a somewhat unconventional suspension system the 25s put in a convincing and enjoyable performance with warm yet lively balance.	Circumaural, open-back, dynamic.	BB	55
<b>Quart PMB 65</b> £69.90	Good Good	Quite revealing and neutral albeit with the usual closed back sound, this competes well with more established models.	Circumaural, closed-back, dynamic.	R	55
<b>Sennheiser HD30</b> £12.99	Poor Good	Built specifically for the personal stereo market these small and light Sennheisers have a slightly synthetic sound, but are an upgrade on the average Walkphones.	Supra-aural, semi-open back, dynamic.		55
<b>Sennheiser HD410SL</b> £26	Good Good	The 410s have a tight clear presentation underlined by a slightly forward top end, and can be a bit raw with less than adequate sources.	Supra-aural, open-back, dynamic.	BB	55

## THE WORLD'S NO 1 GUIDE TO BUYING HI-FI

# DIRECTORY

## HEADPHONES

NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Sennheiser HD420SL £45.50	Good Good	The 420s gave a full and tangible quality to instruments and voices, whilst not the most revealing headphones around they would suit slightly brash sources	Supra-aural, open-back, dynamic		55
Sennheiser HD540 Ref Gold £150	Very Good Good	The 540 Golds prove that dynamic headphones can be subtle, informative and capable of creating a remarkable sense of space	Circumaural, open-back, dynamic	R	55
Sony MDR-E272EX £30	Average Poor	These in-ear 'fontopid' type phones are intended for upmarket personal stereos, and sound reasonably good for their size, but are plagued by hiss	Intra-aural, 'open-air', dynamic		55
Sony MDR-A60 £40	Poor Poor	Unusual lightweight intra-aural types, the A60s are pretty stylish but failed to deliver the goods sonically	Intra-aural, 'open-air', dynamic		55
Sony MDR V4 £50	Fair Good	These folding closed-back phones are nicely made but didn't sound too great, the tonal balance being on the 'cold' side	Supra-aural, closed-back, dynamic		55
Sony MDR V6 £70	Good Very Good	A lot more civilised and dynamic than the V4s, these were pretty good for their type and fold up to boot	Circumaural, closed-back, dynamic	R	55
Stax SR34 £140	Very Good Fair	The least expensive Stax headphones around, the SR34s are lively and rhythmic with good tight bass and a sweet midrange	Supra-aural, open-back, electret		55
Stax SR Gamma £199.85 (SRD-6 Adaptor £100)	Very Good Very Good	The next model down the Stax range from the Lambda, the Gamma is an excellent headphone with little to criticise but the price	Circumaural, open-back, electrostatic	R	55
Stax SR Lambda Pro £360 (SRD-7SB Mk 2 Adaptor £185)	Excellent Very Good	A bit of an industry reference the Pros are frighteningly revealing, bringing across more information than loudspeakers costing twice as much	Circumaural, open-back, electrostatic	R	55

## PERSONAL STEREO

Whilst not exactly hi-fi components, personal stereos probably play more music to more ears than CDs and LPs combined and as such should not be ignored. Since the introduction of the Sony Walkman in the early eighties, more and more people have adopted these diminutive machines and consequently the market has become saturated with a vast assortment of players. This is obviously good for competitive pricing but bewildering if one is trying to select a reasonable machine. Prices start incredibly low (around £10) and wind themselves up

to close on £300, although the sub-£50 sector is the most popular.

There seems to be almost no end to the features that appear on personals, some of them have specifications like a midi system! Graphic equalisers are very popular, for what they're worth, and Dolby is fairly common on the £40 plus models, though the quality of noise reduction systems seems to be pretty poor. You can expect more useful features such as autoreverse and ferric/chrome-metal tape type compatibility on many machines and

some even record, but usually only from a microphone or built in radio where it exists.

The sound quality available tends, not surprisingly, to increase with the price of the machines but even quite expensive players are prone to wow with critical material, so if classical piano music is your bag then steer clear of the cheaper (sub £50) players.

Note that our value judgements relate to the personals group as a whole, and are not comparable with separate hi-fi ratings.

MODEL NAME PRICE	LAB SOUND	COMMENTS	FEATURES	VALUE	BACK ISSUE FULL REVIEW
Aiwa HS-G35 MkII £35	Poor Fair	A reasonable player for the price but not well suited to classical material and let down by the headphones	Autoreverse, graphic EQ, types I & II		56
Aiwa HS-J36 £89	Good— Average	Comprehensive facilities and reasonable sound are no mean feat for the price.	Dolby, autoreverse, types I, II & IV, AM/FM, recorder	R	56
Aiwa HS-PX101 £149	Average— Good	A very slick little number with soft touch controls and remote control headphones	Dolby B, C, autoreverse, types I, II & IV	R	56
Aiwa HS-J101 £170	Poor Good—	Let down by cheap headphones, this is otherwise a quite nice machine with radio presets and electronic transport controls	Dolby, autoreverse, graphic EQ, tape types I, II & IV, AM/FM, recorder		56
Ferguson 3T46 £35	Very Poor Poor	Not particularly subtle but having reasonable speed constancy, it's OK with most material but can get painful	Autoreverse, AM/FM		56
JVC CX-7 £111	Poor Average+	Quite attractive and unusual in appearance, the CX-7 sounded pretty good and came close to recommendation	Dolby, autoreverse, types I, II & IV, rechargeable		56
JVC CX-R7K £188.77	Poor Good	Maximum feature count from this expensive JVC, including soft touch record and stereo microphone. Sound quality, however, could be better for the price.	Dolby, autoreverse, types I, II & IV, AM/FM, record, rechargeable		56
Panasonic RX-SA78 £100	Very Poor Fair	Not particularly good value with poor speed stability and irritating hiss levels, the latter can be improved with better headphones.	Autoreverse, graphic EQ., AM/FM		56
Philips D6658 £30	Very Poor Poor	The low price limits sound quality, and this is not a spectacular machine, but it does a reasonable job nonetheless	Graphic EQ, AM/FM		56
Saisho PS90R £40	Poor Poor	A bit of a jumble of features and gadgets, the PS90R has on-board speakers, an extending aerial and even records, but sound quality is dubious	Graphic EQ, types I, II & IV, AM/FM, recorder		56
Sanyo MGR-77 £35	Very Poor Very Poor	Rather a basic machine with a raw edgy sound, not helped by poor speed stability	Graphic EQ, AM/FM		56
Sanyo MGR-87 £50	Very Poor Fair	The 87 came up with a slightly fast but rhythmic sound. Although lacking in finesse, it worked OK with pop material	Autoreverse, graphic EQ, AM/FM		56
Sanyo MGP 600D £50	Average+ Average—	With styling aimed at the fairer sex the 600D sounded a little better than the similarly priced MGR-87. Lacking in clarity, it was still quite endurable	Dolby, autoreverse, graphic EQ, types I, II & IV		56
Sanyo JJ-P4 £100	Poor Good	Claimed by its makers to be the world's smallest personal stereo the JJ-P4 is a tasty looking object that's capable of good sounds to boot	Dolby, autoreverse, tape types I, II & IV, rechargeable		56
Sony WM-34 £40	Poor Average	This straightforward no frills Walkman makes pretty plausible sounds at a reasonable price and apart from the Walkman Pro was the only model to earn a Best Buy rating	Dolby, types I, II & IV	BB	56
Sony WM-F38 £70	Average— Average	A quite stylish player, the F38 delivered good performance for the price and also had reasonable headphones	Dolby, types I, II & IV, AM/FM	R	56
Sony WM-F63 £100	Average— Average—	This attractive Sports Walkman is nicely built but sonically flawed by rather hissy intra-aural headphones	Dolby, autoreverse, types I, II & IV		56
Sony Walkman Pro £249-£289	Good+ Excellent	One of the finest sounding cassette decks on the market today. A mandatory Best Buy, it takes other personals to the cleaners (except on weight and power consumption)	Dolby B, C, types I, II & IV, record, line in/out, varispeed		52/56
Toshiba KT-4027 £35	Very Poor Very Poor	Not a very wonderful machine, the 4027 sounded pretty appalling with all but the most unsubtle music	Graphic EQ, AM/FM		56
Toshiba KT-4047 £60	Average Average	This model proved capable of making the most of better recordings, and sounds reasonably tuneful	Dolby, autoreverse, graphic EQ, types I, & II, AM/FM	R	56

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# GLOSSARY

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

**AM:** Amplitude modulated; see 'Medium Wave'

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

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

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

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

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

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

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

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

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

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

**BASS:** Lower part of the frequency spectrum.

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

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

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

**BIAS:** (*tape*) This refers to a high frequency current passing through the record head which allows the audio current also passing through the head to produce reasonably linear magnetisation of the tape at all levels permitted by the 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<sup>-6</sup> 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 $\mu$ s or 120 $\mu$ 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- ( $\mu$ ):** Prefix for units meaning one millionth of.

**MICROSECONDS ( $\mu$ 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 *cross-talk*.

**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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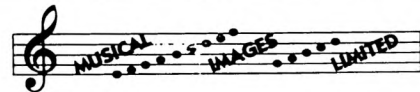
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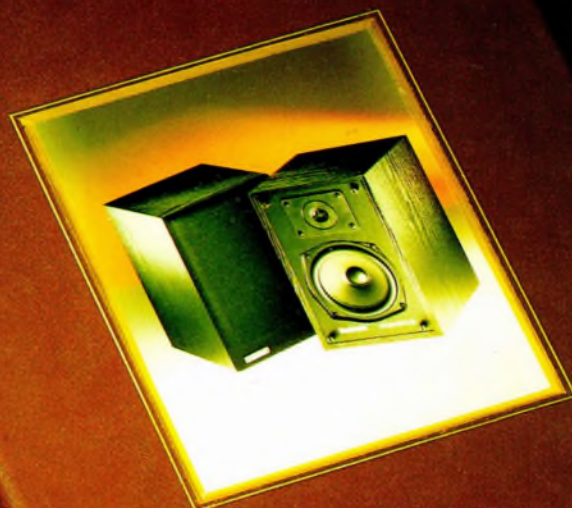
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